

# Upper Gastrointestinal Endoscopy Nurses' Compliance with Infection Control Standard Precautions

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## **Abstract**

**Background:** Health facilities acquired infection is a worldwide problem predisposing to increased mortality and morbidity. Nevertheless, the health care personnel are liable to blood borne pathogens hazards. Thus, ensuring nurses' universal infection control precautions (ICP) practices compliance during upper gastrointestinal endoscopy is a worldwide health care challenge; resulting in overall health outcome consequences. The current study **aimed** to assess the compliance of upper GI endoscopy nurses' with universal ICP practices. **Design:** A descriptive research design was utilized. **Settings:** The study was implemented at the upper GI endoscopy unit of the Main University Hospital, Alexandria, Egypt. Subject included all available (40) nurses. One tool was developed; entitled "The Upper GI Endoscopy Nurses' Compliance with Universal Infection Control Precautions Observational Checklist". **Results:** The most frequently observed infection control related-nurses' practices were related to: soiled laundry management (60%), respiratory hygiene etiquette inside the endoscopy room (57.5%), personal protective equipment (55%), and disposal of waste (52.5%). More than half (57.5%) of the nurses were non-compliant with total ICP practices. **Conclusion:** Assessing nurses' ICP compliance during upper GI endoscopy procedure was a challenge; where more than half of nurses failed to adhere to the total IC precautionary practices. The researchers **Recommendation:** carrying out training programs and timely courses for nurses' to update their knowledge that consequently is reflected on their adherence.

**Keywords:** Endoscopy, Infection Control, Nurses' Compliance, Universal Precautions, Upper Gastrointestinal.

## **Introduction**

Endoscopies are widely used as the basis of gastrointestinal diagnoses, treatment, prevention of digestive system diseases and gastroenterology management. Increasing interest in gastrointestinal endoscopies was dedicated by scientists to ensure higher procedures effectiveness and quality started in 1805 when Bozzini performed his first trial to directly visualize the internal human body through a tube light guiding or "Lichtleiter", and later by Dr. Schindler invented the flexible gastroscope (Januszewicz et al., 2020; Méndez, 2016).

The average endoscopy procedures in Egypt was 15 million/year; where; more than half (55%) were esophagogastro-duodenoscopy, more than a quarter (30%) for colonoscopy and only 15% for lower GI endoscopy. There are no clear documented data about the average number of upper GI endoscopy procedure in Egypt despite the emergent gastroenterology practice. (Mohamed, Mohamed, Abo ElAta and Abd Ellatif; 2018) However, in 2018 and 2019 the FDA released the results of surveillance studies of endoscope contamination, where more than 6% of endoscopy devices were found to be colonized via pathogens.

Moreover, following Endoscopic retrograde cholangiopancreatography (ERCP) the declared incidence of infection in 2020 was 2- 4%. (Douglas & Adler, 2020).

Accordingly; when the procedure is performed by a properly trained and highly qualified endoscopy doctors and nursing staff; thus its associated diagnosis and treatment will be considered safe with low complications incidence. (Britannica, 2020) However, Upper GI endoscopy aids in diagnosing the underlying reason for abdominal pain, swallowing difficulties, nausea, vomiting, and reflux, not clarifying loss of weight in addition to anemia. Also has been performed in the upper GI tract for ulcers, cancers, polyps and internal bleeding site detection (Rahman et al., 2019).

Over the past 100 years, endoscopic gastroenterology science and practice technology evolution has been reported, bearing in mind the complexity of IC in clinical practice being a crucial aspect of safe endoscopy procedures. This fastened the need for a highly qualified nurse specialized endoscopy who is accountable for the patient's both physical and psychological safety throughout the endoscopy procedure (Wang, 2019; Greebet al., 2018).

In spite of the availability of published guidelines by the Centre for Disease Control and Prevention (CDC) to prevent exposure to infection in the endoscopy units; only a small number of nurses have been identified as fully complying with these ICP standards. Thus, there is always the possibility of a lack of competencies and unintentional harm during the upper GI endoscopy procedure; if the staff does not comply with universal ICP. (CDC, 2020) The upper GI endoscopy is a serious procedure that must be performed according to stringent universal guidelines namely: hand hygiene, respiratory etiquette, and protective clothing, that should be considered whenever there is a risk of body fluids, sharps management contamination, to maintain patient and staff safety, minimize

complications, and improve patients' health outcomes (Calderwood et al., 2018).

Nevertheless, endoscopy nurses' non-compliance can be owed to lacking time, facilities, lacking training and updating their knowledge, in addition to their inability to balance across rapid, prompt care delivery along with the urge for self-protection. Thus concerning the endoscopy nurses' ICP quality improvement; it is essential to guide and regularly audit their performance quality for early identification of potential inadequate performance (Esmail et al., 2019).

**Significance of the study:** This research will contribute to the base of knowledge related to upper GI endoscopy nursing; where the researchers have found insufficient research data assessing nurses' compliance with ICP throughout upper GI endoscopies procedure in Egypt. There is also a proven worldwide discrepancy between the ICP perception of health care providers, and their actual behaviors and practices following proper protocols essential for patient safety and preventing the spread of infection in the field of GI endoscopy.

### ***Aims of the Study***

This study aimed for assessing the compliance of upper GI endoscopy nurses' with IC standard precautions practices throughout the endoscopy procedure.

### ***Research question***

1. What are the upper GI endoscopy nurses' IC standard precaution's levels of compliance at the selected study setting?
2. What is the relation between nurses' compliance level and their socio demographic information?

### ***Materials and Method***

#### ***Materials***

#### **Research design:**

The researchers utilized a descriptive research design.

### **Settings:**

The research was carried out at the Gastroenterology Endoscopy Units, at the Main University Hospital, Alexandria, Egypt .

### **Subjects:**

A convenient sample of 40 nurses, representing the entire nurses' workforce at the above-mentioned setting.

**Tools:** One tool was developed by the researchers upon relevant recent literature review, with the aim of assessing each upper GI endoscopy nurses' compliance with Universal ICP Practices; before, during and after procedure. It was entitled: Upper Gastrointestinal Endoscopy Nurses' Compliance with Infection Control Universal Precautions Observational Checklist. It comprised two parts as follows:

**Part I:** Nurses' Socio-Demographic Data Sheet: This comprised data related to: nurses' qualifications, age, gender, years of experience, and past attendant in preceding pre and in-services gastroenterology endoscopy training.

**Part II:** Nurses' Compliance Practices Observational Checklist. This part was developed from CDC, 2020; Abdelaziz et al., 2019; El- Greebet et al., 2018; and Metwally et al., 2016. It comprised a total of "56" items aimed to assess Upper Gastrointestinal Endoscopy nurses' compliance with ICP Practices. These items covered "8" areas of ICP including compliance with: Hand hygiene, Hand disinfection, Personal protective equipment (PPE), in addition to the Respiratory Hygiene Etiquette inside endoscopy room. Likewise, it aimed to assess compliance with Reprocessing/ decontamination of endoscope and the management of accessories. Moreover this part aimed to evaluate the endoscopy nurses' in three areas in endoscopy namely; soiled laundry management, waste disposal and disinfection following blood/ body fluid spill.

**Scoring system:** Each nurse was observed three time; where, nurses ICP practices were scored on a 3 point rating scale distributed as: Done correctly = 1, Done incorrectly or Not done = 0. Nevertheless, the nurses' ICP practices scores were summed and converted into percentages. However; overall score of 90.0% and above for ICP nurse' practices were considered "compliance" level of compliance; whereas less than 90.0% was considered "non-compliance".

### **Method**

#### **Administrative process:**

- Before the study was conducted, the Ethics Research Committee approval; Faculty of Nursing, Alexandria University; was attained.
- Following explanation of the study purpose; official permission from hospital directors and the departments' heads to conduct the study was acquired.

#### **Tool validity and reliability:**

- The study tool was tested for its content validity via 5 professors from medical and nursing fields where any required modifications were completed. The tool was also tested for its reliability by measuring the items' internal consistency using Cronbach's alpha, with the (r) value 0.762.

#### **Pilot study:**

- It was conducted on 10% of the study sample, for ensuring the feasibility, clarity and applicability of the study tool. These nurses were comprised in the current study, due to a shortage of endoscopy nurses. However, following the pilot; only minor grammatical changes were done to the tool which would not have been a cause of sampling bias.

#### **Data collection:**

- In order to prepare the study tool, data collection started by investigating the latest relevant literature, websites, researches & textbooks concerned with nurses' role within each GI endoscopy phase of care .
- The researchers started data collection at the above mentioned setting introducing themselves as nurses interested in endoscopy. Where the researchers utilized the tool's Part I to collect its related data through individual nurses face to face interview in the endoscopy waiting area .
- Then, each nurse was observed individually three times at three following separate days; to assess their pertinent ICP practices throughout each upper GI endoscopy procedure using the study tool's Part II. The mean of the three observations was calculated to obtain nurses' total IC practices mean scores, which were then converted into overall compliance percent scores reflecting their level of compliance.
- Nurses' observations were concealed; in order to maintain data collection objectivity and the researchers were documenting nurses' actual practices during the morning shifts. Where, each nurse assessment lasted from 45-60 min.
- Data was collected over 4 months, starting from mid-November 2020 until mid-March 2021.

### **Ethical considerations;**

- The endoscopy department's head nurse gave written consent and approval for the researcher to attend before, during and after the endoscopy procedure; for collecting necessary data. However, the researcher assured confidentiality and anonymity at all times.

### **Statistical analysis**

- Data was analyzed utilizing IBM SPSS software ver. 20.0. (Armonk, NY: IBM Corp). Qualitative data was designated

employing numbers and percentages. While, quantitative data was labeled using range, and mean. P was significance at the 0.5% level. The Student t-test was utilized to compare between two studied groups. While, F-test (ANOVA) was performed to compare between more than two groups.

### **Results**

The overarching researchers' theme, 'Assessing the upper GI endoscopy nurses' compliance with IC standard precautions' was identified with two sub-themes: Identifying their unsupportive nurse level of compliance and correlating to nurses' socio demographic data .

#### **Part I: The nurses' socio-demographic data**

**Table (1):** reveals that 50% of nurses held a degree at bachelor level, while 32% had secondary school diploma education. Moreover, 47.5% of the nurses were between 20-<30 years with only 20% aged between 30<40. The entire study sample was female (100%). Moreover; half of the nurses (50%) had nursing experience of 10>20 years with an average of 12 years' experience in endoscopy. Additionally, 60% of nurses had attended GI endoscopy in-service training; with 75% of them working for more than five years .

#### **Part II: Nurses compliance with Universal Infection Control Precaution Practices.**

**As illustrated in table 2 :** the area in which the studied nurses exhibited the universal infection control precautions most compliance practices was related to: soiled laundry management (60%) of nurses, followed by respiratory hygiene etiquette inside the endoscopy room representing (57.5%), then personal protective equipment (PPE) (55%), while the disposal of waste (52.5%). Whereas, the area with the least compliance universal infection control practices was for: hand disinfection with (50%) of nurses, followed by hand hygiene,

overall score of reprocessing/decontamination of endoscope accessories and equipment representing in addition to disinfection from blood/ body fluid spill; represented by (45%) each.

**As regard to table 3** which represents the standard universal infection control precaution mean and standard deviation scores in relation to the three studied nurses' practices researcher's observations; where First, second and third observation mean score range was 51.74, 47.75 and 45.67 respectively; with a three observations overall mean score of 48.39.

**Figure (1):** Demonstrates the studied nurses' distribution in relation to their overall compliance with infection control practices. Where, more than half of the nurses (57.5%) were found to be non-compliant, while (42.5%) of them were compliant with regard to overall infection control precautions practices scores .

**According to table (4):** Highly significant correlation was declared between nurses' education levels and their overall compliance with universal infection control practices score at ( $p < 0.001^*$ ). Where, nurses who held secondary nursing diploma school had the highest percent of compliance representing (54.33%). Also significant correlation between nurses' age and their overall compliance with upper GI endoscopy nurses' universal infection control practices ( $p < 0.002^*$ ) was observed. Where, the highest mean percent (55.13%) was found amongst nurses aged between (30 > 40) years old. However, no significant correlation was declared between nurses' years of experience & previous pre and in-services training and their compliance with universal infection control practices precautions.

### **Discussion**

There is a standard set of guidelines which aim to protect hospital staff from potential hazards and prevent a potential loss of man-power if staff suffers occupational

injuries or illness. The same guidelines also prevent blood borne pathogens transmission from potentially infectious materials. **Broussard, & Kahwaji, (2020).**

Compliance with standard set of guidelines is an essential practice that safe guards both nurses and their patients from potential exposure to infections. Worldwide studies have identified poor adherence to infection prevention which in turn increases the incidences of infection at health care settings. **Al-Faouri et al., (2021); Metwally et al., 2016** Therefore it is important to ascertain the level of nurses' knowledge and practices; as this can act as a corner stone for controlling infection within the field of endoscopy.

The current study found that; more than half of the nurses studied were non-compliant when it came to hand hygiene, a finding which chimes with a study by **Engdaw, et al., (2019)**; conducted on 335 study participants and found unsatisfactory adherence of health care practitioners to hand hygiene. On the other hand this is contradicted by **Onyedibe et al., (2020)** who investigated Staffs' compliance hand hygiene and reported that half of sample violated hand hygiene. This difference between studies could be due to the fact that; stressful situations can make abidance to the hand hygiene policy difficult; in addition to limited access to hand hygiene facilities with lacking of good role models.

The current study results reveal that more than half of the nurses were abiding to the use of personal protective equipment. This goes in line with a study by **Esmail et al., (2019)** that investigated nurses' adherence to standard precautions regarding to blood and body fluids, and involved 86 nurses. This study found that most of the sample studied complied to wearing personal protective equipment.

This study also shows that more than half of studied nurses were found to be non-compliance when it came to reprocessing/

decontamination of endoscopes and other equipment; which highlights the consequences of nurses' in-service training lacking in endoscopy area of practice. This result is endorsed by **El-maghawry and El-hawy, (2019)** study who found that, nurses were non-compliance in relation to ICP practices when reprocessing/decontaminating endoscopes, accessories and equipment.

With reference to soiled laundry management the current study found nearly two thirds of nurses were compliance in soiled laundry management. This finding goes hand in hand with **Abouelfadle et al., (2021)** who found satisfactory nursing practices regarding laundry handling. In spite this result; the majority of subjects were "transporting contaminated laundry bags while carrying them near their own uniforms". However, this practice is in opposition to the recommendation by the Occupational Safety & Health Administration; as they declared presence of occupational hazards involving laundry management, where contaminated laundry bags should be handled far from our bodies and should not be shaken during transportation to avoid sharp objects punctures and contamination of staff clothing.

Regarding disposal of waste; the present study found nearly half of the studied nurses are compliance when it came to disposal of waste, this is in line with a finding reinforced by **Oyekale & Oyekale, (2017)** who found around half of sample studied have adequate management of healthcare waste. However, **Aboelfetoh & Shakweer, (2021)** found that only one third of the studied nurses were compliant with universal IC standard precautions. Nevertheless this result is opposite to **Esmail et al., (2019)** who found that, majority of the nurses were compliant with standard precaution practices. This difference between two studies could be due to workload, insufficient resources, insufficient training programs and staff number, all of which are potential obstacles

to compliance with infection control standard practices.

The current study found that the nurses' age could lead to significant statistical differences between rates of standard ICP compliance. However, this result indicates that as nurses get older, their experience training opportunities increases thereby leading to an overall strengthening of their ICP practice compliance. **Eskander et al., (2013)** found that; the rate of compliance was higher amongst the older nurses. Moreover, **Fashafsheh et al., (2015)** have strongly support the present study findings, as they identified that there is a significant correlation between ICP and age, and experience. Although, the present findings revealed that there were no significant differences between nurses' experience and their mean score of compliance. This chimes with **Abuduxike, et al., (2021)** who found that; participants with work experience ( $\leq 5$ ys) complied with the standard IC practices more than those with ten years of experience.

The current study indicates no significant differences when bearing in mind the correlation between nurses' training programs attendance and their mean compliance percent scores. However, a study conducted in Mansoura by **Amer et al, (2017)** also comes to the same conclusion that, no significant differences between of the degree of attended training and nurses' compliance with IC procedures.

Generally; the study results have strongly answered the research questions by underlining the fact that, more than two fifths of upper GI endoscopy nurses' IC practices were non-compliance; which was found to be specifically related to their level of education and age. This highlighted also the fact that; older nurses had greater chances to attend a variety of training, thereby adding to their experience and overall ability to comply with upper GI endoscopy IC practices.

Lack of resources cannot be overlooked whenever we are knocking infection control practice. Infection control is a costly practice that can never exist perfectly wherever there is a dramatic deficiency of required equipments and supplies.

### **Conclusion**

It can be concluded that; the studied upper GI endoscopy nurses had an unsatisfactory level of compliance with the overall universal ICP practices. Furthermore, there were significant correlation between nurses' age & level of education and their compliance with overall upper GI endoscopy nurses' universal infection control practices.

### **Recommendations**

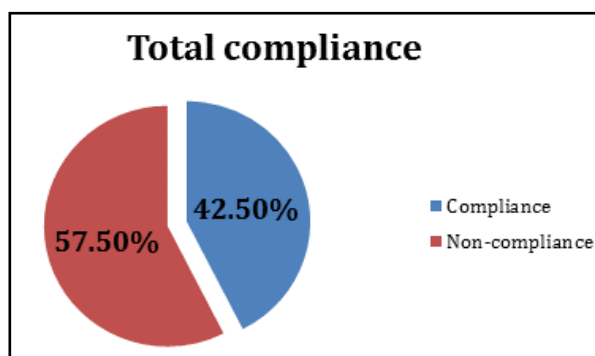
The study findings address the urgent need for developing targeted strategies and nursing interventions that motivate Arabic-speaking nurses' compliance with universal ICP with regards to GI endoscopy procedure which will be reflected on patients' health outcome. Moreover, continuous supervision for nurses' Universal ICP practices through the hospitals' IC team is mandatory which has to be parallel with providing in-service training courses.

**Table (1): Distribution of the studied nurses according to socio-demographic data (n=40).**

<b>Socio-demographic data</b>	<b>No.</b>	<b>%</b>
<b>Qualification</b>		
Diploma "secondary school of nursing"	13	32.5
Technical institute of nursing	6	15.0
Bachelor degree	20	50.0
Master's degree in nursing	1	2.5
<b>Age</b>		
20 > 30	19	47.5
30 > 40	8	20.0
40 ≥60 years	13	32.5
<b>Gender</b>		
Female	40	100.0
<b>Years of experience</b>		
<10	15	37.5
10 <20	20	50.0
More than 20 years	5	12.5
Median	12.0	
<b>Pre and in services training received</b>		
Yes	24	60.0
No	16	40.0
<b>If yes (n = 24)</b>		
Less than 1- 5 year	6	25.0
More than 5 year	18	75.0
<b>Number of endoscopies / shift</b>		
Median	6/shift	

**Table (2): Mean score and SD of upper GIT endoscopy nurses’ practices observations regarding their compliance level with Standard universal precautions of infection control (N=40).**

No.	Standard universal infection control practices	Compliance Level			
		Compliance		Non-compliance	
		N	%	N	%
A.	Hand hygiene	18	45	22	55
B.	Hand disinfection	20	50	20	50
C.	Personal protective equipment (PPE) overall score	22	55	18	45
D.	Respiratory hygiene etiquette inside the endoscopy room overall score	23	57.5	17	42.5
E.	Reprocessing / decontamination of endoscope, accessories and equipment				
	1.Preliminary cleaning	19	47.5	21	52.5
	2. Manual cleaning	18	45	22	55
	3- Upper endoscope storage	19	47.5	21	52.5
	4- Care of accessories	17	42.5	23	57.5
	Overall Reprocessing/decontamination score	18	45	22	55
F.	Soiled laundry management overall score	24	60	16	40
G.	Disposal of waste overall score	21	52.5	19	47.5
H.	Disinfection from blood / body fluid spill overall score	18	45	22	55



**Figure (1): Mean score and SD of upper GIT endoscopy nurses’ practices observations regarding their compliance level with Standard universal precautions of infection control.**



**Table (3): Overall upper GI endoscopy nurses’ practices observations regarding standard universal infection control precaution.**

Nurses’ practices observations	Mean	SD	Mean%
First observation (score range)	57.95	3.92	51.74
Second observation (score range)	53.48	5.41	47.75
Third observation (score range)	51.15	4.80	45.67
Overall three observations (score range)	54.19	5.49	48.39

**Table (4): Correlation between the mean percent scores of the overall upper GI endoscopy nurses’ level of compliance with regard to the universal infection control precautions practices, and their socio-demographic characteristic.**

Nurses’ Socio-demographic characteristics	Overall compliance mean percent score regarding upper GI endoscopy nurses’ universal IC practices	Test of sig.	P
<b>Qualifications</b>			
Diploma nursing	54.33	F= 7.998*	<0.001*
Technical Institute of Nursing	53.27		
Bachelor degree nursing	49.78		
Master degree in nursing	48.21		
<b>Age</b>			
20 > 30	50.28	F= 7.128*	0.002*
30 > 40	55.13		
40 ≥ 60 years	51.79		
<b>Gender</b>			
Female	51.74		
<b>Years of experience</b>			
< 10	52.86	F= 2.388	0.085
10 < 20	51.07		
More than 20 years	49.11		
<b>Pre and in services training received</b>			
Yes	52.29	t= 0.804	0.426
No	51.38		

t: Student t-test

F: ANOVA test

\*: Statistically significant at  $p \leq 0.05$

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