International Journal of Chemical and Biochemical Sciences
(ISSN 2226-9614)

Journal Home page: www.iscientific.org/Journal.html



# Study of the state of knowledge and the research for possible risk factors of nosocomial infections in hospitalized patients at El Idrissi Hospital, Kenitra. Morocco

*Asmaa Chaib[1*], Yassine Chaib[2], Anas EL anssari[2], Khalid Chakhtoura[2], Elouakfaoui Aziz[3], Driss Touil[3], Rouani Abdeljebbar[5], Abdelaziz Chaouch[1], Mahjoub Aouane[3]*

[1]*Department of Chemistry, Laboratory Organic Chemistry Catalysis and Environment Faculty of Science Ibn Tofail University, Kenitra, Morocco*

[2]*Higher Institute of Nursing Professions and Health Techniques of Rabat, Ministry of health and Social Protection, Morocco*

[3]*Department of Biology Laboratory Natural Resources and Sustainable Development Faculty of Science Ibn Tofail University, Kenitra, Morocco*

[5]*Department of physics Faculty of Science Ibn Tofail University, Kenitra, Morocco*

**Abstract**

Nosocomial infections are considered a primary cause of death and morbidity in hospitalized patients. The main purpose of the study that we conducted in El Idrissi Hospital in Kenitra (Morocco) is the study of the state of knowledge in the hospitalized patients and the search for possible determinant factor of nosocomial infection. Our data collection methodology was based on a survey based on a valid and reliable questionnaire with a Cronbach index of 0,81. Our study is based on 203 patients, of which 60,1% (n=122) are male and 39,9% (n=81) are female. He averages age of these patients is 43,93±1,23 years. However, 77% of participants say they know nothing about infections contracted during hospitalization. We noted that factors favouring nosocomial infections include cultural and socioeconomical factors, factors related to patients' behaviour and habits and institutional factors. In fact, 54% of participants declare that they use self-medication of antibiotics; 70% of patients admitted to having used the personal objects and materials of another patient. However, 66% of patients do not wash their hands with soap after each passage to the toilet and 91% of surveyed consume cooked meals outside of the hospital. In contrast, 62% of patients testified that some caregivers so not change gloves when passing between patients. The prevention and control of infectious risks are essential to ensure the quality and security of care, for this, it is necessary to promote precautions and essential measures concerning good hygiene practices, training and information for all stakeholders in the health field.

**Keywords:** Nosocomial infection, hygiene measures, Cronbach index, state of knowledge - risk factor

**Full length article** **Corresponding Author*, e-mail: asmaa.chaib17@gmail.com

## 1. Introduction

Nosocomial infections (NI) are known worldwide and affect different hospital structures of all ages. These infections remain a major problem despite the scientific and technical advances in the health field. They can directly impact the increase in mortality and morbidity, prolongation of hospitalization as well as significant socioeconomic complications. NI is considered an indicator of the quality of health care services provided to citizens, thus pushing health establishments to improve their services quality. For this reason, these health establishments must adopt preventive and hospital hygiene measures in order to avoid the risk of infection and contamination in the healthcare environment, thus providing a healthy environment for patients, health professionals, and the surrounding area.

Despite technological advances and developments in health and hospital care sector, the risk of infection from hospitalization turns out to be inevitable for some patients, particularly those suffering from an impaired immunity, or undergo one or more invasive procedures, especially since health establishments are overcrowded places that increases the transmission and the spread of NI. Thus, the application of strict hygiene rules and necessary precautions in the fight against NI are the solution to ensure the patients safety and secure an acceptable level of care quality[1]. Infections are said

to be nosocomial when they are acquired during a hospital stay and were not present nor in incubation at the time of admission to the hospital[2].

Nosocomial infections cause remarkable complications on the health status of individuals, often causing aftereffects in the medium and long term, especially at the functional level. These infections increase morbidity, mortality, and the costs as well as the psychological and social impacts on patients. According to the World Health Organization, more than 1,4 million people worldwide suffer from care-related infectious complications. These infections are among the leading causes of patients' mortality, of all ages, especially for the most vulnerable among them. In developed countries, such as United States, a patient on 136 gets an infection at the hospital that makes them seriously ill. This equates to 2 million cases per year causing about 80 000 deaths. In England, healthcare-related infections caused 5000 deaths per year[3].

However, in Morocco, there is a lag in the awareness of the importance of surveillance and prevention of NI as well as their seriousness and impact on health establishment and population. At the national level, only one prevalence survey was carried out in 1994, the results of which revealed a prevalence of 5% in provincial hospitals, 10% in regional hospitals, and 11% in national hospital structures[4]. NI may be related to the providing care practices, the organization of hospital activities, the actions of healthcare staff, the equipment used, the hospital environment and the invasive procedures that the patient undergoes. Our study consists in the first part to develop the state of knowledge of the nosocomial infections in patients hospitalized in the unit of care at the CHP of Kenitra and look for the possible risk factors of this infection in a second part.

## 2. Materials & Methods

### *a. Study environment*

This research is conducted at El Idrissi Regional Hospital, located in Kenitra city, which serves the population of the Gharb Cherada Beni Hsen which is estimated at 1901301 inhabitants, during a three months period.

### *b. Population under study*

The target population of the study is all patients hospitalized in the different services and care units at El Idrissi Hospital in Kenitra. The realization of the study cannot cover the whole targeted population represented by the litter capacity of 416 beds of El Idrissi Hospital. Therefore, we will work on a well-defined and representative sample of this population. This sample is determined by a sampling process set at n =203.

### *c. Data collection methods*

In order to collect the necessary data from the sampling process, it was recommended by the authors to use an inpatient questionnaire allowing to gather the information needed to build a synthesis meeting the objectives previously determined. To ensure the success of our study, a set of ethical considerations were taken in account such as obtaining a prior authorization from the management of the establishment, the confidentiality and anonymity of the questionnaire and the choice of the suitable time, excluding hours spent on care, change of linen, presentation of meals and visiting hours.

## 3. Results and discussion

### *3.1. Sociodemographic characteristics of patients*

Table (1) presents the results of the distribution of age and gender of patients. It shows that the average age is 43,93±1,23 years. The 95% confidence interval ranges from 41,51 years old to 46,35 years old, with a minimum age of 2 years old and a maximum age of 83 years old. However, the Fisher test does not show a significant difference (chi-square = 1.44, p <0.23), between the average age for men (45,13±1,61 years) and the average age for women (42,12±1,88 years). The distribution of patients by gender shows that 60.1% (n=122) are male and 39.9% (n=81) are female, so gender ratio is not balanced (p<0.000). The dispersion evaluated by the coefficient of variation (39.81%) shows a great variation in the ages of the patients, it is 39.46% for the males and 40.24% for the females.

The distribution of patients by level of education shows that 54% have never attended school while 29% have a primary level and 17% have a secondary level. Nonetheless, 61% of patients come from rural areas and 39% from urban origin. Innumbrable studies have shown that there are several factors favoring the occurrence of nosocomial infections : the high age of the patient, the fragility of his state of health. The level of education or degree level are among the variables that best predict the health status of a group or population. For people with the lowest education level, the rates of hospitalization and care is superior to that of the rest of the population. They seem to be treated only when their state of heanth is urgent. This situation leads to an early deterioration of their health as well as heavy care and more hospitalizations[5]. Both women and men living in farm households report many diseases, but this is due to their higher age. In men, the differences between social background are less sensitive. Household income also influences the number of reported diseases for both women and men, with the lowest income earners reporting more illness than those reporting higher incomes. Finally, the higher the level of education, the lower the number of reported diseases[6].

### *3.2. State of knowledge of the participants*

During the hospitalization, the patient must take some measures and follow special rules to avoid a deterioration of his state of health, among these precautions, those concerning personal hygiene during the stay in the health facility, which must be rigorously applied to avoid the risk of contamination by a pathogenic microorganism, and which will result in an alteration of the general state of the patient. It is true that public awareness of the importance of hygiene rules and the economic, social, and health impact of NI is important in order to minimize the risk of contamination and transmission of pathogens during hospitalization.

The assessment of the state of knowledge of inpatients in care units indicates that 77% of participants do not know what is called hospital-acquired infections and have never heard of ; however, only 23% revealed the opposite. 87% of them have already heard it via family and acquaintances while no one has heard it from the media or health professionals. When 94% of respondents feel uninformed about the size of the NI while only 6% feel well informed. 30% of participants think that NI can cause death while 70% have no idea. In the same perspective, 45% of

participants think that only patients can be affected by NI, while 15% think that visitors too can run this risk, however 16% think that both patients and caregivers can be affected and 24% believe that anyone with access to the hospital can be contaminated. As a result, any detected NI should be limited by measures and precautions in order to stop its spread, therefore, any infection unreported to the operational hygiene team (OHT) will escape these preventive measures and precautions, thereby causing adverse economical and social consequences for those who are cared for, caregivers and health establishments[7].

Regarding the most worrisome elements during hospitalization, 30% opted for anesthesia while 27% revealed that medical errors are the most worrying, 13% confessed that the risk of discovering another disease carries them the most, 18% believe the risk of at the sting are the most embarrassing and only 12% said that the risk of infection worried them much more. It should be noted that if the prevention of nosocomial infection diseases is based largely on the host establishment, the health care personal and the hygiene measures adopted as well as the therapeutic procedures implemented, the knowledge state of the patient on NI and its possible behavior and hygienic habits during hospitalization may be a major factor in the exposure to NI risk. Our study reveals that most patients are unaware of the magnitude and severity of NI and underestimate the risks incurred during hospitalization, as well as a lack of information about unwanted events that may occur during the stay. Most expressed that they are poorly informed about NI as well as lack of information regarding the instructions and hygiene measures to be followed during the period of hospitalization. According to the national council of the order of doctors in France, the nosocomial risk is not only attributable to hospital personnel, it also concerns the public. The Consumer Safety Commission has planned to call inpatients to follow hygiene rules (regular hand washing), by actively participating in the means of fight against nosocomial diseases with diffusion to the public of information as it is already done in some hosiptals[8].

### *3.3. Factors favoring nosocomial infections*

On one hand, 41,9% (n=85) of patients' charts provide information on factors favoring infections such as Chronic Skin Lesions (CSL), Corticosteroids (CO), Diabetes (DB), Obesity (OB), other (latent infection site, BMR carriage, invasive device, no stopping of smoking). On the other hand, table (2) summarizes notifications of factors favoring the infection by diseases depending on the gender of participants. In fact, the chi-square test shows a significant relationship between the gender on one hand and diabetes and other diseases on the other, with respectively the chi-square values 9.06 (p<0,003) and 5,24 (p<0,022). While the charts of male patients with DB and Others are therefore filled with an indication of infection with rates 17.22% and 12.29% respectively, whereas for women, these rates are 35.80% for DB and 24.69% for others.

In addition, the aforementioned factors (comorbidities, diabetes, high blood pressure, renal insufficiency, …) can be a risk factor favoring catching one or more NI. In France, chronic diseases are long-term diseases and evolutive diseases. They often result in a deterioration of the quality of life and are sometimes associated with disability or serious health complications. These pathologies include diabetes, high blood pressure which affects 66% of overs 50s, obesity which affects 50% of 18–74-year-olds, or cardiovascular dieases[9]. As a risk factor, we note people who often combine several pathologies, primitive or secondary immunosuppressed patients to an immunosuppressant or corticosteroid treatment, patients with damaged skin, diabetics, respiratory insufficiency, polytrauma patients and malnourished[10].

In regard to the patient's stay in the hospital services which results in the difference between the discharge date and the hospitalization date, the average is 6,8621±,37 days, with a minimum of 0 days, a maximum of 27 days and a median of 5 days (50% are lower and 50% are higher). The coefficient of variation that expresses the dispersion in the group is much larger, it reaches 78,13% and the distribution is slightly asymmetric-positive (asymmetry coefficient = 1,58 and flattening coefficient = 2,29). In addition, the table below summarizes the results of the analysis of variance with a single classification criterion « gender effect ». The test did not show a significant difference between the average stay for male and female patients (Fisher =1,85; p<0,17). The average number in our ample is 6,86±0,37 days. Indeed, the average number of days of stay among male patients slightly exceeds that of women, it is respectively 7,27 days with a maximum of 27 days and 6,23 days with a maximum of 27 days.

The distribution of patients by age category shows a significant link between the latter and the stay with a fisher value of 2,98 and a p value inferior to 0,05. However, the comparison of the averages by the Tukey test shows that the average number of stay the most important is noted in hospitalized children, it is 10 days, followed by elderly patients where the average number reaches 8,4 days, then comes adolescents and adults with respectively 7,48 days and 6,34 days. Yet, the maximum of days of hospitalization is noticed in adults with 27 days. Nevertheless, the distribution of patients by origin and length of hospitalization is shown in table 3. The latter shows a very highly significant effect on the distribution of stay (Fisher = 14,98; p<0,000). In fact, the average length of stay in patients from other health establishments (average = 8,28 days) is higher than that from home (average = 5,46 days). Regarding the duration before the surgery, the average is 1,94±,18 hours, with a minimum of 0 days and a maximum of 14 days and a median of 1 day (50% are lower and 50% are higher). 95% of preoperative stays fluctuate between 1,59 and 2,29 days. Table 3 presents the results of the analysis of variance with a single classification criterion: « gender effect ». The test did not show a significant difference between the preoperative stay and the gender of the patient (fisher=0,28; p<0,6). In addition, the average duration of males (2,02±0,24 days) exceeds that of female (1,83±0,25 hours). The average number of stay in ours ample is 6,86±0,37 days. Indeed, the average number of stay among men slightly exceeds that of women, it is respectively 7.27 days whose maximum stay has reached 27 days and 6.23 days whose maximum stay has reached 27 days.

The distribution of patients according to the age category shows a significant link between the latter and the stay (Fisher=2,21; p<0,05). In fact, the Tukey average comparison shows that children and elderly patients are those with the longest duration of stay, with average values of 3.75 days and 2.33 days respectively, followed by other categories,

for example, in adults and adolescents, these durations are respectively 1.88 days and 1.24 days.

The distribution of patients by origin and preoperative hospitalization stay is shown in the table below. As a result, the Fisher test showed a strong link between these two variables (Fisher=8,54; p<0,004). Indeed, the average duration of stay in patients from other health facilities (average = 2.45 days) with a maximum stay of 14 days, exceeding that of their home (average = 1.44 days) with a maximum of 8 days. Health facilities are the refuge for people suffering from different pathologies and infection, which makes them a place where the risk of contamination is high. The more we frequent, the greater the risk of contracting an infection. In fact, long-term hospitalization and patients transfers from one department to another or from one health facility to another may be a factor favoring exposure to various microbial agents. They can cause an attack by one or more NI, especially for patients whose resistance to infection is reduced, those suffering from chronic diseases such as diabetes, high blood pressure, heart disease, malnutrition, leukemia or immunodeficiency.

Health structures are the refuge of people who suffer from different pathologies and infections which makes them a place where the risk of contamination is high. The more you frequent them, the greater the risk of contracting an infection. long-term hospitalization as well as transfers of patients from one department to another or from a healthcare establishment health of another may constitute a factor favoring exposure to various microbial agents which may be at the origin of an attack by one or more INs especially for patients whose resistance to infections is reduced suffering from chronic illnesses such as diabetes, high blood pressure, heart disease, malnutrition, leukemia, or an immunodeficiency[11].

In France, the prevalence survey conducted in 2001 showed that 2939 of 21010 patients who had a nosocomial infection, had acquired it in another establishment. The proportion of non-institutional contamination among patients with nosocomial infection was 14%. For the Paris-North CCLIN survey, carried out in 1993, which included 14723 patients, the transfers from another hospital or from another care unit in the same establishment accounted for 14% and 29% of patients respectively [12]. Frequenting several establishments and care units increases the risk of catching an NA given the vulnerability of the patients' immune system and the diversity of microorganisms that exist in their care facilities. This situation makes it difficult for the detection and the declaration of NI because no official agent accepts to admit his responsibility in this NI attack. An infection contracted in the host establishment loses its nosocomial character for the accepting establishment. The stay duration should be reduced as much as possible, especially for the period prior to the surgery. In fact, the flora of the patient is likely to undergo changes during a long preoperative period. It is, therefore, possible de recommend hospitalization for a scheduled intervention at the maximum the day before and when it's possible, the same morning[13].

### *3.4. Surgery: pre and postoperative conditions*

In this part we will describe the reasons for the surgery or intervention, so they are numerous. Table 4 summarizes the crossover results between the nature of the intervention and the gender. The table shows that 54.19% of interventions are urgent, of which 56,36% (n=62) for male patient and 43,64% (n=48) for female patients. The chi-square test showed no significant difference (chi-square=1,40; P<0,24). Besides, 6.9% had multiple interventions, the chi-square test showed no significant difference (chi-square =1,86; p<0,17). Table 5 illustrates the results of the chi-square independence test between the contamination class and certain parameters (age, gender, and urgent intervention). The repartition of patients by contamination class shows that 71,92% (n=146) of patients are characterized by a clean contamination class, 27.59% (n=56) are at a clean/contaminated contamination level and only one patient is confirmed among the contaminated class. There were no dirty infected or unknown class patients.

The cross-sectional study between class and age category did not show a significant link (chi-square = 3,11; p<0,79). Of those with clean contamination, 73.97% (n=108) are adult patients and more that 10% are adults or adolescent patients, while children represent only 4.11% (n=6). In contrast, gender did not show a significant association with the class of contamination (chi-square =3,83; p<0,15), and 63,7% (n=93) among those with clean contamination are male and 36,3% (n=53) are female, while 50% of patients with clen/contaminated contamination are male or female. Only one person in the contaminated class is a male. Nevertheless, the chi-square test of independence showed a significant link between the urgent state and the contamination class (chi-square= 8,39; p<0,015). Indeed, of the patients with urgent intervention (n=110), 71 out of 110 patients had a clean contamination, which represents a rate of 64.54%, and 39 out of 110 patients belong to the clean/contaminated contamination class.

According to the ASA classification, score 1 is given to 73.9% (n=150) of patients, score 2 is given to 21.7% (n=44) and score 3 is given to 4.4% (n=9). Before the patient proceeds to the surgery, caregivers' preparations are made by such as preoperative skin preparations and surgical disinfections of the hands. Regarding operating conditions, the caregivers ensure that the air treatment and the maintenance of the room are in conformity. On 5.42% (n=11) of the charts, difficulties encountered during the preoperative and /or during the surgery are mentioned. As for the caregivers behavior, all medical staff, and this for all surgeries, wears masks and uniforms. Regarding the care equipment used for medical devices, care supervisors within the hospital always think of the sterilization of trace material and the maintenance of reusable equipment and medical devices. In the same way, they proceed to postoperative bandages. Also, they lead the patient to pre and post operative antibiotic therapy sessions[14].

Table 6 presents the depths of the infection results by variables such as gender, origin, urgency, and age. This analysis shows that 68% of charts display no infection compared with 24% of patients who have a supericidal infection and 8% with a deep infection. However, the cross-sectional study between the degree of infection and gender by the chi-square test shows no significant difference (chi-square= 0,34 ; p<0,84), while 28 out of 122 male patients (22.95%) and 21 out of 81 female patients (25.92%) had a superficial infection and 9.01% (n=11) of men versus 7.41% (n=6) developed a deep degree infection. Yet, the chi-square test of independence shows a strong link between the degree of infection and the origin (chi-square= 16,96 ; p<0,000).

**Table 1.** Patient distribution by age and gender

| | N | Avg ± StdE | Confidence interval à 95% for the average | | Mini | Maxi | CV in % | chi-square (p value) |
|---|---|---|---|---|---|---|---|---|
| | | | Lower bound | Upper bound | | | | |
| M | 122 | 45,13±1,61 | 41,940 | 48,323 | 13,0 | 83,0 | 39,46% | 1,44 (p<0,23) |
| F | 81 | 42,12±1,88 | 38,375 | 45,872 | 2,0 | 82,0 | 40,24% | |
| Total | 203 | 43,93±1,23 | 41,511 | 46,352 | 2,0 | 83,0 | 39,81% | |

M : male ; F : female ; N : effectif ; Avg : average ; StdE : standard error; Mini : minimum ; Maxi : maximum ; CV : coefficient of variation ;

**Table 2.** Intersection between gender and the contributing factors

| Contributing factors | | Gender | | Total | Notification rate in % | Chi-square |
|---|---|---|---|---|---|---|
| | | Male | Female | | | |
| CSL | Oui | 2 | 1 | 3 | 1,48% | 0,055 (p<0,81) |
| | Non | 120 | 80 | 200 | 98,52% | |
| CO | Non | 122 | 81 | 203 | 100,00% | - |
| | Oui | 0 | 0 | 0 | 0,00% | |
| DB | Oui | 21 | 29 | 50 | 24,63% | 9,06* (p<0,003) |
| | Non | 101 | 52 | 153 | 75,37% | |
| Other | Oui | 15 | 20 | 35 | 17,24% | 5,24 (p<0,022) * |
| | Non | 107 | 61 | 168 | 82,76% | |
| OB | Oui | 8 | 4 | 12 | 5,91% | 0,23 (p<0,63) |
| | Non | 114 | 77 | 191 | 94,09% | |
| HTA | Oui | 12 | 14 | 26 | 12,81% | 2,42 (p<0,12) |
| | Non | 110 | 67 | 177 | 87,19% | |
| Total | | 122 | 81 | 203 | | |

* : significant difference

**Table 3.** Distribution of patients by length of stay and preoperative stay according to certain sociodemographic factors

| Variable | Modality | Sample Size | Duration of stay | | Preoperative stay | |
|---|---|---|---|---|---|---|
| | | | Average | Standard Error | Average | Standard Error |
| Gender | Male | 122 | 7,27 | ,49 | 2,02 | ,242 |
| | Female | 81 | 6,23 | ,56 | 1,83 | ,253 |
| Total | | 203 | 6,86 | ,37 | 1,94 | ,177 |
| Age | Child | 8 | 10,00 | 3,12 | 3,75 | 1,810 |
| | Adolescent | 21 | 7,48 | 1,17 | 1,24 | ,371 |
| | Adult | 149 | 6,35 | 0,42 | 1,88 | ,193 |
| | Elderly | 25 | 8,40 | 0,95 | 2,33 | ,534 |
| Total | | 203 | 6,86 | 0,38 | 1,94 | ,177 |
| Origin | Home | 102 | 5,46 | 0,44 | 1,44 | ,143 |
| | Other service | 101 | 8,28 | 0,58 | 2,45 | ,320 |
| Total | | 203 | 6,86 | 0,38 | 1,94 | ,177 |

**Table 4.** Cross-sectional study between gender and type of intervention

| | | Gender | | Total | Chi-square |
|---|---|---|---|---|---|
| | | Male | Female | | |
| Urgency | Yes | 62 | 48 | 110 | 1,40 (P<0,24) |
| | No | 60 | 33 | 93 | |
| Multiple interventions | Yes | 6 | 8 | 14 | 1,86 (p<0,17) |
| | No | 116 | 73 | 189 | |
| Total | | 122 | 81 | 203 | |

**Table 5.** Patient distribution by class of contamination and certain characteristics such as gender, age and intervention urgency

| | | Class of contamination | | | Total | Chi-square (p-value) |
|---|---|---|---|---|---|---|
| | | Clean | Clean/ contaminated | Contaminated | | |
| Age | Child | **6** | **2** | **0** | **8** | **3,11 (p<0,79)** |
| | Adolescent | **17** | **4** | **0** | **21** | |
| | Adult | **108** | **40** | **1** | **149** | |
| | Elderly | **15** | **10** | **0** | **25** | |
| Gender | Masculin | **93** | **28** | **1** | **122** | **3,83 (p<0,15)** |
| | Féminin | **53** | **28** | **0** | **81** | |
| Urgency | Yes | **71** | **39** | **0** | **110** | **8,39* (p<0,015)** |
| | No | **75** | **17** | **1** | **93** | |
| Total | | **146** | **56** | **1** | **203** | |

*** :** significant differance

**Table 6.** Distribution of patients by degree of infection and some sociodemographic factor**s**

| Variable | | Degree of infection | | | Total | Chi-square (p value |
|---|---|---|---|---|---|---|
| | | Superficial | Deep | No infection | | |
| Gender | Male | 28 | 11 | 83 | 122 | 0,34 (P<0,84) |
| | Female | 21 | 6 | 54 | 81 | |
| Origin | Home | 22 | 1 | 79 | 102 | 16,96 (p<0,000) |
| | Other service or establishment | 27 | 16 | 58 | 101 | |
| Urgency | Yes | 29 | 10 | 71 | 110 | 0,95 (p<0,62) |
| | No | 20 | 7 | 66 | 93 | |
| Age | Child | 0 | 3 | 5 | 8 | 15,88 (p<0,014)* |
| | Adolescent | 5 | 2 | 14 | 21 | |
| | Adult | 34 | 9 | 106 | 149 | |
| | Elderly | 10 | 3 | 12 | 25 | |
| Total | | 49 | 17 | 137 | 203 | |

* : significa

nt difference

**Table 7.** Multiple correlation between the variables: stay, preoperative stay, postoperative stay and age

| | Stay | Age | preoperative stay | postoperative stay |
|---|---|---|---|---|
| Stay | 1 | ,044 | ,606** | ,761** |
| | | ,536 | ,000 | ,000 |
| | 203 | 203 | 201 | 198 |
| Age | ,044 | 1 | ,069 | ,051 |
| | ,536 | | ,332 | ,478 |
| | 203 | 203 | 201 | 198 |
| preoperative stay | ,606** | ,069 | 1 | ,542** |
| | ,000 | ,332 | | ,000 |
| | 201 | 201 | 201 | 196 |
| postoperative stay | ,761** | ,051 | ,542** | 1 |
| | ,000 | ,478 | ,000 | |
| | 198 | 198 | 196 | 198 |

* : significant difference

In fact, out of 102 patients coming from their homes, 21.57% (n=22) have a superficial infection and only one case has a deep infection, versus 77.45% who have no infection. On the contrary, patients referred by other services (n=101), 26.73% (n=27) developed a superficial infection and 15.84% (n=16) a deep infection. Additionally, the patients whose intervention is urgent, 26.36% have a superficial infection, 9.09% developed a deep infection and 64.54% developed no infection. The chi-square test showed no significant difference (chi-square=0,95; p<0,62). Finally, the independence test shows a significant link between the degree of infection and the age category. Of the 8 children reported, 3 presented deep infection, while 22.82% (n=34) of adults had a superficial infection and 6.04% developed a deep infection.

The chi-square test showed a significant link between these two last variables. The combined analysis of te four variables (age, stay, preoperative stay and postoperative stay) by multiple correlation (table 7) shows that the stay, from entry to discharge, is positively correlated with preoperative stay with a correlation coefficient of 0.61 (p<0,000). It is also positively correlated to postoperative stay with a correlation coefficient of 0.76 (p<0,000). So, we can deduce a positive correlation between preoperative stay and postoperative stay, with a correlation coefficient of 0.54 (p<0,000). We can say that the stay within hospital structures depends essentially on preoperative stay and postoperative stay, the more they stay from entry to discharge increases, the spay preoperative and postoperative increases and vice versa.

The distribution of hospital stays after surgery by gender did not show a significant difference (Fisher=2,25; P< 0,13). The average length of stay postoperative in men is 5.26 days whereas in women id 4.21 days. The « provenance effect » analysis of variance shows a significant difference between postoperative length stay and provenance (Fisher=16,76; p<0,000). In fact, the average duration among those coming from outpatient referrals is almost double the postoperative duration in patients coming from home, so it is 6.23 days versus 3.5 days. However, the nature of the intervention in case of emergency is not a limiting factor in postoperative length of stay as long as Fisher's test showed no significant difference (Fisher=0,09; p<0,76).

The evaluation of behavior and practices of caregivers during medical care shows that 62% of patients have certified that caregivers do not wash their hands after completing the care of the patient and move on to the next. 82% of patients said that caregivers wear gloves while providing care while 18% say they do not. 66% of the surveyed admitted that caregivers do not change gloves when they move to the next patient, and 69% confirmed that the linens are not changed periodically during hospitalization then 31% expressed the contrary and that the average frequency is 5 days. In order to guarantee a high level of care and to improve the care of patients at the level of the various services and units of care, the nursing staff must be aware of the impotence of the application of the protocols of care in order to reduce the risk To transmit to the patient an infection which can be responsible for the deterioration of his state of health during his stays at the level of the services of care[16].

## 4. Conclusions

Nosocomial infections can be transmitted through health care personnel by contaminating a patient with the germs of another with the instruments used while providing care or with soiled hands, hence the need to correct the caregivers' behavior.

The increasing use and excessive consumption of antibiotics leads to increased resistance of bacteria, which is a real health problem for individuals. This overconsumption of antibiotics is due to the self-medication of patients without consulting the doctor, justified by 54% of participants with previous use of antibiotics for similar symptoms or recommendations.

Beyond the usual determinants of self-medication, some appear specific to this therapeutic class. It is above all the feeling of knowing, related to the knowledge of his body, his symptoms, but also of medical knowledge acquired during previous consultations. 75% of patients who say they have taken antibiotics without a prescription believe antibiotic use is justified because a doctor has already prescribed them for the same symptoms.

**References**


[1] M. Phaneuf, Inf; Ph.D. C. Gadbois, Inf ; M.SC. Inf ; M. Inferesspurces. (2009, revised in January 2010). "Nosocomial infections-Acting together for safe and healthy clinical environments".France. 4-6.

[2] C. Yassine, E. Anas, A. Mahjoub, H. Samir, C. Khalid, A. Soulaymani. (2021). Study on the Factors for Reporting Nosocomial Infections in Hospitalized Patients. Indian Journal of Forensic Medicine & Toxicology. 15(2).

[3] World Health Organization. (2005). Recommendations OMS for hand hygiene during care (advanced version). Synthesis. 3-9.

[4] S. Ottmani, J.F. Amrani, F. Gouaima, F. Elkhiel, A. Echkale. (1994). Results of the prevalence survey of nosocomial infections at 24 hospitals. Morocco. 9-23.

[5] M.Z. Michel. (2001). Precariousness and learning at school. 1-2.

[6] Research Branch of Evaluation Studies and Statistics. (2011). Population health in France. P 19-111.

[7] C. Yassine, E. Anas, A. Mahjoub, H. Samir, C. Khalid, A. Soulaymani. (2021). Study on the Factors for Reporting Nosocomial Infections in Hospitalized Patients. Indian Journal of Forensic Medicine & Toxicology. 15(2).

[8] Pr. J. Langlois. (2000). (Report adopted at the session of the national council of the order of physicians). nosocomial infections and out-of-hospital care infections. 11.

[9] Research Branch of Evaluation Studies and Statistics. (2011). Population health in France.19-111.

[10] H. Ridha. (2008). The multiple factors of healthcare-associated infection. Tunis. 39-153.

[11] Y. Chaib, A. ELanssari, M. Aouane, S. Hamama, N. Oujar, K. Chakhtoura, et al. (2016). The factors related to the patients hospitalized favoured nosocomial infections. International Journal of Innovation and Applied Studies. 14(2): 472.

[12] J.L. Termignon. (2003). Implementation of the decree n° 2001-671 du 26 juillet 2001: survey of Moselle healthcare establishments with intensive care activity and proposal to facilitate reporting of nosocomial infections. 4-5.

[13] R. Charvet. (2010). Submission for the D.E.S.C of Forensic Medicine, Nancy Henri Poincare University- Medical school. Surgical site infections (ISO) in orthopaedics and traumatology. Current situation and medicolegal consequences. Reflections on a prospective study of 7163 surgical procedures over five years. France. 10.

[14] A. Bouleghmane. (2006). National Institute of Health Administration. Thesis submitted for the degree of master's degree in health administration and public health. Evaluation of hospital hygiene practices at the SEKKAT hospital in the Casa Ain chock district prefecture. Morocco. 16-53.

[15] P. Goudel. (2013). Master's degree in pharmacy studies, University of Lorraine Faculty of Pharmacy, Fair use of antibiotics at the adult brabois hospital CHU de Nancy: assessment of the role of the pharmacist and the infectiology operational team from 2006 to 2012. 11.

[16] Y. Chaib, A. ELanssari, M. Aouane, S. Hamama, N. Oujar, A. Chaib, M. Nehir, K. Chakhtoura, A. Soulaymani. (2019). The Factors Influencing the use of the Protocols of Care Implanted at the Hospital Idrissi Kenitra-Morocco. European Journal of Scientific Research. 151(4): 489-499.