

Hospital Waste and Typhoid Fever, a Public Health Problem in Hospital: Cases of Nurses in Four Care Institutions in Kinshasa (Rd. Congo)

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Abstract: The present study aims to determine the activity of gatifloxacin against *Salmonella typhi* at the base of typhoid contracted by nurses following the management of hospital waste in a Kinshasa health facility in RD.Congo. The management of hospital waste solid or not does not follow the standards issued by the WHO (garbage are not in the standards, the staff has no protective equipment and everything is done by hand). Of the 38 nurses who were followed, 94.74% were completely cured and all symptoms disappeared after three days of taking the antibiotic.

Keywords: Hospital waste, typhoid, nurses, gatifloxacin, health institutions, Kinshasa, DR Congo

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Introduction

In the configuration of the hospitals visited in Kinshasa, capital of the Democratic Republic of Congo, hospital waste is a real public health problem. They consist of waste assimilated to household waste (DAOM) and waste activities of infectious risk care (DASRI). They are then solid biomedical waste generated by a hospital structure (kitchen waste, office departments as pediatrics, gynecology, surgery) (Daumal, 2012). Thus, the cited author summarizes hospital waste as any biological or non-biological waste, disposed of without any intention to be reused. The hospital staff who is exposed and who makes the connection between the patient and the doctor is the nurse (diploma, passionate, vigilant and of a good human quality (Marie-Céline, 2017).

A nurse is a person because of his profession is close to patients and acts according to the advice of doctors. It ensures the comfort of the patient, their hygiene and their wellbeing. His place of work is the hospital, clinic or other liberal health structures. Thus, it is exposed to several associated infections (mismanagement of patients and their waste in a health facility) such as nosocomial disease and its corollaries such as pneumonia, urinary tract infections, sepsis, digestive tract infections and typhoid fever (Daschner, 1993).

Typhoid fever is a bacterial infection that causes sepsis related to an infectious agent. The infection can be serious and even deadly because of the so-called *Salmonella typhi* bacteria. It can be passed on to health professionals through human waste or the biomedical waste that contains them. The germ is found in the blood by performing blood culture (Bhutta, 2006).

Data from the World Health Organization in 2018 show that 11 to 20 million people contract the disease and that 128,000 to 161,000 die annually (WHO, 2018). The symptoms are: prolonged fever with temperatures between 39 and 40 ° C, headache, nausea, abdominal pain, constipation and / or severe diarrhea that appears when the disease worsens, rashes (hot spots) for some patients. There are other symptoms that occur in patients such as abdominal pain, restlessness, confusion, chills, attention disorders, nosebleeds, severe fatigue, lethargy, weakness.

The treatment involves the administration of liquid and intravenous electrolyte to kill the bacteria. Antibiotics also have the same role. Examples of typhoid medicines are chloramphenicol, ciprofloxacin, cefotaxim, ofloxacin, azithromycin, trimethoprim. The list is long.

Poorly sorted, hospital waste carries several diseases (bacteria, germs); especially in the first line are the nurses who collect waste in their service.

The objective of our study is to verify if the nurses of the health facilities visited are affected by typhoid fever in the exercise of their function when they are in the presence or handling of hospital waste. If warranted, our team will help with treatment using antibiotic-gatifloxacin 200mg or 8-methoxyfluoroquinolone- (Zymaxid) instead of chloramphenicol. This dose is recommended as a tablet to be taken orally .The choice of this antibiotic is dictated by the fact that it can cure patients in 96.5% of cases (Sulochana, 2005).

What motivates this study is the fact that in May 2004, the WHO launched an alert that shows an epidemic outbreak of typhoid fever in Kinshasa in the localities of Kimbaseke, Kikimi, Masina, and Ndjili. 13400 cases were reported including 615 serious cases counted who suffer from peritonitis for 134 fatal cases for 10 days (1 to 10/12/2004). Out of 200 observations, one study indicates that in medical personnel, 0.5% of typhoid fever cases have been reported (Valmary, 1979).

Methodology and Material

The target population is nurses from four health facilities in Kinshasa Province, DR Congo. These hospitals are old and partially funded by the state under the supervision of the Ministry of Health. Health facilities are composed of:

The University clinics in Kinshasa (CUK): deals with the teaching of medicine to students of the University of Kinshasa. It was then a training center which was created in 1957. The area is 27.000m² of which 23.000 m² of built surface. This health facility has 547 beds for 20 departments for 1793 agents composed of 404 doctors, 685 paramedics, 704 surface or maintenance agents.

The Kinshasa Provincial Reference General Hospital (HGPRK): was created in 1912 with a capacity of 2,000 beds with 1004 beds occupied to date. There are 31 pavilions with several departments ranging from pediatrics to physical medicine. There are 2368 employees,

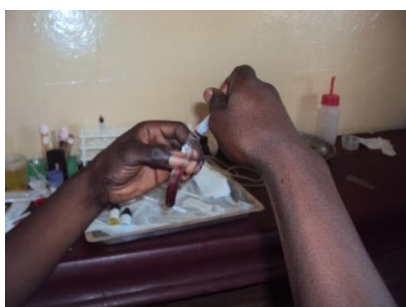
including 1050 paramedics, 69 maintenance workers, 169 doctors and other non-inventoried agents.

The Kintambo General Hospital (HGK): was established in 1923-1924; with currently several departments for 230 occupied beds. 804 staff makes up the entire hospital staff of 222 doctors, 259 nurses, 232 administrative staff, 86 paramedics and 5 maintenance staff.

The General Reference Hospital of Ndjili (HGRN): was created in 1952 for 22 services for 260 occupied beds. 405 agents make up the entire staff of the hospital. It is composed of 90 doctors, 130 paramedics, 150 administrative agents and 35 maintenance agents.

Our selection of the sample is for nurses between 30 and 45 years old, men or women without distinctions, who occupy this job for at least 10 years and who answered the questionnaires during a period of 4 months. Before submitting questionnaires to nurses, here are the pictures that summarize how hospital waste is managed.

The two figures (1 and 2) which follow show on the left a nurse - laboratory assistant who takes the blood of a patient without any protection. The syringes, the cotton wool are thrown on this blue cover where we find paper, bottles, with drops of blood scattered on the lid. The nurse is exposed here to any kind of disease and microbe (bacterium, germ) that accompanies the waste.



Figures (1, 2). Laboratory sampling of HGPRK

Then the waste is stored by the nurses in their service or under the leech until the cleaning agents come to recover for a final evacuation site which is often chosen at their choice in the periphery or inside the establishment of as shown in Figures 3 and 4.



Figures (3, 4): bin with mixed hospital waste in the HGRN Gynecology Service Corridor with a red placenta pouch and unstandardized trash under the HGK sink which is on the right. Finally at the end of the corridor is a blue tank of Figure V which is the place of final mixing of DAOM and DASRI before the final evacuation. In the health facilities mentioned there is no room for the storage of garbage cans collected in various departments.



Figure 5. Final waste collection bin that illustrates the definition of biomedical waste which is a mixture of DAOM and DASRI.

The figures cited above illustrate the behavior of nurses within the health facility. They work without protection, which is why they also contract several diseases.

Thus, a follow-up for one year from January 2017 to December 2017 is necessary to see the manifestation of signs of typhoid fever (prolonged fevers around 39 to 40°C, continued headache, cough and regularity of diarrhea, nausea and abdominal pain). For the selected case, they continued the care in January and Mars 2018 using the chosen antibiotic.

The nurses in our study also responded to a health questionnaire before and during the period of this study. The results are shown in Table 1.

To confirm the presence of Salmonella in adults, blood culture was performed. The samples taken by the nurses have not been made by intravascular an device, which often increases the risk of contamination. The contaminations are linked to the fact that the sampling site is poorly prepared, hands that are not disinfected, poor sampling techniques with invasive devices and poor asepsis of caps of blood culture flasks. The facts also that the nurses do not wear gloves increase the chances of contamination.

As equipment: an automaton for incubation for a period of 5 to 7 days, tourniquet, hydro-alcoholic solution, disinfected bottles. The quantity of blood sampled is at least 20 ml distributed in two vials of aerobic and anaerobic blood culture (it is possible also two or three or four pairs of blood cultures collected over 24 hours). The total volume cultured varies between 40 and 60 ml (Lee, 2007). It should be noted that before any antibiotic treatment, three pairs of blood cultures must be taken, where the incubation period will be prolonged from 5 to 7 days to 21 days minimum.

Results and Discussions

In terms of personnel, the four health facilities are composed of 989 nurses in which we chose 80 who submitted and answered all the questionnaires of investigations concerning the clinical signs of typhoid fever (Table 1).

Table 1. Clinical signs of typhoid fever (January 2017-December 2017) (n = 80).

Symptoms	CUK (20)	HGPRK (20)	HGK (20)	HGRN (20)	Amount	%
Fever	15	18	15	17	65/80	81,25
Headache	14	15	18	12	59/80	73,75
Cough	13	16	14	18	61/80	76,25
Diarrhoea	14	15	13	16	58/80	72,50

When reading the Table 1, we find that of the 80 nurses who answered the questionnaire 81,25% presented during the year a high fever with temperatures included between 39 and 40 ° C, 76,25% the cough, 73.75% headache and finally 72.50% diarrhoea.

Nurses tell us to lower body temperature, quinine (or aspirin) served as a medication whenever it had the episode of temperature rise; Dafalgan for headache and Motilium for diarrhoea (self-medication); other nurses use medicinal plants to relieve this rise in temperature.

Following the repetition of the symptoms, it was important to do a thorough study to determine the source. Another factor that can justify the symptoms can be explained by the insalubrities of the entire city of Kinshasa province, the presence of stagnant water and the development of mosquitoes and wild waste deposits in general.

The study selected 10 nurses per health facility and made up a sample of 40 people in Jan 2018 – March 2018. These people continue to experience the same symptoms and have been contacted for follow-up and development of blood culture tests to confirm the presence of typhoid fever. Blood culture is the only way to state the diagnosis of typhoid fever for the first two weeks.

Thus, a blood sample was taken from each nurse selected to confirm the actual presence of *Salmonella typhi*. Of 40 nurses 38 of them suffer from typhoid fever following the incubation performed on samples taken from the blood. The treatment we chose because of its activity on the bacterium is gatifloxacin (quinolon class antibiotic). Table 2 presents the results obtained

Table 2. Treatment outcome of nurses with gatifloxacin (n = 38)

Days	Tablets	Results	Comments	%
1	2	2/38	abandonment	5,26
3	6	36/38	healing	94,74

Table 2 shows the effectiveness of the antibiotic used and shows that 94.74% of the nurses were cured and all the inventoried signs disappeared in less than 7 days by taking 2 tablets daily and for 3 days (6 tablets consumed). Only 5.26% gave up and were not followed from the first day of taking the antibiotic.

Conclusions

The study carried out correlates the behavior of nurses with hospital waste. Indeed, the nurses are supposed to clean the hands after each sampling, to make the use of the gloves when handling the patients either in hospitalization or in ambulatory care. It then shows that due to the lack of doctors working in health facilities that we often confuse the rise of fever, stomachaches or diarrhea as well as cough are more related to the insalubrities or the presence of mosquitoes in their immediate environment while through their workstation, it lacks hygiene. As a result, they are surrounded by hospital waste, especially DASRI, which supply germs and bacteria and can cause typhoid fever.

What confirms this work than on the sample of 40 of them two cases dropped and at least 38 were followed. 36 nurses were cured by taking 6 tablets for 3 days, i.e. 94.74% of gatifloxacin and 2 nurses gave up treatment and were not followed. This result confirms the

WHO study on the application of gatifloxacin in 390 patients in Asia and South Africa, which was found to cure 96.5% (www.sciencesetavenir.fr).

In the future we will propose a comparative study between the use of two antibiotics gatifloxacin and cefixim in relation to the activity of chloramphenicol on the workstation in health establishments. With the education and public awareness of hospital hygiene in health facilities where many bacteria and germs circulate, this disease can be eradicated

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