



## ORIGINAL ARTICLE

## Incidence of Percutaneous Endoscopic Gastrostomy Site Wound Infection among Frail Elderly Patients Admitted in a Tertiary Medical Center

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### Abstract

**Background:** Nutrition is an important determinant of health in elderly patients. It also contributes to their overall quality of life and longevity. Percutaneous endoscopic gastrostomy (PEG) tube is used to provide enteral access in patients who are unable to swallow to improve nutrition. PEG site infection is an important healthcare-associated infection and this study aims to determine the incidence and clinical profile of PEG site wound infections among elderly patients admitted in a tertiary medical center.

**Methods:** A total of 102 frail elderly patients underwent PEG insertion from May 2017 to April 2018. Clinical and microbiological data were collected for culture-positive cases.

**Results:** A total of 30 PEG site wound infections occurred (29.4%). Sixteen organisms were isolated. *Klebsiella pneumoniae* was the most common (n = 17) followed by *Pseudomonas aeruginosa* (n = 6). Most of the infections (43%) were detected in the first 14 days post procedure. Most elderly patients with wound infections have cardiovascular & neurologic disease, diabetes mellitus, anemia and hypoalbuminemia. There was seven Carbapenemase producing and six Extended spectrum beta-lactamases producing Enterobacteriaceae. Four Gram-negative Multi-drug resistant organisms. Polymicrobial infection was noted in half of the patients (53%). The 30-day mortality rate was 6.8%.

**Conclusions:** PEG site wound infection is a common problem with clinical impact to elderly patients. The study was able to provide an epidemiologic data of PEG site wound infections among frail elderly patients and will provide clinicians and hospital personnel a guide to infection prevention and treatment strategies in hospitals.

### Keywords

Percutaneous endoscopic gastrostomy (PEG) tube, Wound, Infections, Frail, Elderly

### Introduction

Percutaneous endoscopic gastrostomy (PEG) tube was first described in 1980s and is a method of placement of a tube with the aid of an endoscope percutaneously. PEG tube placement is one of the most commonly performed procedures by gastroenterologists and have become widely used to provide enteral nutritional support as well as giving medications to patients who are unable to ingest solid or liquid foods due to many disorders.

Placement of PEG tube has been increasing for the past years. In a study done by Mendiratta, et al. placement of PEG tube increased by 38% in elderly patients and placement of PEG tube in patients with Alzheimer's dementia doubled (5%-10%) in the study period. Over a 10-year period, PEG tube use in hospitalized elderly patients increased significantly. More importantly, approximately 1 in 10 PEG tube placements occurred in patients with dementia [1].

The primary indications of PEG tube insertion are: enteral access for feeding or medication administration and decompression of the gut. However, there are

several contraindications for PEG tube insertion and these are the following: serious coagulation disorders, hemodynamic instability, sepsis, peritonitis, abdominal wall infection at the selected site of placement, marked peritoneal carcinomatosis, interposed organs (e.g., liver, colon), history of gastrectomy, gastric outlet obstruction, severe gastroparesis, massive ascites, portal hypertension (gastric varices), peritoneal dialysis, active gastric pathology, pyloric stenosis and expected survival < 2 months in which nasogastric tube is preferred [2,3].

Many of the complications associated with PEG tube placement maybe seen at any time following the placement. Complications of feeding tube placement are wound infections, bleeding, aspiration, tube migration and the buried bumper syndrome. More serious complications are necrotizing fasciitis, colcutaneous fistula and peritonitis. The reported rates of complications after percutaneous endoscopic gastrostomy tube placement are 16 to 70 percent and most complications are minor [4-8]. Most studies suggested that complications are more likely to occur in elderly with multiple co-morbid illnesses.

### Significance of the Study

This study provides information on the incidence, acquisition, clinical outcomes and correlation of possible risk factors for PEG site wound infections. The data will provide a better understanding on the epidemiology of PEG site wound infections in frail elderly population.

On a wider scope, information from this study can be used as reference for other studies, especially focusing on risk factor identification, impact of antibiotic selection and predictors of clinical outcomes.

Data from this study will also be relevant for comparison of trends and observations of PEG site infections in Asia, in other developing countries and as part of global epidemiologic picture.

This study aims to determine the incidence and clinical profile of PEG site wound infections among frail older adult patients admitted in a tertiary medical center.

### Methodology

This is a prospective, descriptive, case series study of bacteriological culture-confirmed PEG site wound infections in Frail Elderly patient ages 65-years-old and older admitted from May 2017 to April 2018.

The study population included via continuous sampling, only Frail Elderly ( $\geq 65$ -years-old) patients, male or female, admitted at St. Luke's Medical Center-Quezon City from May 2017 to April 2018, with organism isolate/s from the PEG site during the duration of hospital stay in the hospital are included in the study.

Patients were included only once in the study, regardless of the number of an organism/s were isolated. The isolated organism will be considered and described

in terms of infection, resistance pattern, and patient clinical course.

Data from the patient's chart and microbiology laboratory information were recorded. The parameters registered for each patient were age, sex, duration of hospital stay, antimicrobial susceptibility profile, co-morbid illnesses, infection outcomes, and final hospital outcomes. Frequencies and percentages were used to summarize nominal data.

### Results

There were a total of 30 elderly patients with culture confirmed PEG site wound infection documented from a one year study period. A total of 102 elderly patients who underwent PEG insertion are frail and encountered weight loss prior to the procedure. The incidence rate is 29.4% (30/102). Sixteen are male and 14 are female. Patients mean age is  $82 \pm 9$  with majority of ages fall within 85-95 years old. Forty-three percent (43%) of those patients with PEG site wound infections acquired it in less than 2 weeks period after insertion. Fifty percent (50%) are diagnosed while the patient is still confined in the hospital wherein the PEG site are taken care by a doctor or a hospital nurse and the other 50% was diagnosed at home where in a private duty nurse or a professional care giver take cares of the PEG site. Cardiovascular diseases were the most common

**Table 1:** Demographic & clinical characteristics of elderly patients with peg site wound infections.

Characteristics	N = 30	%
Mean age, $82 \pm 9$ years (SD)		
> 95	1	3%
85-95 years	14	47%
75-85 years	7	23%
65-75 years	8	27%
Place of Diagnosis		
In the hospital	15	50%
At home	15	50%
Sex		
Male	16	53%
Female	14	47%
Duration of peg insertion prior to infection		
< 2 weeks	13	43%
< 6 mos	8	27%
6-12 mos	4	13%
> 12 mos	5	17%
Co-morbidities		
None		
Cardiovascular disease	26	87%
Neoplasm	7	23%
Endocrine (DM, thyroid disorders)	16	53%
Pulmonary (COPD, Asthma)	4	13%
CKD (eGFR < 15 ml/min or on HD)	5	17%
Neurologic (dementia, stroke)	21	70%

co-morbidity seen in patients, followed by neurologic disease and diabetes mellitus (Table 1).

Table 2 shows the different laboratory parameters done to elderly patients with wound infections. Seventy-three percent (73%) of patients were anemic. Majority had normal white blood cells counts. Albumin levels were low in majority of patients with a rate of 84%. Five out of thirty patients were undergoing dialysis.

A total of 16 organisms were isolated. Coliform organism was the most common organism (n = 22) isolated with Klebsiella pneumonia being the most common accounting for 57% of the organisms (n =17). This was followed by Pseudomonas (n = 6), Enterococcus (n = 5)

**Table 2:** Laboratory characteristics of elderly patients with PEG site wound infections.

	N = 30	%
<i>Hemoglobin level</i>		
Normal hemoglobin levels	8	27%
Anemia	22	73%
<i>White blood cell count</i>		
Leukocytosis	11	37%
Normal WBC count	18	60%
Leukopenia	1	3%
<i>Albumin level (n = 25)</i>		
Normal albumin levels	4	16%
Hypoalbuminemia	21	84%
<i>Renal function</i>		
eGFR > 60 ml/min	8	27%
eGFR 16-59 ml/min	17	56%
eGFR < 15 ml/min or on HD	5	17%

**Table 3:** Percent distribution of different organisms isolated.

Specimen	N = 30	%
<i>Klebsiella species</i>	18	60%
- <i>Klebsiella pneumonia</i>	17	
- <i>Klebsiella oxytoca</i>	1	
<i>Pseudomonas aeruginosa</i>	6	20%
<i>Enterococcus faecalis</i>	5	17%
<i>Enterobacter species</i>	3	10%
- <i>Enterobacter hormaechei</i>	1	
- <i>Enterobacter cloacae</i>	1	
- <i>Enterobacter aerogenes</i>	1	
<i>Acinetobacter baumannii</i>	2	7%
<i>Staphylococcus aureus</i>	2	7%
<i>Staphylococcus epidermidis</i>	1	3%
<i>Streptococcus pyogenes</i>	1	3%
<i>Citrobacter koseri</i>	1	3%
<i>Bacillus subtilis</i>	1	3%
<i>Escherichia coli</i>	1	3%
<i>Burkholderia cepacia</i>	1	3%
<i>Candida species</i>	11	37%

and others (Table 3). There were seven Carbapenemase producing and six ESBL producing Enterobacteriaceae. Four Gram negative Multi-drug resistant organisms (MDROs) and one MRSA isolated. Polymicrobial infection (>= 2 pathogens) was noted in 16 patients (8 patients with 2 organisms, 6 patients with 3 organisms and 2 patients with 4 organisms). Candida species were also noted in 11 patients (Table 3).

About 70% of those with PEG site wound infections have co-existing pneumonia and 13% have urinary tract infections. There was 33% mortality rate of patients with wound infection. All deaths are not directly due to PEG site wound infections. The 30 day mortality rate of elderly patients who had gastrostomy tube inserted and had PEG site infection was 6.8% (7 out of 102). Most deaths are due to pneumonia (Table 4).

## Discussion

The incidence rate of PEG site infections across all age group ranges from 12 to 32% [9-12]. In our study, the incidence of PEG site infection in frail elderly person falls within the range which is 29.4%. It is almost the same in a study done in India wherein there prevalence rate is 28.8% and close to the prevalence rate in Singapore which is 22.4% [12,13].

Several risk factors have been postulated in patients having PEG site infections and both patient-related and technique-related factors have been linked to it. These are diabetes mellitus, malignancy, steroid use, malnutrition and technical factors such as clinical institution to where the procedure was performed, size of PEG tubes used, experience of the endoscopist, small abdominal wall incisions and excessive traction on the PEG tube [13-15]. In a study done by Davis, et al. infection rate was not associated with demographics, insertion technique or antibiotic prophylaxis and wound care practices appear to be a significant contributor to infection rate. The different wound care practices and non-adherence to hospital protocol contributes to the risk of infection [9]. In our study, diabetes mellitus appears to be a common co-morbidity associated with PEG site infections. The most common indications of PEG insertion were dementia, stroke and malignancy. Most of our frail elderly patients who had the infection are anemic and have low albumin levels. Several studies have shown a positive effect of antibiotic prophylaxis in reducing the

**Table 4:** Clinical profile of patients with peg infections.

Characteristics	N = 30	%
Other related Infection		
Pneumonia	21	70%
UTI	4	13%
None	5	17%
Final hospitalization outcome		
Died	10	33%
Discharged	20	67%

risk of infection after PEG insertions [16,17]. However, antibiotic prophylaxis was seldom given since most elderly patients have already been receiving antibiotics to treat other infections prior to the procedure and there were no prophylactic antibiotic policy prior to PEG insertion in our hospital.

Nosocomial or hospital associated infection is a major problem in hospitals worldwide and they constitute a major source of adverse healthcare outcomes. Several pathogens have been implicated in these infections. In our study, the microorganisms cultured from PEG wounds were: MRSA, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Enterococcus faecalis* and *Acinetobacter baumannii* which reflects hospital acquired infection. The most common organism isolated from culture is *Klebsiella pneumoniae* which is different from other studies done in other countries wherein their most common are: *Pseudomonas aeruginosa* and MRSA [10,13]. The high prevalence of multi-drug resistant organism and the high number of polymicrobial infection was one of the most important findings of our study. Most elderly patients who underwent PEG insertions are severely ill and debilitated and have multiple previous hospitalizations prior to the procedure, increasing the chances of becoming colonized by multi-drug resistant organisms. The use of several broad-spectrum antibiotics before PEG insertion may explain the high level of multi-drug resistant bacteria in our frail elderly.

In this study, the 30 day mortality rate is 6.8%. Most of those who died within the 30 day are diabetic, hypoalbuminemic and acutely ill. The 30-day mortality rate of percutaneous gastrostomy tube insertion ranges from 10-24% [16,18-20]. Deaths are not directly related to complications of procedure. Risk factors for 30-day mortality among hospitalized patients were: serum albumin < 3 g/dl, chronic obstructive pulmonary disease and diabetes mellitus [21]. Patients hospitalized with acute illness are at high risk for serious adverse events and complications after PEG insertion than in stable patients with dementia [22]. Early mortality could be reduced if PEG placement is delayed until acute illness has improved in some patients [23].

## Conclusion

The incidence rate of PEG site infections among our elderly patients is 29.4% in our hospital setting. All of the elderly patients in the study are frail, and PEG site wound infections occurs more to those who are acutely ill and have multiple co-morbidities. It is advisable to correct first those co-morbidities that are reversible (anemia, infection, acute kidney injury, etc.) and control of chronic conditions (hypertension, heart failure, diabetes mellitus, etc.) should be done prior to proceeding to PEG insertion. Awareness is important about the significance of the infection. This study provides descriptive data regarding PEG site infections. The current mi-

crobiological data may guide infection prevention and treatment strategies in hospitals. A multi-disciplinary approach may be employed to reduce the high rate of infection. A hospital protocol for prevention of PEG infection is recommended. Further research is required to determine possible risks factors and the best preventive measure and wound care strategies for gastrostomy site wound infections.

## Author Contributions

All authors have equal contribution in the article.

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## Conflicts of Interest

The authors declare no conflict of interest.

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