

## Surgical Site Infection in the General Surgery Department of the Fousseyni Daou Hospital in Kayes

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### Abstract

### Original Research Article

**Objectives:** To study surgical site infections (SSI) in the general surgery department of the Fousseyni Daou Hospital in Kayes. **Material and method:** This was a prospective study carried out from November 1, 2015 to April 30, 2016 on patients who underwent surgery and were hospitalized for at least 48 hours in the general surgery department. **Results:** During the study period we consulted 677 patients, of which 325 were hospitalized and 300 operated. Of the 297 patients who survived after surgery, 12 developed a surgical site infection, a frequency of 4.16%. Of the 12 patients, 11 were male, the mean age was 39 years with a standard deviation of 14.9. The most common type of infection was superficial infection of the surgical wound with 66.66% of cases followed by deep infection in 33.3% of cases. We proceeded to local care with antiseptic such as Dakin, polyvidone iodine, association (Chlorhexidine + Chlorocresol + Hexamidine) and hydrogen peroxide. **Conclusion:** Surgical site infections are frequent and serious because of their morbidity and mortality and the cost of their management. The rigorous respect of the measures of asepsis per and post operative as well as a good antibiotic therapy based on the antibiogram allow to minimize them.

**Keywords:** Infection, surgical site, morbidity and mortality, Fousseyni Daou Hospital in Kayes.

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## INTRODUCTION

The hospital, which is normally considered as a place of knowledge, medical education and hygiene, can become a source of infection in certain circumstances, either through the use of invasive methods, or in the case of several hospitals due to a lack of hygiene, organization, professional conscience or means.

An infection is said to be nosocomial if it appears during or following hospitalization within a period of at least 48 hours and if it was absent on admission to the hospital [1].

The surgical site is the area where the surgical procedure is performed. In general, surgical site infections are considered nosocomial if the infection occurs within 30 days of the operation or, if a prosthesis or implant is inserted, within one year of the operation [1]. Surgical site infections represent 14 to 16% of

hospital-acquired infections and are the 3rd most common cause of these infections after urinary tract and pulmonary infections in Europe and the United States [1].

The diagnosis of SSI is based on the criteria defined by the CDC Atlanta and biological examinations [2].

The treatment of SSI is often difficult as it sometimes requires multiple surgical interventions, often with poor results or with dreadful sequelae [3].

The prognosis of SSI is good if the infection is superficial; when it is deep, it usually leads to re-interventions, making the prognosis poor, with a mortality rate reaching 10% [4].

Many studies have been carried out in the context of the fight against hospitalization. Different

studies carried out in the context of the control of hospital infections have objectified the following frequencies: in the United States, in Washington, in 2010, a study carried out by BUCHER *et al.*, at St Louis Children's Hospital showed that 0.99% of children operated on developed an SSI [5].

In France a study done by M. Gabriel BIRGAND in 2014 had shown that 12.7% of the operated patients presented a surgical site infection [6].

In Africa; in 2013 Samia GHERNAOUT-BENCHOUK found an estimated SSI rate of 7.7% [1]. While in Mali this rate was evaluated at 7.8% in 2011 according to a study by B. DIARRA in the general surgery department of the CHU Gabriel TOURE [7].

This study is part of the prevention and management of surgical site infections in the general surgery department of the Fousseyni Daou Hospital in Kayes

## OBJECTIVES

To study surgical site infections in the general surgery department of the Fousseyni Daou Hospital in Kayes.

## MATERIAL AND METHOD

This was a prospective study carried out from November 1, 2015 to April 30, 2016 on patients who underwent surgery and were hospitalized for at least 48 hours afterwards in the general surgery department who met the Atlanta CDC criteria (see Table I). Inpatients who did not undergo surgery were excluded from the study.

Data collection was done by patient observations typing on Word 2007 software and analysis on SPSS software (version 10.0).  $P < 0.05$ : Chi-square significance level

## RESULTS

During the study period we consulted 677 patients, of whom 325 were hospitalized and 300 operated. Of the 297 patients who survived after surgery, 12 developed a surgical site infection, a frequency of 4.16%.

Of the 12 patients, 11 were male, the mean age was 39 years with a standard deviation of 14.9.

The most common type of infection was superficial infection of the surgical wound with 66.66% of cases, followed by deep infection in 33.3% of cases.

The risk factors for the occurrence of surgical site infection were: ALTEMEIR contamination class 3 and 4; NNISS index 1 and 2; anesthesia; type of surgery with probability tests  $p < 0.05$ . Dirty surgeries and contaminated surgeries had 9 and 2 cases of surgical

site infection respectively. We recorded one case in the clean surgery.

The analysis of the 12 samples resulted in 12 positive cultures, i.e. a bacteriological yield of 100%. *Escherichia coli* was the most isolated germ with 33.33% followed by *Klebsiella pneumoniae* 8.33% and *Serratia marcescens* 8.33%, other germs 49.98% (*Enterobacter sakaz*), and the most frequently isolated germ with 2.33%.

(*Enterobacter sakazakii*, enterococci, *Enterococcus*, *Pantoea* spp, *Chryseomonas luteola*, *Kluyvera* spp).

The most frequent *Escherichia coli* strain was sensitive to Ceftriaxone in  $\frac{3}{4}$  of cases. All the germs found were sensitive to one of the antibiotics tested (Amoxi+clavulanic acid, Cefotaxime, Imipenem, Gentamicin, Metronidazol, Fosfomycin, Ciprofloxacin, Chloramphenicol).

The consequences of the infection of the surgical site were the prolongation of the hospital stay in average of 15 days for the infected patients, that is to say 2 times superior to those of the not infected, an increase in the cost of the care, repercussions on the physical and psychic state of the patient.

We proceeded to local care based on antiseptic such as Dakin, polyvidone iodine, association (Chlorhexidine + Chlorocresol + Hexamidine) and hydrogen peroxide.

## DISCUSSION

SSI is a serious complication that can negatively influence the outcome of the surgical procedure.

Our rate of 4.16% has a significant difference with the Kenyan, Burkinabe and Algerian series (14.6%; 22.35%; 10.8%) probably due to the type of surgery, the length of hospital stay and the general condition of the patient and the rigorous respect of asepsis conditions by the practitioners.

Men were the most represented with a ratio of 11; this representation of men was found in the American, Malian, Burkinabe and Moroccan series (0.9; 1.67; 2.4; 2.12).

The average delay of SSI occurrence was 2 days in our study, it is lower than those found in the series Kientega in Burkina in 2012, Diarra in Mali in 2010 and Guetarni in Algeria respectively (5; 7; 3 and 9) days [7; 30; 34] without significant difference of  $P > 0.05$ .

Through the Altemeier class, we observed a progressive increase in risk from clean surgery to

contaminated surgery with a rate that varies from 0.62% to 20%; this increase was found in the different Kenyan, Nigerian and Malian series without significant difference (see Table II).

The NNISS index is the sum of the indices of the class of contamination, the ASA score and the duration of the operation; in our study we found an increase in the risk of infection from 0.80 to 100. This increase was found in all the series (see Table III), a statistical difference was found at score 3 with the series of Diarra in Mali and Abdelfattah in Morocco. This could be explained by the difference in sample sizes.

Emergency digestive surgery is a risk factor for SSI. In the Senegalese and Algerian series there is a statistical difference with a  $P=0.001$  (see Table IV).

Conclusion: Surgical site infections are a serious complication feared by surgeons because of their prognosis. Several factors come into play, such as the duration of the operation, the NNISS score and the nature of the surgery.

They cause an increase in the hospital stay and the cost of the management. They should be a major concern in surgery; preventive measures can reduce their occurrence.

**Table I: CDC Atlanta definition of SSI**

Type of infection	Clinical and/or radiological criteria	Bacteriologies	Minimum criteria for diagnosis
Surgical site infection	-Purulent discharge -bloody discharge -redness and/or heat - fevers less than or equal to 38°C	Positive culture	-1 or -2+5 or -3+5

**Table II: Altemeier and Authors class**

Authors	Sample	Clean Surgery	Contaminated Clean Surgery	Contaminated Surgery	Dirty surgery
Dinda Kenya 2013	268	5.50%	8.80%	20%	2%
Akolo Nigeria	118	4.7%	4.7%	30%	70%
Diarra Mali 2010	374	1.6%	4.6%	12.2%	13.5%
Our study 2016	297	0.62%	0%	3.84%	20%

**Table III: NNISS score and authors**

Authors Sample	Echantillon	Score 0	Score 1	Score 2	Score 3
DIARRA B Mali 2017	374	2.13	8.9	4.31	33.33
Abdelfattah Morocco 2013	466	3.4	4.6		12
KIENTEAGA Burkina 2012	2722	15	60	20	5
Our study 2016	297	0.80	9.80	100	

**Table IV: According to the type of surgery**

Type of surgery	Farhouat Dakar 2009	Guettarin Algeria 2014	Our study 2016
Colorectal		89(15.7%) $P=0.001$	10(0%)
Adenoma of the prostate	10(10%) $P=0.001$		50 (16.66%)
Peritonitis 13	(15.4%) $P=0.001$		34 (75%)
Hernia 258	(1.2%) $P=0.062$		74 (0%)
Appendicitis	84 (17.9%) $P=0.001$	49 (20.4%) $P=0.15$	57 (8.33%)
Free bowel	21(38.1%)		

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