

## Reprocessing Competency of Gastrointestine Endoscopes, the Gap Between Basic Principles and Actual Practice in Endoscopy Units in Alexandria University

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**ABSTRACT:** Endoscopy is a major diagnostic and therapeutic modality in the care of patients with disease of the gastro-intestinal tract. Ethically, we are obligated to do the right thing. However, is it fair that the first patient receives a properly cleaned/processed device and subsequent patients may not? All patients have the right to receive the same standard of care. The society of gastroenterology nurses associates (SGNA) presents a standards to be used for all settings where gastrointestinal endoscopy is practiced. The purpose of the study is 1- To assess the endoscopy nurses practice as regard principle of disinfection and sterillization as an infection control in gastrointestinal endoscopy units. 2- To identify the difference between the standard of infection control practice and the actual nurses practice. Nursing practice evaluation sheet includes endoscope reprocessing competency sheet and observational competency checklist were used. It was found that a huge gap exists between what is generally recommended for reprocessing endoscopes and clinical practice and what is practiced.

### INTRODUCTION:

The rapid expansion of medical knowledge and technology has introduced a range of complex and aggressive diagnostic and therapeutic procedures which are gastrointestinal endoscopy.<sup>(1)</sup> Bleeding and perforation are complication of gastrointestinal endoscopy that are usually immediate and obvious. However, infectious complications and transmission of infection are Endoscopy-associated infections remain the most frequently reported infections associated to

medical devices.<sup>(3)</sup> The vast majority of rigid endoscopes and flexible endoscope are not being more difficult to recognize.<sup>(2)</sup> sterilized between uses. For example, endoscopes can be cleaned and exposed for an adequate period of time to a high level disinfectant, but then rinsed with tap water, thereby contaminating the device again with a variety of water borne microorganisms.<sup>(4)</sup>

A wide range of pathogens involved in endoscopy-associated infections has been described including viruses (HBV, HCV, and

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HIV), different bacterial general (e.g. *Salmonella*, *Pseudomonas*, *Helicobacter*, *Mycobacterium*, and *Staphylococcus*), fungi, and parasites. Relevant sources of infection are patients who are infected or carriers, not only in terms of endogenous infection, but also of cross infection due to faulty policies or practices for processing and storage of scopes and accessory devices, or to non-compliance with adequate policies.<sup>(5)</sup>

On the other hand, there are ethical issues associated with inadequate processing of endoscopes where patients come to us for medical care. Ethically, we are obligated to do the right thing, however, is it fair that the first patient receives a properly cleaned/processed device and subsequent patients may not? Don't patient have the right to the same standard of care regardless of the time of the day their procedure is scheduled? When the nurse is finished processing a scope, ask herself, "would I want this scope used on me or a member of my family?" If not, why you are using it?<sup>(6)</sup> All patients have the right to receive the same standard of care. There are

several nursing organizations that develop practices or standards. The Society of Gastroenterology Nurses Associates (SGNA) has guidelines for infection control in endoscopy and association of peri-operative Registered Nurses (AORN) has its recommended practices.

The SGNA presents a standards to be used for all settings where gastrointestinal endoscopy is practiced, including guidelines for the use of high level disinfectants and sterilants for reprocessing of flexible gastrointestinal endoscopes. This is true regardless of the setting that is, hospital, clinic, or office, or the variety of gastro-intestinal procedures performed. The SGNA guidelines are regarding the personnel, rooms, reprocessing protocol and education and training. For personnel, the American Nurses Association (ANA), recommended that format of structured standard must be inclusive of all levels of nursing care provider in a variety of settings, and described the collaborative nature of gastroenterology, hepatology, and endoscopy practice. On the other hand, only

individuals who are able to read, understand, and implement instructions on the proper cleaning and high level disinfection of gastrointestinal endoscopies and accessories should be given the responsibility to reprocess such instruments. In addition, these individuals must meet annual competency standards to endoscopy reprocessing.<sup>(1)</sup> As regarding the procedure room to prevent cross-contamination in an endoscopic procedure room, most area of the room should be designated as clean but contaminated areas should be separated from clean counter areas, Also all contaminated areas must be cleaned and decontaminated between patients, reprocessing room should be a room separate from where endoscopic procedures are performed. Considerations include adequate space for reprocessing activities, proper airflow and ventilation requirements, work flow patterns, work surfaces, lighting, adequate utilities such as electrical support and water, hand and eye washing facilities, air drying capability, and storage.<sup>(7)</sup> According to reprocessing protocol, there are basic steps to clean and perform high level disinfections of gastrointestinal endoscopes like preparing the endoscope for cleaning, leak testing, cleaning, and rinse after cleaning. High level disinfection (HLD) destroys all vegetative microorganisms but not necessarily all bacterial spores. HLD is achievable with a 20 minute soak at room temperature using a 2% glutaraldehyde solution that test above its minimum effective concentration [American Society of Gastrointestinal Endoscopy (ASGE) & SGNA 2000], manual disinfection, rinse after manual disinfection drying, and storage.<sup>(8)</sup> Finally, education and training which are a critical part of the orientation and continuing education for all personnel, including physicians, nurses, and assistant personnel. The component of this education program should include universal precautions, Occupational Safety and Health Administration (OSHA) rules on occupational exposure to blood borne pathogens, reprocessing procedure for endoscopes and accessory equipment, mechanism of disease transmission, maintenance of a safe work environment,

safe handling of high level disinfectant and sterilants, and procedures for waste management.<sup>(1)</sup>

The guidelines provide a policy allowing for identification and elimination of possible sources of infection, either originating from other patients or from the environment, and thus significantly contributes to the improvement of patient's and staff's safety. Compliance with accepted guidelines for the reprocessing of GI endoscopes between patients is critical to the safety and success of their use. When these guidelines are followed, pathogen transmission can effectively be prevented. Increased efforts and resources should be directed to improve compliance with these guidelines.<sup>(2)</sup>

## **AIM OF THE STUDY**

### **This study aims at:**

- Assessing the competency of nurse's clinical practice as regards the endoscope washing and disinfection, and endoscope reprocessing competency.

- Identifying the difference between the standard of infection control practice and the actual nurse's practice in gastrointestinal endoscopy units in Alexandria University.

## **MATERIAL AND METHODS**

### **Material**

Design: this research is non-experimental cross sectional.

### **Setting**

This study was conducted at medical and surgical endoscopy units in Alexandria Main University Hospital and the Endoscopy Unit in Medical Research Institute.

### **Subject**

The sample of the study included all nurses working in the above mentioned endoscopy units, 7 nurses in Alexandria Main University Hospital and 13 nurses in Medical Research Institute.

### **Tools**

A questionnaire was adopted by the researchers, it comprised two parts:

**Part I:** Addressed information about age, nursing qualifications, years of experience, years of experience in endoscopy units, the cause of working in endoscopy unit, who has trained her, attendance of training programs, and her knowledge about the transmission of disease through the endoscopy.

**Part II:** Includes endoscope reprocessing competency sheet published by Society of Gastroenterology Nurses and Associates 2000 (SGNA). It was divided into appendix I including reprocessing competency criteria observational checklist which includes 13 subitems and appendix II including competency observational checklist clinical practice, endoscope washing, and disinfection. It includes 5 critical behaviors, response on the previously last two components were rated by using Met (0) and Not Met (1).<sup>(1,4)</sup>

## Methods

- 1- Permission to conduct this study was taken from authorities in the previous mentioned settings and consent from nurses participating in the study.
- 2- The tool were revised by 6 experts from the medical field as follows; 2 physicians from Research Institute, Alexandria University, 2 professors from Faculty of Nursing, Alexandria University, and 2 professors from Faculty of Nursing, Banha University to test content validity. Clarity and corrections were carried out accordingly.
- 3- Observational reliability on six nurses, two from each area, test-retest of reliability was done ( $\alpha=0.78$ ).
- 4- A pilot study on five nurses, included in the study, was done to test feasibility of the tools.
- 5- The researchers attended training programs to be experienced and ready to conduct the study.
- 6- Each nurse was observed once by two experienced researchers at the same

time to assess her performance for reprocessing of endoscope and her clinical practice for washing and disinfection.

### STATISTICAL ANALYSIS

The statistical package for social sciences (SPSS) was utilized for statistical analysis and tabulation.

#### **The following statistical measures were used**

- a- Descriptive measures include number, percentage, arithmetic means, and standard deviation,
- b- t-test was used to compare between total score of years of experience in relation to reprocessing and washing disinfection practice

### RESULTS

Table (1) shows the distribution of the studied sample according to the nurse's characteristics. As regards age, half (50%) of the studied sample were of age over 30 years.

Concerning nurses qualifications, the majority of nurses (90%) held a nursing diploma specialty. In relation to work place, 65% were in endoscopy unit in Medical Research Institute, Alexandria University. As regards the years of experience, 45% have more than 10 years of nursing experience and 45% have more than 10 years of endoscopy experience. Regarding the cause for working in endoscopy unit, 60% were transferred to endoscopy unit temporarily and 40% are hired at the beginning of their working career in the endoscopy unit until the time of conducting the present study.

Table (2) reveals the knowledge and attendance of the studied sample of the training programs of reprocessing and washing and disinfection practice of endoscope, 70% attended training programs but only 50% attend on a regular base once per year. As regards knowledge, about transmission of diseases through the gastroscopy, 100% of nurses stated that there is transmission of infectious disease through gastroscopy. Regarding the type of infectious

diseases, 75% stated that only viral disease could be transmitted through gastroscopy. In relation to the training of reprocessing, washing, and disinfection, the majority of the nurses (90%) were trained by experienced nurse in endoscopy unit.

Table (3) illustrates the nurses practice as regards reprocessing competency criteria. 95% of nurses wear personal protective equipment, 85% of nurses brush all valves and channels, but only 35% of nurses brush lip of biopsy port five times, 80% of nurses suck scope until is fluid clear. It reveals that only 70% of endoscope reprocessing competency criteria were met.

Table (4) illustrates the nurses practice regarding washing and disinfection of endoscopes. 95% of nurses demonstrate the use of automatic reprocessor for high level disinfection. However, 100% demonstrate the process of manual disinfection for endoscopes. 40% of nurses demonstrate the process of manual washing and brushing all channels. This table reveals that only 70% of

critical behavior of clinical practice of washing and disinfection of endoscopes were met.

Table (5) shows the relation between attendance of training programs and the practice of reprocessing criteria and clinical practice of washing and disinfection of endoscopes. It reveals that 65% of the studied sample attend training programs and wear personal protective equipment, bubble air to clear air/water channel, and suck scope until is fluid clear, 69% of nurses who attended the training program followed the reprocessing criteria and clinical practice of washing and disinfection of endoscopes. On the other hand, 28% of nurses who did not attend the training program were following the reprocessing criteria and clinical practice of washing and disinfection of endoscopes.

Table (6) shows the relation between the total years of experience and the practice of reprocessing criteria and clinical practice of washing and disinfection of endoscopes, 85% of nurses who had 10 years of experience met the suction of scopes until is fluid clear, ends

by suctioning air to clear fluid from scopes, 85% of nurses had 9 years of experience brushing all valves and channels. On the other hand, 60% of nurses who had 13 years of experience do not meet to demonstrate the process of manual washing and brushing all channels, 50% of nurses who had 7 years of experience do not meet to demonstrate the process of manual disinfection for endoscopes.

## DISCUSSION

Proper reprocessing of endoscopes is critical to the safe and successful treatment of patients. All staff who are working in gastrointestinal endoscopy unit should adhere to reprocessing competency criteria and critical behaviors of washing and disinfection that will maintain a safe environment, free from the possibility of spreading disease to patients and coworkers.<sup>(9)</sup> The study revealed that all nurses in the endoscopy unit in Alexandria University were not specialized in endoscopy units and the majority of nurses is transferred to endoscopy unit. The Society of

Gastroenterology Nurses and Associates recommended that temporary personnel should not be allowed to clean or disinfect instruments in either a manual or an automated reprocessing system.<sup>(1)</sup>

The results also revealed that more than half of the nurses attend training program but only half of them attend training program yearly, the majority of the nurses stated that only viral disease could be transmitted through the gastroscopy, also the majority of them were trained by previous nurse who worked in the endoscopy room. Should nurses not receive specific training programs related to reprocessing of endoscopes, it is evident that they would perform poorly in their practice. As revealed in the study, the nurse who attended training program met only more than half of the reprocessing criteria and critical behavior of washing and disinfection of endoscopes because they were only exposed once or twice to such training. In addition, the previous nurse who worked in endoscopy was responsible to train the new one which is very dangerous because the malpractice will be spread from one nurse to another, and poor practice could be expected. Thus, lack of specialized training programs on a

regular base and/or refreshing workshops may be factors behind nurses' poor knowledge and non-compliance to guidelines of reprocessing protocol.

Several studies stated that reprocessing guidelines education is a critical part of the orientation and continuing education for all personnel, including physicians, nurses, and assistant personnel who work in the gastrointestinal endoscopy setting. Components of this education program should include the following: universal precautions, rules on occupational exposure to blood borne pathogens, reprocessing procedures for endoscopes and accessory equipment, mechanism of disease transmission, maintenance of a safe work environment, and procedures for waste management.<sup>(10)</sup>

Several studies emphasized that the additional training with documented competency must be done for new models of endoscopes or automatic endoscope reprocessors as they are introduced in the facility. Annual updates are recommended to ensure compliance with current standards and manufactures' guidelines.<sup>(11)</sup>

The study showed that more than half of the reprocessing criteria and washing and disinfection critical behaviors were met by the endoscopy

nurses. It means that there is a huge gap that exists between what is generally recommended for reprocessing endoscopes and what is practiced.

Society of Gastroenterology Nurses and Associates recommended that decisions must be made in each endoscopy setting regarding the number and category of personnel who will be responsible for instrument reprocessing. All persons involved must be properly trained and their performance subject to periodic review and continuing education. All individuals who reprocess endoscopes and accessories require detailed knowledge of the instruments, this knowledge is developed through repetition and the guidance of a preceptor.<sup>(12)</sup> Another study stated that there should be documentation of completion of the initial infection control orientation, reprocessing competency, and subsequent annual competency review and infection control update for each individual who reprocess instruments.<sup>(8)</sup> From the foregoing discussion, it can be concluded that endoscopy nurses need to be well trained and up to date concerning knowledge and practice of endoscope reprocessing competency criteria, critical behavior of washing and disinfection, and continuous reinforcement should be planned and scheduled on regular basis.

## CONCLUSION

Clearly, medical devices designed to penetrate skin or contact normally sterile areas of the body should receive a sterilization process. The vast majority of endoscopes are not being sterilized between uses. Compliance with accepted guidelines for the reprocessing of GI endoscopes between patients is critical to the safety and success of their use. When these guidelines are followed, pathogen transmission can effectively be prevented. Increased efforts and resources should be directed to improve compliance with these guidelines.

## RECOMMENDATIONS

Form the results revealed by this study, the following are recommended:

- 1- There should be documentation of completion of the initial infection control orientation/reprocessing competency and subsequent annual competency review and infection control update for each individual who reprocesses endoscopes.
- 2- All nurses involved in endoscopy setting must be properly trained and their performance subject to periodic review and continuing education.
- 3- All individuals who reprocess endoscopes and accessories require detailed knowledge of the instruments and specific methods required to produce an instrument safe for use.
- 4- There should be a designated individual in the endoscopy setting assigned to monitor compliance with the reprocessing protocol.
- 5- The nurse should attend special training programs to be qualified and certified as an endoscopy nurse.
- 6- Developing policies and procedures related to reprocessing competency in endoscopy units.
- 7- Further research in the area of endoscopy reprocessing should be encouraged.

**Table (1): Characteristics of endoscopy nurses in the study sample**

<b>Personal characteristics</b>	<b>Frequency</b>	<b>Percent</b>
<b>Age (years)</b>		
< 30	10	50
30+	10	50
<b>Nursing qualifications:</b>		
Nursing diploma	18	90
Nursing technician	2	10
<b>Work place:</b>		
Alexandria Main University Hospital	7	35
Medical Research Institute, Alexandria University	13	65
<b>Nursing experience (years):</b>		
3-6 months.	3	15
< 10 years	5	25
10+	9	45
20+	3	15
<b>Mean ± SD</b>	<b>10.77±7.65</b>	
<b>Years of experience in endoscopy units</b>		
3-6 months.	4	20
< 10 years	7	35
10+	9	45
20+	-	-
<b>Mean ± SD</b>	<b>7.61±4.88</b>	
<b>The cause for working in endoscopy unit:</b>		
Hired in endoscopy unit	8	40
Temporarily transferred to endoscopy unit	12	60

**Table (2): Distribution of the endoscopy nurses according to their knowledge and educational and training programs**

Knowledge & training programs	Yes		No	
	No.	%	No.	%
<b>1- Who has trained you to start the working in endoscopy unit:</b>				
Physician	1	5	19	95
Experienced nurse in endoscopy	18	90	2	10
By yourself	1	5	19	95
<b>2- Training program</b>				
- Attend training programs	14	70	6	30
- Attend training program yearly	10	50	10	50
<b>Mean ± SD</b>	14.08±11.73			
<b>3- Knowledge:</b>				
- Transmission of infectious disease through the gastroscopy	20	100	-	-
- The types of diseases:				
Viral diseases only	15	75	-	-
<b>Mean ± SD</b>	10.1±7.84			
HIV	1	5		
More than mentioned	4	20		
<b>Mean ± SD</b>	13±8.6			

**Table (3): Distribution of the nurses according to their practice as regards reprocessing competency criteria**

Items of endoscope reprocessing competency criteria	First observer				Second observer				t value
	Met		Not met		Met		Not met		
	No.	%	No.	%	No.	%	No.	%	
- Wears personal protective equipment (gown, gloves, face protection)	19	95	1	5	19	95	1	5	0.82
Mean ± SD	12.09±7.81		3.5±4.28		12.09±7.81		3.5±4.28		
- Avoids contaminating clean objects with dirty gloves	0	0	20	100	0	0	20	100	1.29
Mean ± SD			13.46±10.46				13.46±10.46		
- Bubbled air to clear air/water channel	14	70	6	30	14	70	6	30	1.29
Mean ± SD	9.35±5.04		14.08±11.73		9.35±5.04		14.08±11.73		
- Sucks of scope until fluid is clear, ends by suctioning air to clear fluid from scope	16	80	4	20	16	80	4	20	1.29
Mean ± SD	10.77±8.37		13±8.6		10.77±8.37		13±8.6		
- Wipes exterior of scope with clean wet cloth & leak tests of scope	7	35	13	65	7	35	13	65	1.34
Mean ± SD	7.71±5.84		12.42±8.2		7.71±5.84		12.42±8.2		
- Brushing all valves and channels	17	85	3	15	17	85	3	15	0.07
Mean ± SD	10.82±6.99		10.5±12.85		10.82±6.99		10.5±12.85		
- Brushing lip of biopsy port									
Two times	4	20	0	0	4	20	0	0	
Three times	9	45	0	0	9	45	0	0	
Five times	7	35	0	0	7	35	0	0	
- Loads endoscope properly in reprocessor with correct attachments	20	100	0	0	20	100	0	0	1.29
Mean ± SD	13.46±10.46				13.46±10.46				
<b>Total items of endoscope reprocessing competency criteria</b>	<b>113</b>	<b>70</b>	<b>47</b>	<b>30</b>	<b>113</b>	<b>70</b>	<b>47</b>	<b>30</b>	

T test ≤ 5%

Table (4): Distribution of the nurses according to their clinical practice as regards the washing and disinfection of endoscopes

Critical behaviors of washing & disinfection of endoscope	First observer				Second observer				t -value
	Met		Not met		Met		Not met		
	No.	%	No.	%	No.	%	No.	%	
- Recognizes cleaning and disinfecting solutions used and length of effective use-life and soak times	9	45	11	55	9	45	11	55	1.87
<b>Mean ± SD</b>	8.15±6.26		12.03±7.46		8.15±6.26		12.03±7.46		
- Demonstrates the process of manual washing and brushing all channels	8	40	12	60	8	40	12	60	1.77
<b>Mean ± SD</b>	7.25±5.56		13.12±8.14		7.25±5.56		13.12±8.14		
- Demonstrates the process of manual disinfection for endoscopes	20	100	-	-	20	100	-	-	1.29
<b>Mean ± SD</b>	13.46±10.46				13.46±10.46				
- Using final rinse and forced air drying	8	40	12	60	8	40	12	60	1.77
<b>Mean ± SD</b>	7.25±5.56		13.12±8.14		7.25±5.56		13.12±8.14		
- Demonstrates the use of automatic reprocessor for high level disinfection	19	95	1	5	19	95	1	5	0.82
<b>Mean ± SD</b>	12.09±7.81		3.5±4.28		12.09±7.81		3.5±4.28		
- Final rinse and forced air drying	20	100	-	-	20	100	-	-	1.29
<b>Mean ± SD</b>	13.46±10.46				13.46±10.46				
<b>Total items of critical behaviors of washing &amp; disinfection of endoscope</b>	84	70	36	30	84	70	36	30	

T test ≤ 5%

**Table (5): Relation between the attendance of training programs and the practice of reprocessing criteria and clinical practice of washing and disinfection of endoscopes**

Reprocessing and washing and disinfection	Attend training programs (n = 14)				Not attend training programs (n = 6)			
	Met		Not met		Met		Not met	
	No.	%	No.	%	No.	%	No.	%
- Wears personal protective equipment (gown, gloves, face protection)	13	65	1	5	6	30	0	0
- Bubbled air to clear air/water channel	13	65	1	5	1	5	5	25
- Sucks of scope until fluid is clear, ends by suctioning air to clear fluid from scope	13	65	1	5	3	15	3	15
- Wipes exterior of scope with clean wet cloth & leak tests scope	7	35	7	35	-	-	6	30
- Brushing all valves and channels	14	70	-		3	15	3	15
- Brushing lip of biopsy port								
Two times	-				4	20		
Three times	7	35			2	10		
Five times	7	35			-			
- Recognizes cleaning and disinfecting solutions used	7	35	7	35	2	10	4	20
- Demonstrates the process of manual disinfection of endoscopes	7	35	7	35	2	10	4	20
- Using final rinse and forced air drying	7	35	7	35	1	5	5	25
- Demonstrates the use of automatic reprocessor for high level disinfection	14	70			5	25	1	5
<b>Total items of Reprocessing and washing and disinfection</b>	<b>96</b>	<b>69</b>	<b>31</b>	<b>22</b>	<b>39</b>	<b>28</b>	<b>27</b>	<b>19</b>

**Table (6): Relation between the total years of experience and the practice of reprocessing criteria and clinical practice of washing and disinfection of endoscopes**

Reprocessing and washing and disinfection	Met				Not met				t-value (p)
	No.	%	$\bar{X}$ years of experience	SD	No.	%	$\bar{X}$ years of experience	SD	
- Suctions scope until fluid is clear, ends by suctioning air to clear fluid from scope	17	85	10.8	6.9	3	15	10.5	12.8	0.07 0.948
- Wipes exterior of scope with clean wet cloth and leak tests scope	7	35	7.7	5.8	13	65	12.4	8.2	1.34 0.197
- Brushes all valves and channels	17	85	9.5	6.4	3	15	17.6	11.8	1.79 0.091
- Demonstrates the process of manual washing and brushing all channels	8	40	7.2	5.5	12	60	13.1	8.1	1.77 0.093
- Demonstrates the process of manual disinfection for endoscopes	10	50	12.4	8.2	10	50	7.7	5.8	1.34 0.197

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