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# Effect Of Implementing Infection Prevention and Control Guidelines for Nurses on Severity of Acute Pancreatitis Among Patients Undergoing Gastrointestinal Endoscopy

**Asmaa Sayed Taha[1], Shalabia Abozead[2*], Zain Elabdeen Ahmed Sayed[3], Amna Abdullah Desoky[2]**

[1]Medical-Surgical Nursing- Faculty of Nursing- Sphinx University-Assiut -Egypt.
[2*,2]Medical-Surgical Nursing- Faculty of Nursing- Assiut University Assiut -Egypt.
[3]Internal Medicine- Faculty of Medicine - Assiut University- Assiut -Egypt.

***Corresponding Author:** Shalabia Abozead
*Email: shalabia.abozead@yahoo.com

**Abstract**
**Background:** Acute pancreatitis is a serious inflammatory condition of the pancreas that can lead to significant morbidity and mortality hence, its prevention is a critical aspect of nursing management. **Aim**: Evaluate the effect of implementing infection prevention and control guidelines for nurses on severity of acute pancreatitis among patients undergoing gastrointestinal endoscopy. **Methods**: A quasi experimental(study-control) research design was utilized at Al Rajhi Assiut University Hospital. Thirty nurses were currently assigned for giving care for a purposive sample of 100 patients underwent upper gastrointestinal endoscopy, divided equally into control (who had exposed to the routine care) and study group (who had received endoscopic care based on infection prevention and control guidelines). Patient assessment sheet, infection prevention and control observation checklist, and modified Glasgow Imrie Severity Criteria for Acute Pancreatitis were the tools for data collection. **Results:** Revealed the mean age was slightly insignificant higher in study group (47.0±4.94) than control group (44.56±7.39), therapeutic indication was the predominant (86.0%, 84.0%) in both groups for treating biliary stones which was the most common diagnosis (34.0%, 36.0%) respectively. Also, the study group exhibited significantly better pancreatic biochemical parameters with no pancreatitis (64 % vs. 28% respectively) and fewer severe pancreatitis compared to control group (16% vs. 60%) after implementing infection prevention and control gastrointestinal endoscopy guidelines ($p < 0.01$). **Conclusion**: Implementation of infection prevention and control gastrointestinal endoscopy guidelines reduced the severity of acute pancreatitis among patients undergoing gastrointestinal endoscope.

**Keywords:** Acute pancreatitis, Gastrointestinal Endoscopy, Guidelines, Infection Prevention & Control, Nurses, Severity

## Introduction

Pancreatitis is an inflammatory condition of the pancreas, represents a significant clinical challenge due to its varying severity and potential complications. The spectrum of pancreatitis ranges from mild self-limiting inflammation to severe necrotizing pancreatitis, which can result in systemic complications and significant mortality **(Beiriger et al., 2023).**

Acute and chronic pancreatitis are the two main varieties. Upper abdominal discomfort, nausea, and vomiting are some of the signs and symptoms of pancreatitis. Pain is usually strong and radiates into the back frequently. A fever may appear with acute pancreatitis, and the illness usually goes away in a few days **(Ashraf et al., 2021).**

Gastrointestinal endoscopy is a cornerstone diagnostic and therapeutic tool in modern gastroenterology. However, the introduction of endoscopic instruments into the gastrointestinal tract (GIT) poses risks, including infections and procedural complications such as pancreatitis. Procedures such as endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic ultrasound (EUS) are especially associated with a heightened risk of post-procedural pancreatitis. The incidence of post-ERCP pancreatitis is reported to be between 3-10%. **(de Sousa & Mendes, 2021).**

Infection prevention and control (IPAC) guidelines have been established to mitigate the risks of infections and other complications associated with endoscopic procedures. These guidelines include a range of measures such as the sterilization and disinfection of endoscopic equipment, adherence to sterile techniques, use of prophylactic antibiotics in certain high-risk procedures and protocols for management of patients before, during, and after endoscope. The implementation of these guidelines aims to reduce the incidence of infections, which can trigger or exacerbate inflammatory processes, including pancreatitis **(Elmoula et al., 2023).**

Nurses play a pivotal role in the healthcare system, particularly in the implementation and adherence to infection prevention and control (IPC) guidelines. Their contributions are crucial in ensuring the safety and well-being of patients undergoing gastrointestinal (GI) endoscopy, thereby reducing the incidence and severity of procedure-related complications such as pancreatitis **(Alhumaid et al., 2021).**

This study aimed to study the severity of acute pancreatitis after implementing infection prevention and control guidelines among patients undergoing gastrointestinal endoscopy.

**Methods**

**A study design**

A quasi-experimental research design (study/control group) was employed to study the severity of pancreatitis after implementing infection and control guidelines among patients undergoing gastrointestinal endoscopy. The design was chosen to assess the changes in the dependent variables while accounting for potential confounding factors, considering the lack of randomization in the selection of participants.

**Variables**

The independent variable in this study was infection prevention and control guidelines while the dependent variable was the severity of acute pancreatitis.

**Participants**

The study participants were recruited from the endoscopy unit at Al Rajhi Assiut University Hospital.

**Nurses:** A convenience sample of all available nurses (30) who were currently assigned for giving nursing care at different shifts in the endoscopy Unit of Al Rajhi Assiut University Hospital.

**Patients:** A Purposive sample of 100 patients who had undergone ERCP and EUS. Divided equally into control group (who had exposed to the routine care) and study group (who had received endoscopic care based on infection prevention and control gastrointestinal endoscopy guidelines).

Based on the specifications from the power analysis conducted using G*Power, the minimum sample size required was determined to be 100 patient undergoing ERCP and EUS using the following equation according to **Steven, (2012).**

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

N=total patient population size of **1150** who attended to endoscopic unit at Al Rajhi Assiut university hospital. During the year 2022. Z = confidence level is 0.95 and is equal to 1.96. D= The error ratio is = 0.05. P= The property availability ratio and neutral = 0.50.

Patients were selected according to the following inclusion criteria: Age from 18 to 65years old, both sexes, full consciousness, had undergone ERCP or EUS either for diagnosis or treatment. Patients who refused to participate in the study, had communication problems, and who were receiving immunocompromised drugs were excluded from the study. The control group received routine care while the study group received endoscopic care based on the infection prevention and control gastrointestinal endoscopy guidelines.

**Tools for data collection**

**Patient assessment sheet:** It was developed by a researcher based on current national and international literature. It consisted of demographic data that included patient's name, age, gender…. etc. and clinical data that included past and present health history such as (diagnosis, causes, onset, duration, type of endoscope (EUS or ERCP) and expected complications.

**Infection prevention and control observation checklist:** It was adopted from **(Public Health Ontario, 2019)** to assess nurses' practice while caring for patients undergoing upper gastrointestinal endoscope. The reliability of this check list was 0.992. It included three parts:

Parts (1): Before introduction of endoscope (pre procedure steps) that compromised of seventeen steps for preparation of endoscope.

Part (2): During endoscopy (intra procedure): it included five (5) steps.

Part (3): After finishing endoscopy procedure (post procedure steps): it contained one hundred sixty (160) steps that should be done after finishing the procedure and as preparation for next use. This part is divided into three main subheading steps; first: What should be done immediately after finishing endoscopy procedure (50 steps). Second: Manual cleaning the endoscope and accessories (103 steps). And third: Using an automated endoscope preprocessor for cleaning and disinfection (7steps).

**Scoring**

The total score of the observation checklist was (182 steps). Each step scored as the following: two degrees for each step done completely, one degree for each step done incomplete, and zero for not applicable. This system translated in results into adequately and inadequately done. The total score more than or equal to 85 % was considered satisfactory level of practice and total score less than 85 % was considered unsatisfactory level of practice.

**Modified Glasgow Imrie Severity Criteria for Acute Pancreatitis:** This scale was developed by **Imrie, (1995),** and adopted by **Chauhan et al., (2022).** It was adopted in this study to assess severity of acute pancreatitis. It was

originally composed of 9 factors however this was subsequently reduced to 8 components. On the basis of blood samples taken on admission and repeated within 48 hours, three or more positive criteria is indicative of severe pancreatitis and may require transfer to a critical care unit. the reliability of this scale was 0.788. References
The eight variables outlined as the following:

1. PaO2 <8kPa | +1
2. Age >55yrs | +1
3. WBC >15x10^9/L | +1
4. Calcium <2mmol/L | +1
5. Urea >16mmol/L | +1
6. LDH >600iU/L or AST >200iU/L | +1
7. Albumin <32g/L | +1
8. Blood Glucose >10mmol/L | +1

**Scoring**
Points assignment correspond to the following risk classes:

- <3 points: mild/moderate pancreatitis
- 3 or more points: severe pancreatitis

**Procedure:**
**It was accomplished through three phases:**
**Phase (I): Preparatory phase**
A pilot study was conducted on (ten patients) to evaluate the applicability and clarity of the developed tools. Those patients were added to the main sample. An official permission was obtained from the hospital director and head of the Unit of Al Rajhi Assiut University Hospital to conduct the study. Patients and nurses' agreements for voluntary participation were obtained after explaining the purpose and the nature of the study. Patients who met the inclusion criteria were approached by the researcher.

**Phase (II): Implementation phase**
Each patient in both study and control groups was interviewed individually at the inpatient department to assess demographic and clinical data. The researcher collected data from the control group before giving the intervention. Nurses' performance based on infection prevention and control gastrointestinal endoscopy guidelines was assessed indirectly by filling the guidelines checklist by internship students through watching the camera of the unit while nurses caring for control group patients undergoing upper gastrointestinal endoscopy. This period was three months from September to December 2023.

**Intervention**
Infection prevention and control gastrointestinal endoscopy guidelines **Lee & Papachristou, (2019); Gupta et al., (2014**) was the intervention that demonstrated for nurses in two sessions; the first session started by explaining the purpose of guideline. Epidemiology, etiology, and pathogenesis of acute pancreatitis associated with flexible endoscope instruments. The second session included demonstration and remonstrations for all steps including (pre-endoscope, intra endoscope, and after endoscope). Each session took from an hour to 2hrs. Teaching methods were lecture, demonstration and redemonstration. posters, videotape, and handouts. Also, the setting was equipped and prepared for demonstration. A colored hard copy was available for all staff members as a guide for them thereafter. The period of data collection for the study group was three months from February to May 2024.

**Phase (III): Evaluation phase:**
Nurses' performance based on infection prevention and control gastrointestinal endoscopy guidelines was reassessed indirectly by filling the checklist by other internship students through watching the camera of the unit while study group patients were undergoing upper gastrointestinal endoscope. As well as each patient (both study and control groups) was monitored immediately after gastrointestinal endoscope up to 48hrs. for occurrence of post endoscopy acute pancreatitis.

**Ethical considerations:**
Research proposal was approved from Ethical Committee in the Faculty of Nursing, Assiut University to safeguard the rights and welfare of the participants throughout the research process with IRB number: 1120230627. There was no risk for studying subjects during application of the research. The study followed common ethical principles in clinical research. Oral consent was obtained from nurses and patients who were willing to participate in the study, after explaining the nature and purpose of the study. All data collected was coded and securely stored, with personal identifiers excluded from the datasets. Participants' privacy and dignity were always respected.

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**Statistical analysis:**
Data were collected and analyzed by the computer program SPSS. Data expressed as mean, standard deviation, number and percentage. T-test is used to determine significant numeric variables. The Chi-square test is used to determine significant for non-parametric variable. A probability level of 0.05 was adopted as a level of significance for testing the research hypothesis.

**Results:**

**Table (1): Frequency distribution of the studied nurses according to their demographic data (n=30).**

| Demographic data | No. | % |
|---|---|---|
| **Age (years)** | | |
| 20-<30 | 4 | 13.3 |
| 30-<40 | 15 | 50.0 |
| ≥40 | 11 | 36.7 |
| **Mean ± SD** | **37.3±6.10** | |
| **Sex** | | |
| Female | 30 | 100.0 |
| **Educational level** | | |
| Secondary school | 30 | 100.0 |
| **Years of experience** | | |
| 5-10 | 13 | 43.3 |
| >10 | 17 | 56.7 |
| **Mean ± SD** | **10.16±3.18** | |
| **attaining previous training about endoscope preparation and sterilization** | | |
| Yes | 30 | 100.0 |

**SD=** Standard deviation.

**Table (2): Comparison between total nurses' practice regarding infection prevention and control gastrointestinal endoscopy at pre and post**

| Nurses' practice | Pre intervention | | | | Post intervention | | | | $X^2$ | P-value |
|---|---|---|---|---|---|---|---|---|---|---|
| | Adequate | | Inadequate | | Adequate | | Inadequate | | | |
| | No. | % | No. | % | No. | % | No. | % | | |
| Pre endoscope | 2 | 6.7 | 28 | 93.3 | 28 | 93.3 | 2 | 6.7 | **45.067** | **0.000**** |
| Intra-endoscope | 7 | 23.3 | 23 | 76.7 | 30 | 100.0 | 0 | 0.0 | **37.297** | **0.000**** |
| Post endoscope | 1 | 3.3 | 29 | 96.7 | 27 | 90.0 | 3 | 100.0 | **45.268** | **0.000**** |
| **Total practice score** | **2** | **6.7** | **28** | **93.3** | **27** | **90.0** | **3** | **10.0** | **41.713** | **0.000**** |
| **Mean SD** | **190.36±34.24** | | | | **344.76±42.00** | | | | **t=16.011** | **0.000**** |

**implementing infection prevention and control guidelines (n=30).**

**Table (3): Frequency distribution of the studied patients according to their demographic and clinical data.**

| Demographic & clinical data | Control group (n=50) | | Study group (n=50) | | $X^2$ | P-Value |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | | |
| **Age Mean ± S.D** | 44.56±7.39 | | 47.0±4.94 | | T=1.940 | 0.055 |
| **Gender** | | | | | 1.020 | 0.313 |
| Male | 31 | 62.0 | 26 | 52.0 | | |
| Female | 19 | 38.0 | 24 | 48.0 | | |
| **Medical diagnosis** | | | | | 2.371 | 0.668 |
| Biliary stone | 18 | 36.0 | 17 | 34.0 | | |
| Benign biliary stricture | 19 | 38.0 | 14 | 28.0 | | |
| Infection in the bile ducts | 4 | 8.0 | 5 | 10.0 | | |
| Bile leak | 8 | 16.0 | 11 | 22.0 | | |
| Sod dysfunction | 1 | 2.0 | 3 | 6.0 | | |
| **Endoscope indication** | | | | | 0.078 | 0.779 |
| Therapeutic | 42 | 84.0 | 43 | 86.0 | | |
| Diagnostic | 8 | 16.0 | 7 | 14.0 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Onset of disease** | | | | | 1.787 | 0.618 |
| **Mean ± S.D** | 3.18±3.75 | | 3.52±3.51 | | T=0.468 | 0.641 |
| **Duration of endoscope** | | | | | 5.716 | 0.057 |
| **Mean ± S.D** | 16.14±2.72 | | 15.80±1.85 | | T=0.730 | 0.467 |
| **Duration of hospitalization** | | | | | | |
| One day | 0 | 0.0 | 2 | 4.0 | 26.19 | 0.000** |
| Two days | 20 | 40.0 | 24 | 48.0 | | |
| Three days | 11 | 22.0 | 24 | 48.0 | | |
| Four days | 19 | 38.0 | 0 | 0.0 | | |

**X2:** Chi-square test**.** t: Independent t-test**. No Statistically significant at p > 0.05. **highly significant at p ‹ 0.01.**

**Table (4): Frequency distribution of the studied patients according to their severity of acute pancreatitis.**

| **Variables** | **Control group (n=50)** | | **Study group (n=50)** | | **$X^2$** | **P-Value** |
|---|---|---|---|---|---|---|
| | **No.** | **%** | **No.** | **%** | | |
| **Pao2 <8kpa** | | | | | 5.657 | 0.017* |
| Yes | 21 | 42.0 | 10 | 20.0 | | |
| No | 29 | 58.0 | 40 | 80.0 | | |
| **Age >55yrs** | | | | | 0.000 | 1.000 |
| Yes | 0 | 0.0 | 0 | 0.0 | | |
| No | 50 | 100.0 | 50 | 100.0 | | |
| **WBC >15x10^9/L** | | | | | 11.56 | 0.001** |
| Yes | 33 | 66.0 | 16 | 32.0 | | |
| No | 17 | 34.0 | 34 | 68.0 | | |
| **Calcium <2mmol/L** | | | | | 10.74 | 0.001** |
| Yes | 19 | 38.0 | 5 | 10.0 | | |
| No | 31 | 62.0 | 45 | 90.0 | | |
| **Urea >16mmol/L** | | | | | 1.000 | 0.500 |
| Yes | 3 | 6.0 | 4 | 8.0 | | |
| No | 47 | 94.0 | 46 | 92.0 | | |
| **LDH >600iu/L or AST >200iu/L** | | | | | 4.960 | 0.026* |
| Yes | 19 | 38.0 | 9 | 18.0 | | |
| No | 31 | 62.0 | 41 | 82.0 | | |
| **Albumin <32g/L** | | | | | 14.49 | 0.000** |
| Yes | 33 | 66.0 | 14 | 28.0 | | |
| No | 17 | 34.0 | 36 | 72.0 | | |
| **Blood Glucose >10mmol/L** | | | | | 5.983 | 0.014* |
| Yes | 8 | 16.0 | 1 | 2.0 | | |
| No | 42 | 84.0 | 49 | 98.0 | | |
| **Total score** | | | | | **20.780** | **0.000**** |
| No pancreatitis | **14** | **28.0** | **32** | **64.0** | | |
| Mild/moderate pancreatitis | **6** | **12.0** | **10** | **20.0** | | |
| Severe pancreatitis | **30** | **60.0** | **8** | **16.0** | | |

**$X^2$ = Chi square test No significant at p > 0.05. *Significant at p ‹ 0.05. **highly significant at p ‹ 0.01.**

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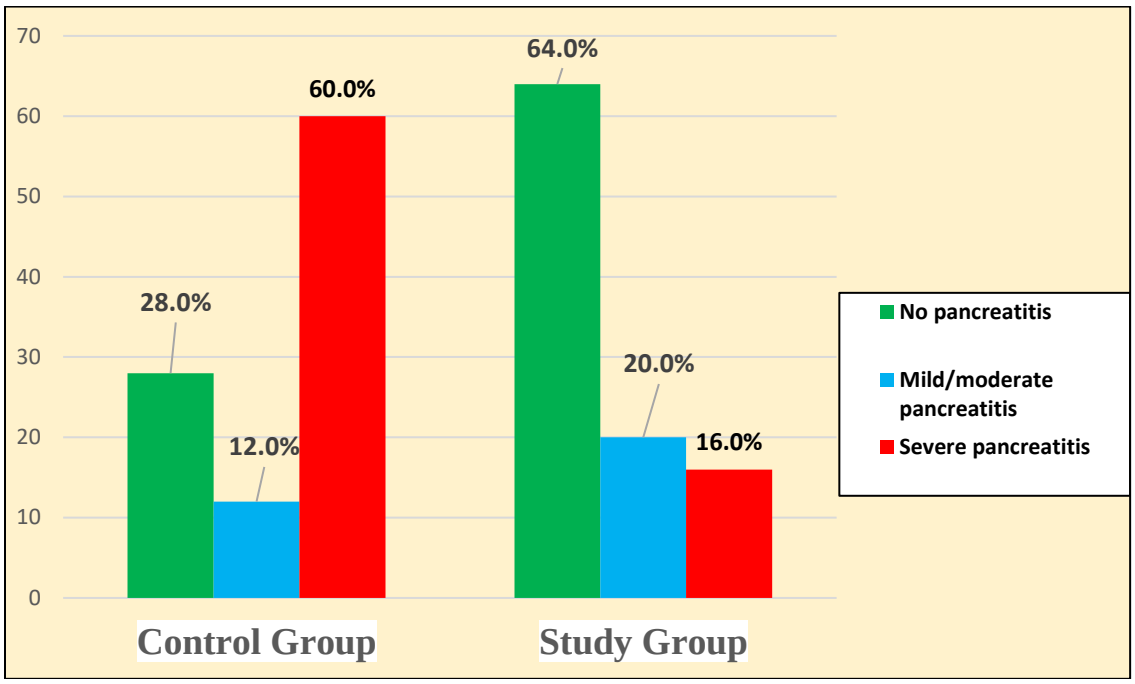


**Figure (1):** Percentage distribution of the studied patients according to total severity of acute pancreatitis **(n=50)**.

**Results:**

Table (1): Reflects that all nurses were female (100%) with a mean age of 37.3±6.10 years, had 10.16±3.18 years of experience. Also, all nurses (100%) had secondary school education and prior training in endoscope preparation and sterilization.

Table (2): Shows that there was a statistically significant improvement in the total nurses' practice after implementing infection prevention and control guidelines compared to their level before.

Table (3): showed that there was no statistically significant difference between study and control groups regarding their demographic and clinical data. The mean age was slightly higher in the study group (47.0±4.94) compared to the control group (44.56±7.39). Biliary stones were the most common medical diagnosis. The indication for endoscopy was predominantly therapeutic in both groups. The duration of endoscope procedure averaged around 16 minutes for both groups. However, the duration of hospitalization differed significantly, with the study group having shorter stays (p=0.000).

Table (4): There were highly statistically significant differences between the study& control groups regarding clinical and biochemical parameters. Notably, a lower percentage of patients in the study group had PaO2 levels below 8 kPa (20% vs. 42%, p=0.017). Both groups had no patients older than 55 years. The control group had a higher prevalence of elevated white blood cell (WBC) counts (>15x10^9/L) at 66%, compared to 32% in the study group (p=0.001). Similarly, low calcium levels (<2 mmol/L) were more common in the control group (38% vs. 10%, p=0.001). Elevated levels of LDH (>600 IU/L) or AST (>200 IU/L) were more frequent in the control group (38% vs. 18%, p=0.026). Low albumin levels (<32 g/L) were significantly more prevalent in the control group (66% vs. 28%, p=0.000). High blood glucose levels (>10 mmol/L) were also more common in the control group (16% vs. 2%, p=0.014). These clinical indicators culminated in a higher incidence of severe pancreatitis in the control group (60% vs. 16%, p=0.000), with the study group having a greater proportion of patients with no pancreatitis (64% vs. 28%, p=0.000) as shown in **Fig. (1)**

**Discussion**

Despite advancements in endoscopic techniques, pancreatitis remains a challenging consequence **(Ahmed et al., 2020).** Regarding demographic data: The present study revealed that there were no significant differences between the study and control groups regarding their demographic &clinical data. This reduces the potential for bias in the study results **(LaPlante et al., 2021).**

The present study found the average age of patients in the study group (47.0±4.94 years) is slightly higher than in the control group (44.56±7.39 years). While the difference is modest, it suggests that the study group may consist of slightly older individuals, which could potentially influence outcomes, as age is often a risk factor in pancreatitis.

Therefore, age should be considered when analyzing the impact of infection prevention and control measures on the severity of pancreatitis in both groups. **Kayar et al., (2020)** in a study entitled "Clinical outcomes of acute pancreatitis in elderly patients: An experience of single tertiary center" found that patients aged 45 and older undergoing ERCP

were more likely to develop severe post-procedure pancreatitis compared to younger patients, even in facilities with strong IPC protocols. This suggests that age remains a significant risk factor, affecting outcomes.
In the other hand, **Chan & Shelat, (2022)** in a study entitled "Diagnosis, severity stratification and management of adult acute pancreatitis–current evidence and controversies" found that, while older patients were more likely to develop complications, there was no statistically significant difference in the severity of post-endoscopic pancreatitis between older and younger patients.
Regarding the gender there was not statistically significant between both groups but though there is a slightly higher proportion of males. The researcher suggested that gender might have a minor but observable effect on outcomes, particularly in the context of IPC protocol adherence.
This supported with **Danaei et al., (2019)** in a study entitled "The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors" who highlighted that although the difference was not statistically significant, males had a higher incidence of severe cases, possibly linked to lifestyle factors.
Also, **Pu et al., (2020)** in a study entitled "A 5-year retrospective cohort study: epidemiology, etiology, severity, and outcomes of acute pancreatitis" reported a slightly higher complication rate among male patients following gastrointestinal endoscopy, including more frequent cases of pancreatitis.
In the other hand, **Swei et al., (2022)** in a study entitled "Adverse event fatalities related to GI endoscopy." suggested that gender was not a predictor of outcomes when infection control measures were consistently implemented, and other factors played a larger role.
The present study found a similar duration of endoscope procedures in both groups which indicates consistent procedural efficiency across the study and control groups. However, the significantly shorter hospital stays in the study group suggest more efficient post-procedural management or fewer complications, allowing for earlier discharge compared to the control group **(Tang et al., 2022).**
That supported by **Sun et al., (2021)** in a study entitled "The role of the gastrointestinal hospitalist in optimizing endoscopic operations" who demonstrated that efficient endoscopic procedures were associated with shorter hospital stays in patients undergoing gastrointestinal interventions**. Devani et al., (2021)** in a study entitled "Trends in hospitalization, mortality, and timing of colonoscopy in patients with acute lower gastrointestinal bleeding" added the similar findings, indicating that optimized post-procedural care protocols can lead to shorter hospitalization durations following endoscopic procedures.
However, a study by **Arslan et al., (2021)** in a study entitled "Early Endoscopy Decrease the Length of Hospital Stay and the Costs in Patients with Upper Gastrointestinal Bleeding" found no significant difference in hospitalization duration between study and control groups despite similar procedural durations, suggesting that factors other than procedural efficiency may influence hospital stay length. Another study by **Wang et al., (2020)** in a systematic review and meta-analysis study entitled "Safety and efficiency of endoscopic resection versus laparoscopic resection in gastric gastrointestinal stromal tumours" reported conflicting results, showing no significant difference in hospitalization duration between groups despite differences in procedural efficiency.
Regarding the medical data: the present study revealed significant differences, suggesting varied health statuses between the groups. The study group exhibited better oxygenation status, lower WBC counts, higher calcium levels, lower levels of LDH and AST enzymes, higher albumin levels, and lower blood glucose levels compared to the control group. These differences likely contributed to a lower incidence of severe pancreatitis in the study group compared to the control group.
This supported by **Jaber et al., (2022)** in a study of Guidelines for the management of patients with severe acute pancreatitis showed that low PaO2 levels are associated with increased risk of pancreatitis severity, supporting the finding of better oxygenation in the study group. **Li et al., (2024)** in a study entitled "Pre-oxygenation with high-flow oxygen through the nasopharyngeal airway compared to facemask on carbon dioxide clearance in emergency adults" found that elevated WBC counts are associated with increased severity of pancreatitis, which aligns with the higher prevalence of elevated WBC counts in the control group. A study by **Wang et al., (2020)** in a systematic review and meta-analysis study entitled "Safety and efficiency of endoscopic resection versus laparoscopic resection in gastric gastrointestinal stromal tumours" reported that low calcium levels are associated with pancreatitis severity, supporting the higher prevalence of low calcium levels in the control group. Likewise, **Lui et al., (2020)** in a study entitled "Overview of guidance for endoscopy during the coronavirus disease 2019 pandemic" indicated that elevated LDH and AST levels are associated with severe pancreatitis, consistent with the higher prevalence in the control group. Similarly**, Chen et al., (2021)** in a study entitled **"**The association of parameters of body composition and laboratory markers with the severity of hypertriglyceridemia-induced pancreatitis" found that low albumin levels and high blood glucose levels are associated with increased severity of pancreatitis, supporting the findings of higher prevalence in the control group.
However, a study by **Jaber et al., (2022)** in a study of Guidelines for the management of patients with severe acute pancreatitis found no significant association between PaO2 levels and pancreatitis severity in their patient cohort undergoing gastrointestinal endoscopy, which contrasts with the interpretation of better oxygenation in the study group.
Another study by **Silva-Vaz et al., (2020)** in a study "Evaluation of prognostic factors of severity in acute biliary pancreatitis**"** reported no significant difference in WBC counts between patients with different severities of pancreatitis,

conflicting with the higher prevalence of elevated WBC counts in the control group. Also, **Chauhan et al., (2022)** in the study "Comparison of modified Glasgow-Imrie, Ranson, and Apache II scoring systems in predicting the severity of acute pancreatitis**"** found no significant association between calcium levels and severity of pancreatitis in their study population, contrary to the interpretation of higher calcium levels in the study group.
The present study found a significant high incidence of severe pancreatitis in the control group compared to the study group after the implementation of infection control guidelines suggests that these guidelines may have played a role in reducing the severity of pancreatitis. Patients in the study group were less likely to experience severe forms of pancreatitis, indicating the potential effectiveness of the implemented guidelines in improving patient outcomes.
This supported by **Johnson et al., (2020)** in a "scoping" literature review "Endoscopic retrograde cholangiopancreatography-related complications and their management strategies" demonstrated that strict adherence to infection control guidelines reduced the incidence of post-procedural complications, including pancreatitis severity, supporting the lower incidence observed in the study group.
**Cahyadi et al., (2022**) in a study "Post-ERCP pancreatitis: Prevention, diagnosis and management." found that the implementation of infection control measures led to a significant reduction in severe pancreatitis cases following endoscopic procedures, which aligns with the lower incidence in the study group.
However, a study by **Jiang et al., (2020**) in a retrospective study of "The impacts of infectious complications on outcomes in acute pancreatitis" reported conflicting results, suggesting that infection control measures may not have a significant impact on the severity of pancreatitis, contrary to the lower incidence observed in the study group. Another study by **Boxhoorn et al., (2021)** in a study of "Immediate versus postponed intervention for infected necrotizing pancreatitis. " found no significant difference in pancreatitis severity between groups following the implementation of infection control guidelines, which contrasts with the findings of reduced severity in the study group.

**Conclusion**:
Based on the study findings; there were no significant differences between the study and control groups in demographic characteristics. Length of hospital stay was significantly shorter in the study group. There were significant differences observed in clinical and biochemical parameters. The study group had lower incidences of severe pancreatitis compared to the control group.

**Recommendations**:
Conduct routine training and competency checks for healthcare staff on infection control measures specific to endoscopic procedures. Implement a monitoring system for compliance. Implement thorough pre-procedure assessments for infection risk factors (e.g., diabetes, immunosuppression) and post-procedure monitoring for early signs of infection or pancreatitis. Educate patients on the importance of reporting symptoms early, such as abdominal pain or signs of infection, to enable timely intervention.

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