

# International Journal of Medicine and Medical Sciences

Volume 8 Number 12 December, 2016

ISSN 2006-9723



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Full Length Research Paper

## Point prevalence study of antibiotic use in hospitals in Butembo

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Received 6 May, 2016; Accepted 4 October, 2016

**Inappropriate use of antibiotics is known as an important risk factor in the development of antibiotic resistance which increases the morbidity and mortality. We aimed to determine the prevalence and characteristics of antibiotic use in hospitals. A prevalence survey was conducted in 11 hospitals from 1<sup>st</sup> to 31<sup>th</sup> October 2014. In this study, from 700 patients investigated in this study, 476 received at least one antibiotic for their treatment; the prevalence of the antibiotic use was 68%. Most of patients were female (59.1%) and aged between 16 and 30 years. The most attended service was internal medicine (34%). 19 diseases were identified, malaria exhibited the highest prevalence (21.6%) followed by surgical site infections (10.7%), urogenital infections (8.6%), and infectious symptoms (8.4%) and bronchitis (8%). The 476 treated patients received a total of 667 antibiotic drugs (1.4 antibiotics per patient). The most prescribed antibiotic was ampicillin (35%) followed by gentamicin (13.6%), amoxicillin (13.5%), ceftriaxone (11%) and metronidazole (10.3%). The prevalence of combined therapy was 34.9% among patients who received more than one antibiotic. The most common route of administration was the intravenous (68.2%) and the most pharmaceutical form used was the powder for injection (51.1%). The prevalence of antibiotic use in Butembo hospital environment was very high which could be a risk factor for the development of resistance in case of inappropriate use of antibiotics.**

**Key words:** Survey, prevalence, antibiotics, hospitals, Butembo, Democratic Republic of Congo.

### INTRODUCTION

Antibiotics are molecules that were since discovered and applied for therapy, have changed completely the evolution of infectious diseases. They have brought considerable benefits for the treatment of infectious

diseases. The disappearance of certain forms of serious bacterial diseases, the decrease of common infectious disease complications, the treatment of infectious diseases are largely attributed to antibiotic although the

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improvement of socio-economic and hygienic conditions also contributed to the reduction of morbidity and mortality from infectious diseases in industrialized countries (Agence du Médicament, 1999). In modern medicine, antibiotics dominate in drug prescriptions. Many prescribers use antibiotics to treat or to prevent microbial infections. Many people who have taken these drugs also engage in self-medication.

Unfortunately, the hope provided by this therapeutic class was very short and the appearance of antibiotic-resistant bacteria reduces the efforts made by the pharmaceutical industry that provided newer and powerful antibiotics (Kiouba, 2002). Excessive and/or inappropriate use of antibiotics brought the development and expansion of bacterial resistance to these products (Fishman, 2006; World Health Organization (WHO), 2011). The link between antibiotic use and bacterial resistance is well established (Austin et al., 1999). Antibiotic resistance reduces the effectiveness and treatment options and increases the morbidity and mortality risks.

In developed countries, monitoring systems for the appearance of bacterial resistance to antibiotics are available and monitoring surveys are conducted in order to provide updated data. Thus, in the United States of America, a survey of hospitalized patients gave a prevalence of 75% (Magill et al., 2014; Hecker et al., 2003); and, in Europe, Eurosurveillance regularly publishes antibiotic use surveys (Ansari et al., 2009; Zarb et al., 2011; Ciofi et al., 2008). In addition to a high prevalence, these studies also highlight the inappropriate use of antibiotics for therapy.

In developing countries such as the Democratic Republic of Congo with poor socio-economic conditions and insufficient sanitation, the antibiotic use patterns in health facilities are the subject of much criticism because in most cases it is made probabilistically. In hospitals, resistant bacteria spread easily and are largely responsible for nosocomial infections. Aiming the patients' well-being, physicians often prescribe empiric therapy through very broad-spectrum antibiotics, which are recent and expensive. This strong selection pressure accelerates the acquisition of resistance factors (Alfandari et al., 1997).

Although epidemiological studies on the prevalence of certain diseases have been conducted, the literature showed few gaps on the antibiotic use literature studies in health facilities are not explored enough in the Democratic Republic of the Congo and the information available from hospital and community is little. Thus, the objectives of this study were to describe the prevalence and characteristics of the use of antibiotics in hospitals of the Butembo city, Democratic Republic of Congo. This study helps to know the most prescribe antibiotics and exposed to possible resistance, but also to consolidate the collection of antibiotic consumption. Also, our findings may support the development of strategies to promote

the rational use of antibiotics.

## METHODS

This study was conducted at hospitals in Butembo City, Democratic Republic of Congo. These hospitals were grouped into two health zones of Butembo. The University Clinics of Graben, the Hospital of Baptist Community in Central Africa, the Light Clinic, the General Hospital of Kitatumba and the Makasi health Center are in Butembo health zone while the hospital Matanda, the General Hospital of Katwa, the Hospital Kivika, the Wanamahika Hospital, the Ngothe Hospital and the Medical Center HOLY FAMILY are in Katwa health area.

For each selected hospital, a staff officer, who could be a nurse or a doctor, was identified to help in data collection. One day was set in advance with the staff of each hospital for the investigation. The selected patients were those hospitalized for at least 24 h and who were present at 8:00 am in one of the hospital's services on the day the survey was programmed. Our investigation was conducted in a period from 1 to 31 October 2014.

Our sample excludes patients hospitalized for less than 24 h or before the day of our investigation.

Two different groups were set up, one for all patients who were receiving at least one antibiotic on the day of the investigation and another for patients who did not receive any antibiotic for their treatment.

The data were collected from patients' cards with the following variables: The age, the gender, the date of hospitalization, and the prescribed drugs (antibiotics and others drugs), and the number of hospitalized patients who received at least one antibiotic, antibiotic used (identity, number, routes of administration, dose), therapeutic indications. The patient charts were a valuable tool to gather this information. The Excel was used for the prevalence calculation. The prevalence was calculated as a ratio between the number of the patients receiving at least on antibiotic for their treatment and the number of all hospitalized patients.

## RESULTS

A total of 700 patients were hospitalized in hospitals that participated in the study and among them 476 patients were eligible for the following steps of this investigation because their treatment had one or more antibiotics. The prevalence of the antibiotic use in hospitals was 68% (Table 1). This prevalence is slightly higher in the Katwa health zone, in female subjects, among children and young people. The distribution of patients treated with antibiotics is summarized in Table 2.

Although, the highest frequencies of antibiotic use occur from 16 to 30 years old, the age group of 31 to 45 years exhibited the highest prevalence.

The population of patients who was treated with antibiotics was unevenly distributed in the hospital units (Table 2). Katwa health zone comprised more patients than Butembo health zone. The highest admission frequency was observed in Ngothe Hospital (13%) followed by the Wanamahika Hospital (11.6%) and Matanda Hospital (10.7%). The minimum was observed in Makasi Health Center (4.8%). The majority of patients was hospitalized in internal medicine (34%), followed by

**Table 1.** Prevalence of antibiotic use in hospitals in the city of Butembo.

Patients characteristics		Number of patients	Number of patients treated with antibiotics	Prevalence (%)
Health Zone	Butembo	265	179(37.6%)	67.54
	Katwa	435	297(62.4)	68.27
		<b>700</b>	<b>476(100%)</b>	<b>68</b>
Gender	Male	288	195(40, 9%)	67.8
	Female	412	281(59, 1%)	68.2
		<b>700</b>	<b>476(100%)</b>	<b>68</b>
Age (years)	0-15	180	116(24, 3%)	64.44
	16-30	319	220(46.2%)	68.96
	31- 45	125	88(18.5%)	70.4
	46-100	76	52(11%)	68.42
		<b>700</b>	<b>476(100%)</b>	<b>68</b>

**Table 2.** Distribution of patients under antibiotic treatment by hospital.

Hospital	Number of patients	Percentage
NGOTHE Hospital	62	13
WANAMAHIKA Hospital	55	11.6
MATANDA Hospital	51	10.7
General Hospital of Kitatumba	47	9.9
Medical Center Holy Family	45	9.5
Hospital of Baptist Community in Central Africa	42	8.8
General Hospital of Katwa	42	8.8
Hospital Kivika	42	8.8
University Clinics of Graben	38	8
Light Clinic	29	6.1
MAKASI Health Center	23	4.8
Total	476	100

**Table 3.** Distribution of patients under antibiotic treatment by service.

Service	Number of patients	Percentage
Internal Medicine	162	34
Pediatrics	106	22.3
Maternity	120	25.2
Surgery	88	18.5
Total	476	100

maternity (25.2%), pediatrics (22.3%) and surgery (18.5%) (Table 3).

Among patients receiving antibiotics, the most encountered indications observed (21.6%) was malaria. Other indications were surgical site infections (10.7%), urogenital infections (8.6%), infectious syndrome (8.4%) and bronchitis (8%) (Table 4). A variety of active molecules were represented in this antibiotic therapy, including beta-lactams, aminoglycosides, macrolides, quinolones with the predominance of beta-lactam

molecules (penicillins and cephalosporins). The most commonly prescribed antibiotic was ampicillin (35%) followed by gentamicin (13.5%), ceftriaxone (11%) and metronidazole (10.3%) (Table 5). A total of 667 molecules of antibiotics were administered in 476 patients; 1.4 antibiotic molecules per patient. Antibiotics are prescribed either alone or in combination. It was found that the antibiotics were prescribed alone for 65.1% and in combination of two antibiotics for 30.3%. Associations of more than three antibiotics are almost non-existent



**Table 4.** Distribution of patients under antibiotic treatment by diagnosis.

Diagnosis	Number of patients	Percentage
Malaria	103	21.6
Surgical site infections	51	10.7
Urogenital infections	41	8.6
Infectious syndrome	40	8.4
Bronchitis	38	8
Typhoid fever	34	7
Gastroenteritis	30	6.3
Gastritis	24	5
Amoebiasis	21	4.4
Antibiotic prophylaxis	18	4
UTI	18	4
Threatening infection abortion	12	2.5
Pneumonia	12	2.5
Edematous syndrome	10	2
Endocarditis	9	1.9
Meningitis	6	1.3
Secondary infection to diabetes	4	0,8
Tuberculosis	3	0,6
Neonatal Infection	2	0,4
<b>Total</b>	<b>476</b>	<b>100</b>

**Table 5.** Distribution of antibiotics used.

Antibiotic name	Number	Percentage
Ampicillin	223	35
Gentamicin	91	13.6
Amoxicillin	91	13.6
Ceftriaxone	73	11
Metronidazole	69	10.3
Ciprofloxacin	35	5.2
Erythromycin	21	3.1
Penicillin	13	2
Augmentin	9	1.35
Cefotaxime	9	1.35
Doxycilline	8	1.2
Azytromycine	6	1
Pentazocine	3	0.4
Cloxaciline	2	0.3
Others (Azytromycine, kanamycin, extencilline and cefixine)	5	0.7
<b>Total</b>	<b>667</b>	<b>100</b>

(Table 6). Antibiotics prescribed in hospitals in the city of Butembo were mostly the powder for injection (51.1%). Other dosage forms used are the tablet (20%) and the solution for injection (17%). The most common route of administration was intravenous (68.2%) followed by oral route (31.3%). In most cases, antibiotics are prescribed for a period of 1 to 7 days (93.4%) (Table 7).

## DISCUSSION

The survey on the prevalence of antibiotic use in hospitals in the city of Butembo revealed some important information. It was used to assess which antibiotics are currently used in hospitals; it also provide knowledge about the most represented antibiotics and the related

**Table 6.** Distribution of patients according to the number of prescribed antibiotics.

Number of prescribed antibiotics	Number	Percentage
1	310	65.1
2	144	30.3
3	19	4
4	3	0.6
<b>Total</b>	476	100

**Table 7.** Distribution of antibiotics according to the dosage form, the route of administration and the duration of use.

Variable	Parameters	Number of patients	Percentage
<b>Dosage form</b>	Powder for injection	343	51.1
	Tablet	132	20
	Solution for injection	113	17
	Capsule	66	10
	Syrup	11	1.6
	Eye drops	2	0.3
	<b>Total</b>	667	100
<b>Duration of use (days)</b>	1-7	623	93.4
	8-10	39	5.85
	11-15	5	0.75
	<b>Total</b>	667	100
<b>Route of administration</b>	I.V	455	68.2
	Oral	209	31.3
	Ocular	2	0.3
	I.M	1	0.2
	<b>Total</b>	667	100

diseases, the age and the gender of patients; the dosage forms and the most common routes of administration. Shows a high use of antibiotics after emergence of proven or assumed bacterial infections. These results confirmed the conclusion of previous studies (Vlahović-Palcevski et al., 2007; N'diaye, 2003), but they are higher compared to the results obtained by other studies (Zarb et al., 2011; Robert et al., 2012; Toure et al., 1997). The high use of antibiotics might increase the risk of bacterial resistance to some antibiotics; however, it is important to note that the difference between the prevalence found in this study and in previous studies does not necessarily indicate that there is inappropriate use of antibiotics where prevalence is high. These differences might be due to the difference in populations of patients (number, profile) or the prevalence of infectious diseases in the hospitalized population.

Among the antibiotics, ampicillin, a beta-lactam was the most prescribed antibiotic with 35% of cases, followed by gentamicin (13.5%), ceftriaxone (11%) and metronidazole

Among 700 patients, 476 (68%) were receiving antibiotics at the time the survey was conducted. This (10.3%). The choice of these antibiotics is usually probabilistic because the sensibility tests were not conducted prior the antibiotic prescription and in many hospitals the antibiotic use guidelines were not available. Thus, it is feared that only the experience of practitioners is not sufficient to prevent the emergence of resistance to antibiotics used.

The ways of prescriptions encountered in the two health zones of Butembo city are not identical to those found in hospitals in France (Robert et al., 2012). Indeed, in France, 3rd generation cephalosporins and beta-lactam associated with beta-lactamase inhibitors accounted with 44%, while in the present study is ampicillin, an aminopenicillin is prescribed by 35%. But the results found in Mali by Toure et al. (1997) also present ampicillin (57.54%) followed by gentamicin(23.13%), metronidazole (6.5%), lincomycin (2.6%) as the first choice of prescribers. N'diaye (2003)

revealed the predominance of the penicillin G (39.5%), followed by cotrimoxazole (22%), chloramphenicol (12.24%) and penicillin V (6.39%). Kiouba (2002) identified amoxicillin (19.4%), followed by ciprofloxacin (14.13%), metronidazole (12.8%), amphotericin B (12.8%), cotrimoxazole (10.6%) and gentamicin (7.3%). The difference in the prevalence of a given antibiotic likely depends on infectious pathologies present in the area of study and prescribing habits.

In addition to ampicillin, 17 other molecules of antibiotics are regularly prescribed in Butembo. The 18 molecules were prescribed in 667 lines of prescription with an average of 1.4 antibiotics per prescription. N'Diaye (N'diaye, 2003) got 399 lines of prescriptions for 263 patients (1.5 antibiotics per prescription) and Musey et al. (1990) 920 lines of prescriptions for 720 patients (1.27 antibiotic per prescription). More than half of hospitalized patients were under one antibiotic (65.1%) and 30.3% were treated with two antibiotics. These results are similar to those obtained by Jarno and Piednoir (2010) which shows a frequency of 76% for patients on a single antibiotic therapy and 20.5% for patients on two antibiotic therapies. However, it is also possible to find small values of single antibiotic therapy (Kiouba, 2002).

More than 68.2% of the antibiotics were prescribed by intravenous route, which is in line with the value found by Sissiko (2000) while the results obtained by Jarno and Piednoir (2010) and Ouedrago (1997) show a higher frequency antibiotic prescribed by oral route. The dosage form of antibiotics used is dominated by the powder for injection with 51.1%, followed by the tablet form with 20%.

This study presents the ways that antibiotics are used to solve health problems in the city of Butembo. Provided data will be useful to improve the healthcare system in this city by promoting the rational antibiotic use and the susceptibility test prior prescription of antibiotics. However, some limitations of this study should be noted. Indeed, the data collected in this study are from a non-random sample, but rather from a list of the major hospitals in the city of Butembo. The current data can therefore not be representative the situation in all hospitals of the city of Butembo especially the smallest ones.

## Conclusions

The present study determined the prevalence of antibiotic use in hospitals in the city of Butembo in order to contribute to the rational use of antibiotics. This is the first study to characterize practices in the use of antibiotics in hospitals in the city of Butembo. The data collected in this survey will allow a better use of the limited resources of our country in the health field by identifying opportunities to improve the rational use of antibiotics practices which

will reduce health costs and improve the patients' care.

## Conflict of Interests

The authors have not declared any conflict of interests.

## ACKNOWLEDGEMENTS

The authors thank members of staff of Hospitals in the Butembo City for their cooperation and assistance during the study.

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*Full Length Research Paper*

## Decade of permanent cardiac pacing in a tertiary care hospital of Northern India

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Received 11 December, 2015; Accepted 30 March, 2016

This study of 10 year review of pacing was undertaken to analyse the continuous rise in the incidence of pacing in this part of country. 532 patients implanted with permanent pacemakers were evaluated during this decade. The age of patients ranged from 6 to 85 years with majority of patients belonging to age group of 55 to 70 years and a male to female ratio of 2:1. The commonest presenting symptom was cardiac syncope seen in 76.50% followed by pre-syncope 31.50%. The indications for pacemaker implantation were complete heart block 48.12%, sick sinus syndrome 19.17%, symptomatic bifascicular block 12.96%, Mobitz type II 2<sup>nd</sup> degree heart block 7.14%, permanent pacemaker dysfunction 5.85%, trifascicular block 5.63% and high degree AV block 1.13%. The commonest risk factors encountered in these patients were smoking 59.21%, followed by hypertension 26.32%, only 0.56% had no evidence of risk factor. The complications following pacemaker implantation were seen in 8.27%, 2.26% got lead displacement, 1.69% got wound infection, 1.69% got extrusion of generator. Other complications include lead fracture in 0.9%, premature battery failure 0.37% patients, high threshold in 0.19%, Pneumothorax in 0.19% and 0.5% got reimplantation because of generator expiry. Out of 532 patients paced permanently in the past decade, 458 patients followed regularly which revealed that majority of them were totally dependent upon the permanent pacemaker and had improved quality of Life.

**Key words:** Invasive electrocardiography study, Complete heart block

### INTRODUCTION

Pacemaker is an implantable electronic device which takes over the command of cardiac rhythm in failure of the natural mechanism. The therapeutic results achieved by these devices are among the most spectacular of the modern medicine. This is attributed to the continuous research and curiosity of medicine professional to treat the every aspect and complication of disease and not to watch as helpless observers. Ever since pacemakers

were introduced in the 1950s, the pacing technology has witnessed remarkable innovation (Jayapandian et al., 2013). The major indication for cardiac pacing continues to be the failure of impulse formation or failure of conduction. This results from degeneration, fibrotic, atherosclerotic process leading to damage of pacemaker cells and conduction fibres. The infective rheumatic, vascular, infiltrative and neoplastic disease process too

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**Table 1.** Age wise distribution of patients.

Age group (Years)	No. of cases (%)
< 25	08 (1.50)
25-40	69 (12.97)
40-55	182 (34.21)
55-70	237 (44.55)
>70	36 (6.77)
Total	532 (100)

**Table 2.** Sex distribution of patients.

Sex	No. of cases (%)
Males	364 (68.40)
Females	168 (31.60)
Total	532 (100)

contribute. This has led to the steady rise in the number of pacing per million populations in every country almost all over the globe (Charles et al., 2015). The elderly patients aged 60 years and above with syncopal attacks due to varying arrhythmias, have high mortality, high risk of sudden death and so need cardiac pacing (Mond and Proclemer, 2011). The rate of cardiac pacing in various arrhythmias remains unchallenged. There has been alarming intermittent increase in pacing probably attributed to the rise in the incidence of coronary artery disease and the subsequent development of varying Bundle Branch Blocks, Sinus Node dysfunction (Epstein et al., 2008). There has been a progressive rise in the percentage of patients with pacemaker implanted in the past decade at our centre also. The retrospective and prospective study of this decade will be a useful scientific data to frame the guidelines for the future and to formulate / tabulate the indications for cardiac pacing in our day to day patient care. This will also help to lay down the indications and situations where the pacing is needed because of intermittent symptomatic arrhythmias. It will give us the opportunity to review the unexplored follow up of these patients in the form of life style, cardiac status, morbidity and mortality due to cardiovascular and other systemic related causes. This data will give us the enormous material about the complications of pacing in our patients and enlightenment to prevent these in future.

## MATERIALS AND METHODS

The study comprised of retrospective and prospective review of patients with permanent pacemakers implanted in a tertiary care hospital between 2004 and 2014. The study was started in 2009 and comprises of initial five years of screened hospital records of paced patients and enrolment of all permanently paced patients in the

next five years. The case records of all patients permanently paced in our hospital were screened thoroughly for subjective and objective indication for pacing, any associated disease, acute or chronic nature of the basic disease, and its progress was reviewed. Immediate and late complications, follow up of these patients in pacemaker clinics, their life span, quality of life, overall mortality was studied.

## RESULTS

The clinical spectrum of 532 patients implanted with permanent pacemakers is presented, with the analysis of various parameters given in the various tables. The age of patients ranged from 6 to 85 years with a mean age of  $52.82 \pm 16.85$  years. Majority of patients implanted with pacemakers were in 55 to 70 years age group (44.55%) followed by 182(34.25%) in 40 to 55 years (Table 1). Males outnumbered females by a ratio of 2:1. There were 364(68.40%) males and 168(31.60%) females (Table 2). The commonest presenting symptom was cardiac syncope seen in 407 patients (76.50%) followed by presyncope present in 168 (31.50%) patients. Other presenting symptoms in order of frequency included palpitations in 144 (27.06%), chest pain (angina) in 54(10.1%) patients, convulsions in 50 patients (9.3%) patients and Congestive Heart Failure in 10 patients (1.8%) patients (Table 3). More than one symptom was present in a case. Complete heart block formed the largest group of patients in this study of permanent pacemaker implantation as seen in 256 patients (48.12%) including 2 patients of congenital complete heart block and 34 patients (6.35%) progressing to complete heart block from previous Bundle Branch Block. The second commonest indication for permanent pacemaker implantation was Sick Sinus Syndrome in 102

**Table 3.** Symptom distribution / presentation.

Presenting symptoms	No. of cases (%)
Cardiac syncope	407 (76.50)
Presyncope	168 (31.58)
Palpitations	144 (27.07)
Angina	54 (10.15)
Convulsions	50 (9.0)
Congestive heart failure	10(1.88)

**Table 4.** Analyses of indications of permanent pacemaker implantation.

Indication	No. of cases (%)
Complete heart block	256 (48.12)
Sick sinus syndrome	102 (19.17)
Bifascicular block	69 (12.96)
Mobitz type-II, 2 <sup>nd</sup> degree heart block	38 (7.14)
Permanent pacemaker dysfunction	31 (5.85)
Trifascicular block	30 (5.63)
High degree Av block	06 (1.13)
<b>Total</b>	<b>532 (100)</b>

**Table 5.** Percentage of patients with underlying bundle branch blocks progressing to complete heart block.

Type of bundle branch block	No. of cases (%)
Left bundle branch block	15 (2.8)
Rt. bundle branch block + left anterior hemiblock	9 (1.69)
Rt. bundle branch block	8 (1.5)
Left anterior hemiblock	1 (0.18)
Left posterior hemiblock	1 (0.18)
<b>Total</b>	<b>34 (6.3)</b>

patients (19.17%). Among fascicular blocks, 30 patients of Trifascicular block (5.63%), were paced and 69 patients (12.96%) of bifascicular block, 38(7.14%) patients of mobile type-II, 2<sup>nd</sup> degree heart block were also paced followed by 31 patients (5.85%) of permanent pacemaker dysfunction. The least number of patients 06(1.13%) of high degree AV block were also paced (Tables 4 and 5). While determining the association of risk factors it is found that the influence of risk factors was highly significant ( $P<.0001$ ) with the commonest risk factors being smoking among 315(59.21%) patients followed by hypertension 140(26.32%) patients. Only 03(0.56%) cases had no evidence of risk factor. However the risk factors with the least magnitude were identified in the form of obesity in 35 patients (6.58%), diabetes mellitus-28(5.26%) cases, hypercholesterolemia in 06(1.13%) patients and sedentary habitus among 05(0.94%) patients (Table 6). The overall complication

rate was significantly ( $p<0.0001$ ) found of lower magnitude 44(8.27%). The complications following pacemaker implantation were seen in 44(8.27%) patients. 12(2.26%) patients got lead displacement, 09(1.69%) patients got wound infection, 09 (1.69%) extrusion of generator. Other complications included lead fracture in 05 patients (0.9%), premature battery (generator) failure in 02(0.37%) patients, and high threshold in 01(0.19%) patients and Pneumothorax in 01(0.19%) patients. 05(0.94%) patients got reimplantation because of generator expiry (Table 7).

## DISCUSSION

Bradyarrhythmias are a cause of sudden death everywhere in the world, although the precise incidence is unknown. Pacemaker implantation is an accepted intervention

**Table 6.** Risk factor analyses.

<b>Factors</b>	<b>No. of cases (%)</b>
Smoking	315 (59.21)
Hypertension	140 (26.32)
Obesity	35 (6.58)
Diabetes mellitus	28 (5.26)
Hypercholesterolemia	6 (1.13)
Sedentary habitus	5 (0.94)
None	3 (0.56)
Total	532 (100)

**Table 7.** Complications of permanent pacemaker implantation encountered in 532 patients.

<b>Complication</b>	<b>No. of cases (%)</b>
Wound infection	09 (1.69)
Extrusion of pacemaker generator	09 (1.69)
Lead displacement	12 (2.26)
Lead fracture	05 (0.94)
Generator expiry	05 (0.94)
Generator failure	02 (0.37)
High threshold	01 (0.19)
Pneumothorax	01 (0.19)
Total	44 (8.27)

which has been shown to improve the quality of life and reduce mortality in patients with bradyarrhythmias (Falase et al., 2013). Kashmir valley is inhabited by a relatively homogenous inbreeding population with dietary practices and living conditions that do not differ significantly across the valley. A pacemaker implantation and follow up service has been established in our institution and robust database has been developed and maintained. In the experience of Thomas et al from Lagos, 100 patients were implanted between 1999 and 2004. Average age was 62 years, 93% of patients were female, 86 % patients were diagnosed with complete heart block and overall 89% received single chamber ventricular pacing and 11% received dual chamber pacing, No complications were recorded. The Enugu experience is a smaller series of 23 implants done between 2001 and 2006 in which the mean age was 70 years, 65% of patients were in complete heart block, endocardial leads were used in 65% of cases, and epicardial leads in 35% of cases (Ekpe, et al., 2008). There is also published experience in 2003 from Dakar Senegal of 92 implants over a 3 year period. There was an equal male to female ratio and 87% of implants were single chamber ventricular pacing. Complications seen in the series were pacemaker infections in 5 patients, 3 lead displacements, 1 pacemaker syndrome and 8 patients that died during

follow up of non-pacemaker related causes (Thiam et al., 2003). The present study reveals the age of patients ranged from 6 to 85 years, majority belonging to age group of 55 to 70 years and males outnumbering females with ratio of 2:1. These findings are consistent with the 11<sup>th</sup> world survey of cardiac pacing and implantable cardioverter-defibrillators where age of patients ranged from 60 to 75 years and males outnumbered females (Mond and Proclemer, 2011). Similar to the findings of West African series' most of our patients implanted with pacemakers were having completed heart block. This is unlike the pattern in the western world where 30% or less of patients present with complete heart block and sinus node dysfunction is the predominant indication of cardiac pacing (Mond and Proclemer, 2011). 70% of our patients have been implanted dual chamber pacemakers and this trend has increased particularly during the last five years of study period. This is consistent with the current trend all over the globe as dual chamber pacing is more physiological in view of hemodynamic benefits of atrioventricular synchrony that in turn translates into improved longevity and improved quality of life (Clarke et al., 1991). The complete heart block as shown in our study is idiopathic in majority and is the major conduction defect. The magnitude of patients taken for permanent pacemaker implantation also remarkably increased in the



last five years of the decade. The appreciable increase in permanent pacemaker implantation is attributable to early referral services and appropriate investigative facilities, improved peripheral healthcare services, awareness about the cardiac problems among the common people. The overall complication rate in our implantations was low and most of the complications like lead displacement, wound infection, lead fracture have occurred in the initial years of decade and may be attributed to the initial learning curve. Ever since pacemakers were introduced in the 1950s, the pacing technology has witnessed remarkable innovation. Much of the pacemaker related complications may be prevented by leadless pacemakers which have the ability to pace chronically and reliably when lodged endocardially (Jayapandian et al., 2013).

Out of 532 patients paced in the last decade, 458 patients followed regularly who revealed that majority of them were totally dependent upon the permanent pacemaker. This good number of patients attending pacemaker follow-up clinic was again attributable to awareness about the cardiac problems among the common people. The dropouts in our pacemaker follow-up clinic numbered 52. 22 patients paced permanently died because of cardiac (viz; Acute Coronary Event) / Non cardiac diseases. Out of 22 patients 09 died of Acute Coronary Events, 07 died of Cerebrovascular Accidents (4 subarachnoid Haemorrhage, 03 Intracerebral Bleed) and 6 patients died of bronchogenic carcinoma. In spite of these complications it was seen that overall quality of life improved considerably in these paced patients and were free of life-threatening syncopal attacks.

## Conclusion

A pacemaker implantation and follow up service has been established in our institution and a robust database has been developed and maintained. Main indications for implantations are complete heart block, sick sinus syndrome and symptomatic bifascicular blocks. The number of implants and dual chamber pacing has particularly increased during the last five years of study period indicating awareness of cardiac problems among the common people and possibly improved referral services. Complications rates are decreasing due to gained expertise. Regular follow-up in pacemaker clinic indicates public awareness.

## Conflicts of Interests

The authors have not declared any conflict of interests.

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*Full Length Research Paper*

# A five-year review of necrotizing fasciitis at Jimma University Specialized Hospital, Jimma, Ethiopia

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Received 20 May, 2016; Accepted 17 August, 2016

**Necrotizing bacterial infections are extremely serious, fulminant infections of the soft tissues by virulent bacteria. The annual incidence of NF is estimated at 500–1,000 cases annually, and its prevalence globally has been reported to be 0.40 cases per 100,000 populations. It is seen to have a predilection for men, with a male-to-female ratio of 3:1. The disease affects all age groups. Clinical risk factors for necrotizing soft-tissue infection include diabetes mellitus, malnutrition, obesity, chronic alcoholism, peripheral vascular disease, chronic lymphocytic leukaemia, steroid use, renal failure, cirrhosis and autoimmune deficiency syndrome. The mortality associated with NSTI has been in the range of 16 to 45%. Necrotizing fasciitis is common in Ethiopia but the prevalence and risk factor patterns of the disease in Ethiopia setup have not been well studied. The main objective of this study was to assess pattern and outcome of necrotizing fasciitis in Ethiopia. A retrospective cross-sectional study design was conducted, by reviewing medical records of patients who developed necrotizing fasciitis during the period between January 1, 2011 and December 31, 2015 in Jimma University specialized hospital. Overall, 78 patients were diagnosed with necrotizing fasciitis and mortality rate was 19.23%. The mean age of patients was 36.33 years (range: 37 days to 80 years). Male to female ratio was 2.39:1. Seventy percent were from rural area and 39.7% had predisposing factor. The most common site affected is lower limb (39.7%) and the next common is perineum (34.6%). The median duration of hospital stay was 25.23 days. This five-year review has shown a low incidence of necrotizing fasciitis infection with a high mortality rate. Diabetes mellitus, RVI and malnutrition were identified as the main co-morbidities.**

**Key words:** Necrotizing fasciitis, diabetes mellitus.

## INTRODUCTION

Necrotizing fasciitis is less common than subcutaneous abscesses and cellulitis but are much more serious conditions whose severity may initially be unrecognized.

They typically involve deep subcutaneous tissue, superficial or deep fascia, or muscle, or any combination of the three (Dellinger and Anaya, 2007). Necrotizing

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**Table 1.** Socio-demographic characteristics of necrotizing fasciitis cases

variables		frequency	percent
Sex	Male	55	70.5
	Female	23	29.5
Age	0-14	9	11.5
	15-29	22	28.2
	30-44	18	23.1
	45-59	16	20.5
	>60	13	16.7
Address	Urban	23	29.5
	Rural	55	70.5

bacterial infections are extremely serious, fulminant infections of the soft tissues by virulent bacteria that have the ability, usually by the production of toxins, to cause widespread necrosis (Wittmann, 2000). Successful management of necrotizing fasciitis includes the following: early diagnosis, surgical debridement, anti-microbial therapy, intensive supportive care and hyperbaric oxygen (possibly) (Wittmann, 2000). With regards to necrotizing fasciitis of the extremities, the mortality rate is slightly lower than that recorded for abdominal and perineal infections. Patients with Fournier's gangrene that has not spread to the abdominal wall tend to have a better survival. As a general rule, without treatment, the mortality rate approaches 100% (Shaikh et al., 2012).

## MATERIALS AND METHODS

This was a five-year retrospective cross sectional study which was from January 1, 2011 – December 31, 2015 at Jimma University specialized hospital. All patients with necrotizing fasciitis seen in the study period were retrieved. All the data collection process was carried out with trained physician. Morbidity log book of department of surgery and operation log book were explored to find most of the necessary information including patient record numbers which was used to locate the individual patient card in the hospital record office. The data were collected using a structure questionnaire. 98 patient cards were identified and 78 were included in the study. The data was analyzed using SPSS for window version 20. Results were computed with graphs, tables and narratives based on the nature of data. Chi-square and p-value used to determine association between variables and p-value<0.05 was considered significant.

## RESULTS

There were 78 patients, out of which 55 were male and 23 were female with mean age of 36.33 years (an age range of 37 days to 80 years). Male to female ratio was 55:23. Almost, 71.8% (n=56) of the patients affected were

in the age group between 15 and 60 years. Seventy percent of people were from rural area (Table1). There was obvious predisposing factors in 39.7% (n=31) of the cases. Most common predisposing factor in the patients was perianal fistula and abscess, surgery and trauma. Painful swelling (71/78), skin necrosis (6/78), and fever (26/78) were the most presenting features (Table 2).

Of the 78 patients, 15.4% (n=12) had co-morbidities. These included diabetes mellitus and retro viral infection (6.4 and 3.8%, respectively). The most common site of infection was the lower limb and the next was perineum, 39.7 and 34.6%. Twenty five percent (n=20) of the patients had anemia at admission (Table 2).

All patients had surgical management. Eighty two percent of the patients underwent debridement. Multiple and limiting incision was performed for 14.1% patients but 3.8% required amputation of the limb. Sixty percent of patients required 2 or more debridement's until discharge from hospital. The median number of surgery required was 2 times. As a final procedure, skin graft was done for 33.3% of the patients (Table 3).

The median duration of stay in hospital was 25.5 days (range: 1 day to more than 2 months). Complication was presented in 21.8% of patients, in which the most common was MOF and wound infection. Fifteen of the 78 patients died with mortality rate of 19.23%. Independent variables were analyzed with the mortality rate of necrotizing fasciitis patients and there was no significant association between them (Table 3).

## DISCUSSION

During the five-year study period, 78 patients were treated for necrotizing fasciitis. The mean age of the patients was 36.33 years (range 37 days to 80 years) and male to female ratio in the study was 55:23. A study in Northern Ireland from 2007 to 2012 showed mean patient age of 59.4 years (range of 32-88) with a 25:21 male to female (Anaya et al., 2005).

In this study, 91% (71/78) of patients had painful swelling as clinical presentation which is similar to a study in Northern Ireland from 2007 to 2012, showing painful cellulitis (44/46), skin necrosis (26/46) were the most common presenting features (Anaya et al., 2005).

The most common infection site was the lower limb (39.7%) in the study which is dissimilar to a study done in Germany from 1996 to 2005, reporting that the most common site of infection was the trunk (42.3%) (Misiakos et al., 2014). Another study between 2007 and 2012 in Northern Ireland showed the lower extremity was the most commonly affected anatomical site (16/46) (Anaya et al., 2005).

Diabetes mellitus is the most common comorbid condition followed by RVI in the setup. In research done in New Zealand between 2000 and 2006, diabetes was the most frequent co-morbid condition, followed by obesity (Hodgins et al., 2015).

**Table 2.** Clinical condition and mode of presentation at admission

Variables		Frequency	Percent
Common clinical presentation	Painful swelling	71	91
	fever	21	26.9
	Ulceration	6	7.7
Predisposing Factor	Present	47	60.3
	Absent	31	39.7
Distribution of predisposing factors	Trauma	3	3.8
	Surgery	5	6.4
	Perianal fistula and abscess	6	7.7
	Snake bite	1	1.3
	Gangrenous hernia	1	1.3
	Infected hydrocele	1	1.3
	Injection	1	1.3
	Urethral stricture	1	1.3
	Medical illness	12	15.4
Co morbid disease	Present	12	15.4
	Absent	66	84.6
Distribution of co morbid disease	Diabetic mellitus	5	6.4
	Malnutrition	2	2.6
	RVI	3	3.8
	Other	2	2.6
Anatomic Site involved	Perineum	27	34.6
	Upper extremity	4	5.1
	Lower extremity	31	39.7
	Torso	15	19.2
	Other	1	1.3
Preoperative Anemia	Present	20	25.6
	Absent	58	74.4

The most common predisposing factors in this study were perianal fistula and/or abscess (7.7%, n=6), surgery (history of operation) (6.4%, n=5) and trauma (3.8, n=3).

A study done in India from January 1995 to February 2005 showed history of operation (11.7%) was the most common predisposing factor (Adigun and Abdulrahman, 2004) (Table 2).

All patients underwent surgical treatment and the median number of surgery required was 2 times. Limb loss occurred in 9.7% patients with extremity involvement. The mortality rate was 19.23% (n=15) in this study which is similar to a study done in Northern Thailand where the mortality rate was 19.3% (Adigun and Abdulrahman, 2004) (Table 3). A study in Seattle, Washington from 1996 to 2006 reported the mortality rate was 16.9% and limb loss occurred in 26% of patients with extremity

involvement (Skaikh, 2006). A study done in India from January 1995 to February 2005 revealed 16% mortality and also a mean number of surgical debridement was 2.1 (Adigun and Abdulrahman, 2004). A research done in Taiwan from January 2003 to December 2009 showed 12% mortality (Anaya et al., 2009).

#### Limitation of the study

The data was a secondary data since the it was collected from patients chart and registration books, which was not completely documented. So, important data was not available.

The sample size was small which made it difficult to see the significance of some of the statistic.

**Table 3.** Type and frequency of surgical management and outcome.

<b>Variables</b>		<b>Frequency</b>	<b>Percent</b>
Types of surgical management	Multiple and limiting incision	11	14.1
	Amputation	3	3.8
	Debridement	64	82.1
Frequency of surgical management till discharge	1x	31	39.7
	2x	27	34.6
	3x	13	16.7
	4x	2	2.6
	5x	2	2.6
	6x	2	2.6
	>7x	1	1.3
Wound Closure	Skin graft	26	33.3
	Delayed primary closure	37	47.4
	Secondary closure	15	19.2
Total duration of hospital stay	1 week	11	14.1
	2 weeks	2	2.6
	3 weeks	18	23.1
	4 weeks	15	19.2
	5 weeks	7	9.0
	6 weeks	8	10.3
	7 weeks	1	1.3
	8 weeks	4	5.1
	>8 weeks	12	15.4
Post –operation complication	Present	17	21.8
	Absent	61	78.2
Distribution of post-operative complication	Wound infection	4	5.1
	Septic shock	2	2.6
	Multiple organ failure	6	7.7
	Hospital acquired pneumonia	3	3.8
	Respiratory failure	1	1.3
	Post-operative anemia	1	1.3
Condition At discharge	Improve	63	80.8
	Dead	15	19.2

## CONCLUSION AND RECOMMENDATIONS

This five-year review has shown a low incidence of necrotizing fasciitis infection with a high mortality rate of 19.23%. Diabetes mellitus, RVI and malnutrition were identified as the main co-morbidities. It is important to have prospective studies to examine the fitness and sufficiency of above variables as effective predictors of necrotizing fasciitis mortality. Emphasis must be placed on expert clinical diagnosis and judgment in order not to delay surgical treatment as well as use of the multi-disciplinary team.

## Conflict of interest

The authors have not declared any conflict of interest

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