Practice of Sterilization and Disinfection during Hysterosalpingography in some Hospitals of the Northwest, Southwest and Littoral Regions of Cameroon

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Abstract

Hysterosalpingography (HSG) is a diagnostic imaging procedure used to study the female reproductive system using contrast medium which is injected into the uterus and x-ray images are taken as the dye fills the uterus and fallopian tubes. Proper sterilization and disinfection protocols are essential to minimize the risk of introducing pathogens into the reproductive tract during the procedure. The purpose of this study was to investigate disinfection and sterilization practices of HSG equipment before HSG procedure in some hospitals in Cameroon. At the end of the study, collected data was compiled and analysed, the results showed 0% of proper sterilization was done for the equipment used, all the equipment were poorly disinfected with poorly made chemicals (sodium hypochlorite) solution (100%). Most of the equipment used were either about 80% stained or rusted. Based on the finding of this study, it was concluded that the practice of sterilization and disinfection of HSG equipment in Cameroon is poor, and there is need for improvements of the practice

Keywords: *Radiography, Hysterosalpingography, Sterilization, Disinfection, Cameroon.*

I. INTRODUCTION

Hysterosalpingography (HSG) is the radiographic evaluation of the uterus and fallopian tubes, the procedure is used predominantly in the assessment of infertility and abnormalities of the uterus and fallopian tubes. (Farnaz 2012). Since the first HSG by Cary in 1914 this day, HSG still remains one of the best procedures to image the fallopian tubes predominantly used in the evaluation of infertility. Because many women have developed pelvic inflammatory disease following this procedure, it must be performed under strict sterile conditions, since the peritoneal cavity can easily become infected, with the infection spreading through the contrast medium and or equipment used during the procedure. It is therefore very important for all radiographers to have knowledge and practices regarding disinfection and sterilization methods as ways of infection control during this procedure (Spaulding 1939). Infertility affects approximately 48.5 million couples around the world (Beisun 2021). Globally, the age-standardized prevalence rate of female infertility increased by 14.962% from 1366.85 per 100,000 in 1990 to 1571.35 per 100,000 in 2016, representing a shift of 0.370% per year. And most often the women suffering from infertility go in for hysterosalpingography as one of their work ups. (Lauren 2024).

In Africa the average female infertility range from 0.6% to 3.4% for primary infertility and 8.7% to 32.6% for secondary infertility over the past 10 years. (Elhussein *et a*l 2019). In Sub-Saharan Africa alone it is estimated at 5-8% of couples suffer from infertility at some point in their reproductive lives. Majority of these being women go in for HSG procedure as one of their workups and up to 44% of them develop PID following HSG procedure which results from introduction of pathogens in to their reproductive systems during the procedure.

In Cameroon, infertility rate is high with a prevalence of 24% primary infertility, and secondary infertility at 17.6%. The high infertility rate is associated with PID, Sexually Transmitted Infections and age and occupation among other factors (Jerald *et al* 2022). HSG remains one of the most common first-line diagnostic test to evaluate

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infertility which is the main indication for the test, it accounts for 67.5% of workups for infertility (Duhamel *et al* 2020). These values demand proper practice of sterilization and disinfection techniques to prevent nosocomial infections after the procedure. Sterilization and disinfection are the basic components of hospital infection control activities. Because sterilization is a process, not a single event, all steps must be carried out correctly for sterilization to be effective. (Simapreet 2012).

II. MATERIALS AND METHODS

➢ *Study Design:*

The study was a descriptive cross sectional designed.

➢ *Study Area and Justification:*

The study was carried out in three hospitals in three regions of Cameroon, namely: - Policlinique de Poitier Douala, Bamenda Regional Hospital, mile 1 hospital Limbe. These hospitals were chosen because they practiced Hysterosalpingography at the time of the study and are all located in Cameroon.

➢ *Sample Population:*

The study population included all medical imaging technologists and hysterolsalpingography procedures observed at the time of the study.

➢ *Inclusion Criteria:*

The study included technologist working at Policlinique de Poitier Douala, Bamenda Regional Hospital, mile 1 Hospital Limbe, who were allowed to carry out HSG, and all HSG procedures carried out at the time of the study.

➢ *Exclusion Criteria:*

The study excluded all practicing technologist and students who were not allowed to carry out HSG procedure.

➢ *Sampling:*

- *Sample Size Calculation:*

Sample size calculation gave a sample of 252 HSG procedures to be studied.

➢ *Sampling Methods:*

A random sampling technique was used as this gave equal opportunities to choose HSG procedures.

➢ *Data Collection Procedures:*

Data was collected mainly through observation and interviews.

➢ *Data Management and Analysis:*

Data that was collected and filled in observation forms, were coded and typed on excel then was analyzed using statistical package for social sciences (SPSS) version 20.0 and presented in different formats.

➢ *Ethical Consideration:*

The study was carried out paying attention to ethical principles of autonomy, non-maleficence, and beneficence, the hospitals will be randomly labeled hospitals A, B and C within the study for confidentiality.

➢ *Limitations:*

The study was carried out in three hospitals only.

➢ *Definition of Terms:*

- **Hysterosalpingography**: examination of the uterus and fallopian tubes by radiography after injection of an opaque medium (Miriam Webster medical dictionary 2024)
- **Sterilization**: is the process of making something completely cleaned and free from bacteria (Cambridge Dictionary 2024)
- **Disinfection:** the process of cleaning something using chemicals that kill bacteria and other organisms (= very small living things) that cause disease (Cambridge Dictionary 2024)

III. RESULTS

➢ *Demographic Representation of the Study Population according to Highest Qualification:*

Table 1 Shows the Distribution of the Study Population according to the Highest Qualification

	Highest Qualification	Frequency	Percent	Cumulative Percent
	Degree	12	37.5	37.5
Valid	**HND**	20	62.5	62.5
	Total	32	100.0	100.0

From the table, it was discovered that majority of the participants were holders of HND 20(62.5%), while the minority were holders of a first degree 12(37.5%).

➢ *Demographic Representation of the Study Population according to Years of Work Experience:*

Table 2 Shows Distribution of the Study Population according to Years of Work Experience

	Years of work experience	Frequency	Percent	Cumulative Percent
Valid	1—5	16	50.0	50.0
	6—10	12	37.5	37.5
	11 and above	4	12.5	12.5
Total		32	100.0	100.0

From the table, majority of the study participants had work experience ranging from 1 to 5 years 16(50%), followed by those with work experience within the range of 6 to 10 years, making up 37.5% of the total study population, while the minority had above 11 years of work experience 4(12.5%).

➢ *Methods of Preparation of Hysterosalpingography Equipment before use:*

Table 3 Shows the Method of Equipment Preparation before Hysterosalpingography Procedure.

	Equipment preparation	Frequency	Percent	Cumulative percent
Valid	**Equipment sterilized using dry heat or other methods before HSG**	0	0.0	0.0
	Equipment sterilized using (bleach)sodium hypochlorite before HSG	252	100.0	100.0
Total		252	100.0	100.0

From the table, it was discovered that all the equipment for HSG were prepared by sterilizing them in prepared solution of sodium hypochlorite (bleach) 252(100%), while none of the equipment was sterilized before HSG using dry heat or other methods 0(0%).

➢ *Nature of Hysterosalpingography Equipment in the Study Institutions:-*

Fig 1 Nature of Hysterosalpingography Equipment in the Study Area

The HSG cannula used in hospital A and C were seen to be 80% stained or corroded, while the cannula in hospital B was seen still clean.

IV. DICUSSION

This study was aimed at investigating the practice of sterilization and disinfection during HSG in Cameroon, three hospitals in three different regions of Cameroon were sampled, and were randomly labelled A, B and C for confidentiality. The study involved 32 practicing technologists and 252 HSG procedures that were observed. As shown on table 1, it was discovered that out of the 32 practicing technologists, 62% were higher national diploma (HND) holders and 37% were first degree holders in medical imaging technology. Years of work experience for the practicing technologists was investigated as shown on table 2, and it was discovered that majority of the participants had work experience of 1-5 years which accounted for 50% of the total study

population, it was followed by those with work experience ranging from 6-10 years of work experience that accounted for 37.5% of the total population, while the minority had work experience above 11 years, which accounted for 12.5% of the total population.

252 HSG procedures were observed to evaluate the practice of disinfection and sterilization of HSG equipment. As shown on table 3, it was discovered that before the HSG procedures that were observed were carried out, none of the metallic and plastic equipment used was properly sterilized (0%), they were all poorly sterilized (100%). In all the sampled hospitals, sterilization was done by soaking the equipment in a prepared solution of bleach (sodium hypochlorite), liquid soap and water with no defined proportions, despite the years of work experience and levels of education of the practicing technologist, the equipment were later placed on trays disinfected by swapping with wet cotton bud soaked in alcohol. As per sampled hospital, these prepared solution had no defined time limit for use or storage. In Hospitals A and C, their prepared solutions were made up of water and bleach only, these solutions were only changed when the radiographers thought it was not effective again, and on average, they lasted for up to about three weeks, but in hospital B, their prepared solution was made up of liquid soap, bleach and water and the quantities were not defined, the prepared solution was changed on weekly bases, mindless of how many times it had been used. In all three hospitals A, B and C, the solutions were used to disinfect both plastic and metallic HSG equipment. The equipment were allowed in the solution without respect of contact time, this ended up leaving the equipment either 80% corroded metal or 80% stained plastic as seen on figure 1. The stains were suggestive of bacterial growth and or bleach solution deposition, which exposes patients to increased risk of infections and other complications resulting from introduction of debris from the cannula in to the reproductive system. These findings are in line with the study of Kersia 2023 which showed that continuous use of bleach leads to corrosion and rust of metallic equipment.

Presence and use of sterilization approved equipment such as autoclave and chemicals solutions for sterilization and disinfection were investigated, and it was discovered that none of the radiology departments in any of the sampled hospitals had a fully functioning autoclave or approved chemical solutions for disinfection and sterilization of hospital equipment. This finding differs from that of Bukar et al 2011 where the radiology department had approved equipment and chemicals for sterilization and disinfection of equipment..

The nature of equipment used during HSG procedure was evaluated, and it was discovered as shown on figure 1 that the single use plastic kit was used on multiple patients, the metallic equipment including the cannula, hysterometer and forceps were rusted as seen in figure 1 hospital C or in an advanced state discoloration and with severe stain deposit in some cases suggestive of retained bleach and or bacteria growth as seen in figure 1 Hospital A. the reasons that accounted for the nature of the equipment were that in all the hospital involved in this study, bleach contact time with the equipment was not respected, equipment were allowed in the bleach solution for a minimum of 30 minutes and sometimes left overnight, it was also noticed that measure were not taken to accurately measure the bleach water ration appropriate for the various types of equipment. Continuously working with this poor conditions of equipment, exposes patients to possible infections resulting from, injection of rusted particles, bleach deposits and bacterial in to the uterus which may go as far as causing peritonitis, pelvic inflammatory diseases and even carcinogenesis.

V. CONCLUSION

The study has shown that radiology departments in Cameroon hospitals do not have appropriate equipment and chemicals for both sterilization and disinfection of equipment, the study has also shown lack of adequate knowledge on the dilution ratio of bleach (sodium hypochlorite) for various purposes, bleach contact time and life span of the prepared solution. Resultant corrosion and discoloration of HSG equipment, putting all the above mentioned in to consideration, it is concluded that sterilization and disinfection of HSG equipment in Cameroon is poor, and therefore a need to standardize and implement guidelines on national level to help improve patient safety

RECOMMENDATIONS

Radiology departments in Cameroon should develop standard operation procedures for practice of sterilization and disinfection during special radiographic procedures.

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