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EVALUATION OF THE RATE OF SURGICAL SITE INFECTION AFTER THE IMPLEMENTATION OF THE USE OF HYDRO ALCOHOLIC SOLUTION AT THE REGIONAL HOSPITAL OF NGAOUNDÉRÉ

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Abstract

Surgical site infection (SSI), defined by the Centers for Disease Control and Prevention is an infection related to an operative procedure that occurs at or near the surgical incision within 30 days of the procedure, or within 90 days if prosthetic material is implanted at surgery. SSIs occur in 2% to 4% of all patients undergoing surgical procedures. SSIs significantly remain major causes of morbidity and mortality after surgery even though most infections are treatable by antibiotics. The objective of this study was to evaluate the rate of SSI after the implementation of the use of hydro alcoholic solution (HAS) at the regional hospital of Ngaoundéré (RHN). As such a descriptive prospective study going from July 9th 2018 to November 30th 2018, either a period of six (06) month was carried out. The study included all patients who underwent surgery at the regional hospital of Ngaoundéré within study period, and obtained results from data analysis was made possible by the means of software Sphinx V5 and Microsoft office 2013. Within study period, 214 surgeries were carried out amongst which 21 cases of SSIs recorded, either a rate of 9.8%. This design study

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with a relevant 9.8% rate of surgical site infection is greatly lower than that observed in 2014 in the same hospital whereby the rate of SSIs was of the order 30.7%. Hence, we observe a difference of 20.9% amelioration of the rate of SSI. This study therefore shows the importance of the use of HAS contribution in the reduction of SSI at the RHN.

Key words: SSI, HAS, RHN

INTRODUCTION

An infection is the result of a complex interaction between the body defense mechanisms of the patient and that of the germ concerned. All surgical procedures may result in complications of SSIs (BONE, and al.1992). SSIs remains a current event and a real public health concern due to its frequency. In the World, more than 1.4 million peoples suffers from hospital contracted diseases and this risk is increased by 2 to 20 times in developing countries (WHO, 2017). Their prevention seems to be a great challenge as regard to increased patient safety. Generally, these infections are contracted during surgery with exogenous origin (WHO 2010). SSIs extends post-operative hospital stay period by 3 to 20 days, and increases financial hospital charges (Coello R. 1993). The incidence of SSI in Europe varies from 0.5% to 15% following the type of surgery practiced, the state of the patient and the country (Lund S. 1994). In Africa, the prevalence of care associated infections varies from 2.5% to 14.8% (Bagheri Nejad and al. 2011). In Cameroon, studies carried out by Ngo Nonga and collaborators in 2010, with Tonye in 2015 and Ngaroua and collaborators in 2016 showed respectively rates of 45% and 30.7% of SSI. Literature demonstrates that, with a well-defined program of prevention, the rate of nosocomial infection may be reduced to 30% and even less (QUEBEC Government 2006).

The struggle against these infections are well organized in developed countries, but less in developing countries that suffers for the most of the lack of an organ of regulation of representative monitoring data (WHO 2010). The WHO calls on member countries to put in place fighting committees against nosocomial infections (WHO 2002)

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In regard of this difference in rates of SSIs between developed and developing countries, it resort that, much still have to be done in the health systems of our countries. Hence, it will be of great interest to carry out a participative study to the reduction of these SSIs by the means of determining the rate of SSI after the implementation of the use of HAS.

GENERAL OBJECTIVE

Evaluate the rate of SSI after the implementation of the use of the HAS at the Regional Hospital of Ngaoundéré

SPECIFIC OBJECTIVES

1- Determine the rate of SSI after the use of HAS
2- Determine the rate of SSI following the index of NNISS
3- Identify risk factors after implementation of the use od HAS

METHODOLOGY

1- Study design and setting

The design concerned a descriptive cross-sectional prospective study carried out at the regional hospital of Ngaoundéré/Cameroon going from the month of July 9th to November 30th 2018, either a period of 6 months of study.

2- Study subject and method

Our population of study concerned all the patients of the RHN who underwent surgery during study period. Were included as such to this design study all the surgeries that took place at the room theaters of the hospital either the room theater of general surgery and the room theater of gynecology. On the other hand, were not included to this study the following cases: incisions of superficial abscesses (whitlow, abscesses of the anal margin), episiotomy/circumcision, patients with prosthetic implants, patients without a telephonic contact for follow-up, re-interventions, surgical patients with less than 30 days of follow-up by the end of study period.

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Regarding the method of recruitment of patients, we daily visited the services of surgery and gynecology and the room theater so as to consult the program of surgeries, by so doing visit the patients and check out if they could be included to the study or not by clearly explaining to our participants the objective of the study. As such, tools used for the purpose of data collection included: follow-up patient file containing sociodemographic characteristics, pre, per and post-operative data; concerned unit service registers and patients medical and nursing files; a dressing kit, a thermometer, a sphygmomanometer, a computer, a cell phone etc.

3- Statistical data analysis

The sampling process used the census method through a questionnaire addressed to patients responding to the inclusion study criteria. The number of participant was determined by the formula of LORENTZ (1765): $\mathbf{N} = \frac{\boldsymbol{p(1-p)t^2}}{\mathbf{m^2}}$

$\mathbf{N} = \frac{\boldsymbol{p(1-p)t^2}}{\mathbf{m^2}}$	N= population size t= level of confidence 95% (1.96) p= estimated prevalence (30.7% at the RHN) m= margin of error (5%)

Studied variables concerned sociodemographic characteristics such as age, sex, preoperative shower, ASA score, Altemeier class and the outcome of SSI. Dependent and independent risk factors were compared with the statistic test of Chi Square.

Obtained data were analyzed using Sphinx V5, results are presented in forms of tables, and figures elaborated using the Microsoft office Excel 2010. Analysis were equally carried out among variables to identifier the link of significant association existing with the development of SSI. The threshold value of significance was fixed at 0.05.

RESULTS

Among the 214 patients included in this study, 21 patients presented SSIs with a global rate of 9.8%.

1- Sociodemographic Characteristics

a- Age

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The most represented age group was that of [20-29] years with a frequency of 39.7%. The mean age was 28 years with extremes at 7 days and 83 years old.

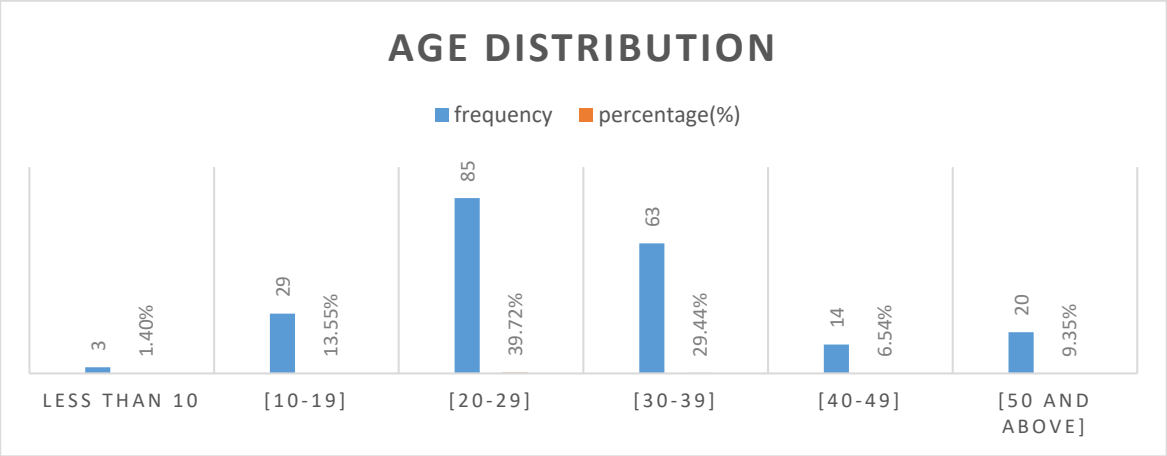

Figure1: age sample distribution

b- Sex

The sex distribution of this study recorded a female predominant representation with 83.2% and the male sex followed with 16.8% as shown below.

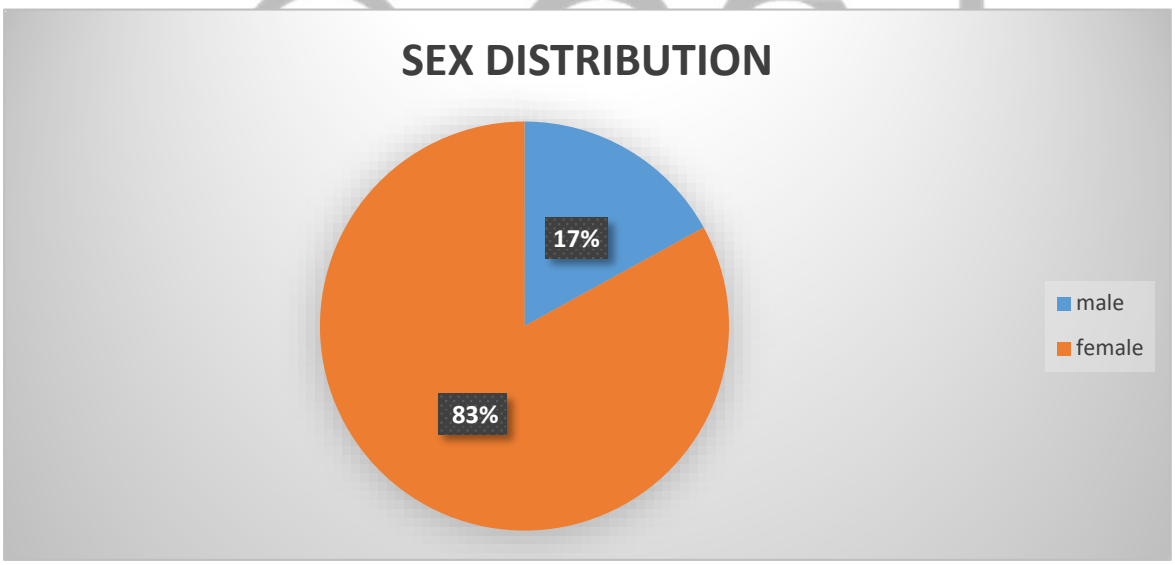

Figure2: sex distribution

c- Distribution following the NNISS Score

The predominant NNISS Score was the Score 0 (zero) with 97.2% as shown in table 1 below.

Table1: patient distribution following NNISS Score

Score	Number	Frequency (%)

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0	208	97.20%
1	6	2.80%
Total	214	100%

2- Risk Factors

a- Frequencies of SSIs and Altemeier classification

Contaminated or dirty surgeries (categories III and IV of the classification of Altemeier) were the most exposed to develop a SSI. There equally exist a statistically significant relation between the classification of Altemeier and the development of SSI. 1-p = 99.9%; Chi^2 =50.36; ddl=13.

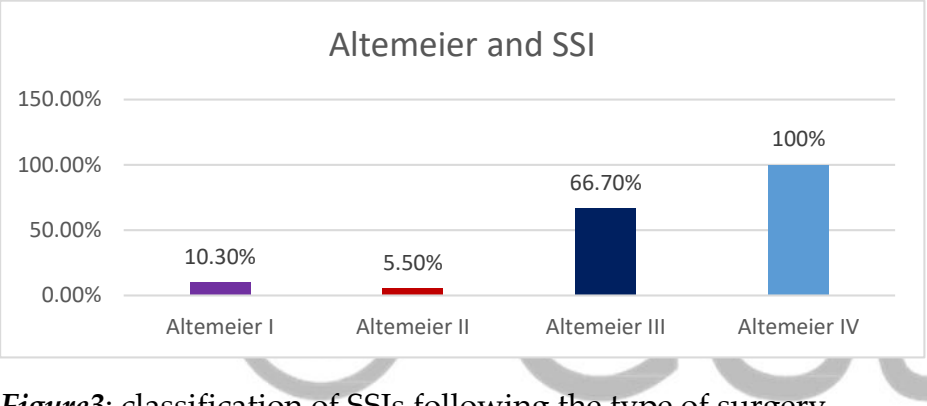

Figure3: classification of SSIs following the type of surgery

b- Distributions of SSIs and the degree of gravity of subjacent illnesses (ASA score)

ASA score ≥ 2 increased significantly the outcome of SSI

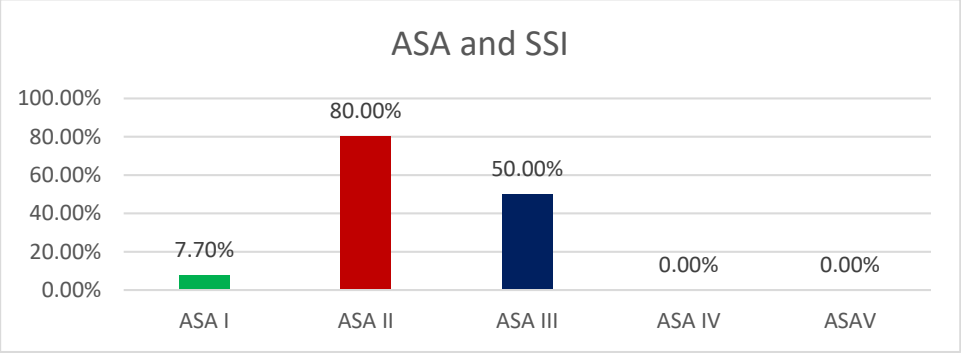

Figure4: patient distribution of SSIs with the degree of gravity of subjacent illnesses

c- Distribution of SSIs following the index of NNISS

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Statistical analysis showed a significant relation between the NNISS index and the outcome of SSIs. The more the NNISS score in great, the more the SSIs is important or increased. 1-p=99.9%; Chi² =37.70; ddl=1

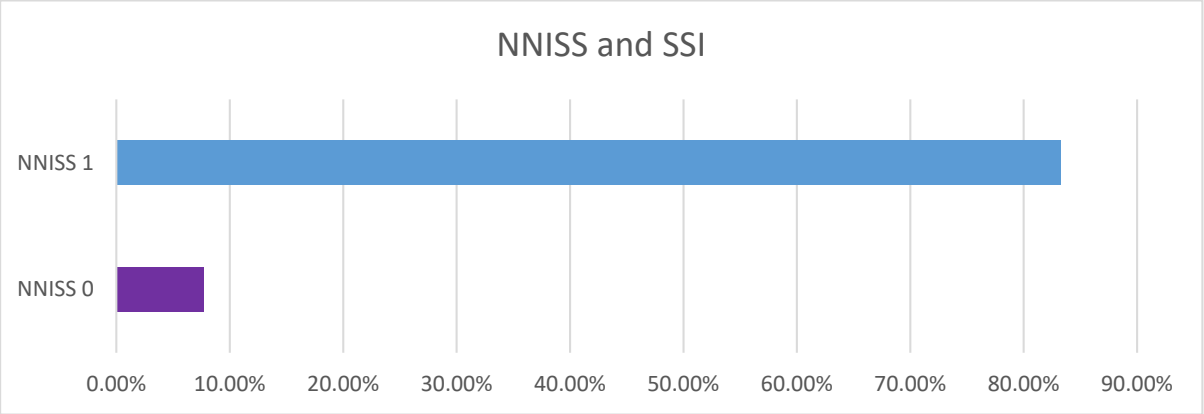

Figure5: distribution of SSI following NNISS index

d- Distribution of SSIs following preoperative shower

Among the 87.9% of the patients who didn't had a preoperative shower, only 10% developed SSIs. Therefore from obtained statistics below, there exist no statistical significance between the outcome of SSIs and preoperative shower. 1-p=56.0%; Chi² =0.06; ddl=1

Figure6: distribution of SSI following preoperative shower

e- Distribution of SSIs following the presence of urinary catheter

The presence of a urinary catheter increased the risk of developing a SSI. This relation was statistically very significant. 1-p=99.9%; Chi² =217.83%; ddl=1

Table 2: patient distribution of SSIs following the presence of urinary catheter

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	Urinary catheter	SSI	Total
YES	173 (80.80%)	21 (9.80%)	214
NO	41 (19.20%)	193 (90.20%)	214
Total	214	214	

DISCUSSION

1- Frequency

This study was based essentially on clinical diagnosis of SSIs as in several studies dealing with similar SSIs. The rate of SSI in this study was 9.8%. This rate is lesser than that obtained by Ngaroua and al. in 2014 who obtained a rate of 30.7% of SSIs at the RHN (our place of study in concern). The program of implementation of the use of the HAS greatly contributed to the amelioration of surgical care and safety of patients. The RHN observed a great decrease in SSIs of the order of 31.92% (RR=3.12.; IC=95%). Our results are similar to that of Djoudi FZ and collaborator in Algeria which was 9.8% (Djoudi FZ 2010), after the institution of a monitoring program. Our rate remains high compared to the rates obtained in France which is of the order of 1.5% SSIs in 2009 (Jarno P. 2009).

In the west, the prevalence of SSI varies between 2 to 5% (Richard 2001) whereas in Africa, the rate varies from 9 to 22% (Kayibanda JF. 2001). This rate still remain high in Africa and in our context, it may be as a result of the precarious hygienic conditions of our hospitals and the lack of a defined system of monitoring of nosocomial infections.

2- Sociodemographic characteristics

In this study, the mean age of the sample was 30.7 years. The factor age, had a statistically significant relation with the development of postoperative infection. This result corroborate with one study carried out in Burundi by Ndayisanba G and al. where the sample size counted mainly young patients with an average age of 37 years. The female sex is a statistically significant factor associated to postoperative infection (OR=3.62; p=0.006). Le sex ratio (male/female) in this study is 0.2. This study

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corroborate with the study of Djoudi FZ and al. (Djoudi FZ 2010) carried out in Morocco where the ratio of male/female was 0.3 in post-operative infections.

3- Risk factors

Risk factors related to infections were: duration of surgery greater than or equal to 2hours, surgical delay or preoperative duration ≥ 3 days and the type of surgery (Altemeier classification). Administered antibiotics before surgery do not prevent the development of infections. As such, Mutombo DP. and al. established that, the administration of antibiotics for prophylaxis purposes increases the risk of surgical site infections (Mutombo DP 1993). Regarding factors related to the duration of surgery, we observed that a surgery that last for ≥ 2 hours greatly increases the risk of SSI. This observation corroborate with data from literature (Nsiata N. 2014).

Furthermore, the relationship between the risk of developing an infection and the type of surgery (classification of Altemeier) was established. The risk was more important for the classes III and IV (p=0.001). Once more, obtained results are similar to those of Coulibaly A in Mali (coulibaly 1999).

On the other hand, an ASA score 2 significantly associated to the outcome of SSI. This association is quite similar to that obtained in France in 2012 by Lonjon and collaborators who established that an ASA score greater than 1 was significantly associated to the outcome of SSI.

The most predominant NNISS score was that of zero (0) with 97.5%. During this study, we had no patient with a NNISS score of 2 and 3, even though NNISS score greater than 1 increases the risk of SSI. Concerned patients in this study that developed SSI were classified under the NNISS score of 1, therefore, it is clear that, the NNISS score is a risk factor of SSI to be taken into account.

CONCLUSION

SSIs constitute a serious complication to handle, both for the patient as well as the surgeon as a result of the fact that, SSIs increases the length of hospital stay period, increases hospital expenses and ruin the success of a surgical operation. Factors in this study that accounts in favor of SSIs include: the female sex, class of Altemeier III and

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IV and the length of hospital stay above 7 days. This study reveals that the rate of SSI was 9.8%. Thus, we obtained a reduced percentage of 31.92% rate of SSI (RR=3.12; IC=95%) compared to the last study. In conclusion, the implementation of the use of HAS in the RHN reduced considerably the rate of SSI and contributed to the amelioration of the quality of surgical care. Nevertheless, the rate of 9.8% still remain high compared to those of developed countries (6.8% to 26%). As such, preventive actions must be reinforced so as to reduce the morbidity and length of hospital stay associated to, without forgetting the expenses related to these infections.

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