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Muhammad shuaib

SU91-MSAHW-S23-110

FAHS

**Frequency and Associated Factor of Aspiration Pneumonia among
Patients in the ICUs of Hayatabad Medical Complex Peshawar**



SUPERIOR UNIVERSITY

Thesis Submitted to

The Superior University Lahore

In Partial Fulfillment of the

Requirement for the Degree of

Master of Science in Allied Health Sciences

By

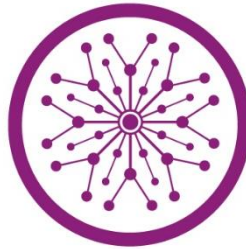
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This is to certify that the research work presented in this thesis, titled **“Frequency and associated factor of aspiration pneumonia among patients in the ICUs of Hayatabad Medical Complex Peshawar”** was conducted by **“muhammad shuaib”** under the supervision of **“Dr. Amdad Ali Faruqi.”**

No part of this thesis has been submitted anywhere else for any other degree. This thesis is submitted to the Faculty of Allied Health Sciences, The Superior University, Lahore in partial fulfillment of the requirements for the degree of Master of Science in the field of **“Allied Health Sciences”** in Faculty of Allied Health Sciences at The Superior University, Lahore.

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DEDICATION

This thesis is dedicated to my beloved family, whose unwavering support, encouragement, and sacrifices have been the cornerstone of my academic journey.

To my parents, whose love and guidance have inspired me to strive for excellence in every endeavor, and to my siblings, who have been my constant source of motivation and cheer.

To my teachers and mentors, whose wisdom and patience have shaped my intellectual growth and instilled in me a passion for learning and discovery.

Lastly, this work is dedicated to the countless healthcare professionals whose dedication to patient safety inspires research and progress in the field of infection control.

With deep gratitude and respect, I humbly offer this work to all who have been a part of this journey.

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LIST OF ABBREVIATIONS

AP	Aspiration Pneumonia
ASA	American Society of Anesthesiologists
CAP	Community-Acquired Pneumonia
CT	Computed Tomography
ER	Emergency Room
ETT	Endotracheal Tube
GI	Gastrointestinal
HAP	Hospital-Acquired Pneumonia
HDU	High Dependency Unit
ICU	Intensive Care Unit
MBBS	Bachelor of Medicine, Bachelor of Surgery
NG	Nasogastric
PEEP	Positive End-Expiratory Pressure
RTA	Road Traffic Accident
SPSS	Statistical Package for the Social Sciences
VFSS	Video Fluoroscopic Swallow Study
VAP	Ventilator-Associated Pneumonia

ABSTRACT

Introduction: Aspiration pneumonia (AP) is brought on by the ingestion of oropharyngeal or stomach secretions into Airway. Processes that impair consciousness, produce swallowing difficulty or hinder lung clearance are examples of comorbidities that predispose to clinically diagnosed aspiration pneumonia. Aspiration pneumonia, a function-based classification of pneumonia, is the most common type of pneumonia in elderly people, regardless of where it develops. In contrast to children, where aspiration pneumonia is less common. The proportion of cases of pneumonia hospitalized that are due to aspiration is drastically rising as people age. This study is to measure the frequency distribution and finding the risk factors of aspiration pneumonia. **Methods:** The Study is conducted in public sector tertiary care hospital Peshawar Pakistan. With convenience-based sampling, Sample size selected was 196, including ASA class II, III and IV, under the care of ICU in the study settings, for more than 4 days. Data was analyzed via SPSS v22, for Frequency Distribution of Age groups, Gender, Aspiration Pneumonia (AP) and then AP was stratified in Cross tabulation with age, gender, smoking status, hospital stay, suit of care, method of feeding, tubing for feed and airway, positioning of patient and sedation level. This was to identify risk factors. Chi square test was applied for significance of statistical analysis. **Results:** The mean age for the sample was, 36.49 ± 15.76 Years, with 47.4% of 196 being males, and other 52.6% were females. Female gender had more incidence of AP, about 9.6%, while in male 6.6%. smokers and nonsmoker had incidence of 3.06% and 8.16%, respectively. Few cases, 4.1% of AP were seen with hospital stay of 10 to 20 days, but non above 20 days. 13.7% AP cases were seen in HDU, 2.5% in ICUs, 8.6% with Nasogastric tubes, 8.1% with Intermittent feed, 9.6% with moderate to severe disabilities, 6.6% in light sedation while 4.5% in deeply sedated patients, and all the cases of AP were in supine position before and during the event. **Conclusions:** It was concluded that there is greater risk of aspiration Pneumonia in patients with disabilities, sedation level, supine positioning, longer hospital stays, Nasogastric tubes more than feeding jejunostomies, , and maxillofacial plus head traumas.

Key Words: Aspiration Pneumonia, ICU, Community acquired Pneumonia, Hospital Acquired Pneumonia, Aspiration Pneumonia

Chapter 1

INTRODUCTION

Aspiration pneumonia (AP) is brought on by the ingestion of oropharyngeal or stomach secretions into Airway. Processes that impair consciousness, produce swallowing difficulty or hinder lung clearance are examples of comorbidities that predispose to clinically diagnosed aspiration pneumonia. The diagnosis of aspiration pneumonia often follows massive aspiration with the involvement of distinctive anatomic sites. Compared to non-aspiration pneumonia, aspiration pneumonia is linked to greater mortality risk (1). A wide range of pulmonary diseases, including airway obstruction, aspiration pneumonia, and acute respiratory distress syndrome, is brought on by the entry of gastrointestinal (GI) content into the lungs, which suppresses the respiratory system's natural defenses and significantly raises the patient's morbidity and mortality. Pneumonia, abscess, blockage, and pneumonia are just a few of the many secondary symptoms that might develop after aspiration. When aspirated material contains bacteria and other germs, an inflammatory response results, which is how pneumonia normally develops (2). An infection of the lung caused by the inhalation or entry of endogenous flora and various bodily substances from the gastrointestinal (GI) tract into the respiratory system is known as aspiration pneumonia (3).

The larynx serves as the lower respiratory system's entrance point. In this approach, its purpose is to keep foreign objects from entering the lower airway and to quickly eject any objects that may do so. Loss of laryngeal innervation due to a stroke or damage to the larynx's muscular and cartilaginous components as a result of cancer therapy decreases laryngeal efficiency and affects the timing of opening and closure. This raises the likelihood of aspiration(4). Saliva, pharyngeal secretions, microorganisms, liquids, poisonous chemicals, food, or gastric contents are just a few examples of the varied materials that might be aspirated(5). The high prevalence of aspiration pneumonia risk factors such as dysphagia, poor oral hygiene, and usage of specific drugs, is probably responsible for this, or at least in part in the population(2). The major cause of death from hospital-acquired infections is nosocomial bacterial pneumonia, which is the second most prevalent cause of nosocomial infections after urinary tract infections. Aspiration pneumonia affects 10% of people who are admitted

to the hospital after drug overdoses. Males are more likely than females to have nosocomial bacterial pneumonia brought on by aspiration, and it affects adults far more frequently than children. Elderly people are more likely to be affected by predisposing conditions. As a result, aspiration pneumonia is more likely to occur in this population(6).

The study estimates that there are between 150 and 1400 cases of community-acquired pneumonia (CAP) per 100,000 people worldwide. The death rate of CAP is 2-5/1000 years, and in 2017, 1.13 million or 261/100 000 people over the age of 70 died as a result of CAP. This is a 9% increase in mortality over the preceding three decades(7). Aspiration pneumonia, a function-based classification of pneumonia, is the most common type of pneumonia in elderly people, regardless of where it develops. In contrast to children, where aspiration pneumonia is less common. The proportion of cases of pneumonia hospitalized that are due to aspiration is drastically rising as people age. Therefore, rather than focusing on the location of the patient's infection while treating pneumonia in the elderly, we should consider the treatment for aspiration pneumonia(8). Hospitalized individuals with CAP and HAP frequently developed aspiration pneumonia. Even though the hospitalized patients were older, aspiration pneumonia occurs often, contrary to what was previously believed. Aspiration pneumonia is frequently seen in older people with CAP, according to a recent investigation(9).

Despite having a unique pathogenesis, this illness is also thought to belong to a spectrum that also encompasses community- and hospital-acquired pneumonia. In nursing facilities, aspiration pneumonia accounts for about 18% of all cases. Additionally, it is responsible for 5–15% of all instances of community-acquired pneumonia. Due to the absence of biological indicators that could aid in diagnosis and the occurrence of asymptomatic instances, it is challenging to estimate the true prevalence of the disorder(10). According to reports, 5 to 15% of instances of community-acquired pneumonia (CAP) are caused by aspiration pneumonia. Aspiration pneumonia occurred in 60.1 percent of CAP patients and 86.7 percent of hospital-acquired pneumonia patients. The majority of pneumonia cases in persons over 70 were caused by aspiration(11).

Anaerobes and oral bacteria may be found in patients with community-acquired pneumonia more frequently than previously believed, according to recent genetic studies. These microorganisms could be crucial in the emergence of elderly aspiration pneumonia. Their low prevalence and the fact that bacterial pathogens are unknown in the majority of cases of aspiration pneumonia suggest that bacteria only play a minor part in the aspiration pneumonia that affects elderly people (2).

Fluids that are naturally toxic to the lower airways and have the ability to start an inflammatory response without the need for bacterial infection are what give rise to chemical pneumonitis. Acid, kerosene, gasoline, milk, mineral oil, and alcohol are a few examples of these fluids. By aspirating oropharyngeal secretions, oropharynx commensal infect the lower airways with bacteria. Aspiration of inert fluids and particulate matter, which are not inherently toxic to the lungs but can cause airway obstruction or reflex airway closure, falls under the third category of pulmonary aspiration. Saline, water, barium, and gastric contents with a pH higher than are examples of inert fluids. Peanuts, betel nuts, and other vegetable and inorganic particles are examples of particulate matter (3).

Even in average people, aspiration is a relatively common phenomenon. One study found that when radioactive material was placed in the nasopharynx of healthy adults while they were sleeping, half of them would aspirate small amounts of the radioactive material. Aspiration is typically defended against by a variety of mechanisms. The larynx closes during swallowing, the upper and lower oesophageal sphincters prevent gastroesophageal reflux, and the cough reflex expels foreign objects from the respiratory tract when the respiratory epithelium's chemoreceptors are activated. If these protective mechanisms are inadequate, aspiration will happen. Reduced level of consciousness, neuromuscular disease with impaired swallowing, structural abnormalities of the aerodigestive tract, prolonged supine position, endotracheal intubation, Nasogastric tube, and vomiting are some of the conditions linked to an increased risk of aspiration. When it comes to the development of aspiration pneumonia in post-stroke patients, clinical factors are crucial. A person may aspirate oropharyngeal or gastric contents that resemble aspiration pneumonia in any condition or health issue that lowers consciousness. Patients are at risk of developing aspiration pneumonia if their level of consciousness declines. Another important clinical factor for aspiration pneumonia is dysphagia. Aspiration pneumonia is more

common in patients with dysphagia than in those without it. Aspiration pneumonia risk increases with the severity of dysphagia. Aspiration pneumonia is also more common in patients who aspirate oropharyngeal secretions and regurgitated gastric contents. Patients with chronic pulmonary, neurological, and congestive heart failure diseases are more likely to develop aspiration pneumonia. Seizures and other neurological issues can put a patient at risk for developing post-stroke aspiration pneumonia. Aspiration pneumonia is less likely to occur in patients with ischemic stroke than it is in those with hemorrhagic stroke. Another typical risk factor for aspiration pneumonia is hyperglycemia (5).

Aspiration of gastric contents, as opposed to oropharyngeal secretions, is more likely to be observed or implied. Mendelson's syndrome was first described in relation to pregnant patients receiving ether anaesthesia. Aspiration that was observed was soon followed by cyanosis and respiratory distress. Infiltrates in one or both lower lobes were visible on the women's X-rays. Despite the severity of the illness, all of the patients recovered within 36 hours, and within seven days, there was radio-graphic resolution. Aspiration pneumonitis has been studied again in the past, and these studies have revealed a more fulminant clinical course leading to adult respiratory distress syndrome. The various clinical outcomes most likely reflect various study populations. The original patients were young, previously healthy women, whereas later studies frequently included elderly, frail patients or those who were suffering from severe co morbid conditions (6).

Pneumonia in older adults can be challenging to diagnose. Chest computed tomography (CT) is a useful supplement to chest radiography, which is required for confirming the diagnosis. This is due to the fact that chest CT may offer useful diagnostic information in elderly or bedridden patients, whose neurological disorders, muscular weakness, and kyphosis make it difficult to obtain accurate X-ray images. The radio-graphic appearance of aspiration pneumonia, also known as gravity dependent pneumonia, varies depending on a number of factors, but it typically involves the dependent (posterior) portion bilaterally. When it comes to pinpointing the pulmonary infiltrates of aspiration pneumonia, chest CT is superior to plain chest radiography. Despite the value of chest CT as a diagnostic tool overall, no studies have specifically evaluated its usefulness in identifying aspiration pneumonia (7).

Aspiration pneumonia is the sixth most common cause of death, and pneumonia and aspiration pneumonia together are the third most common killers. Additionally, it has been noted that pneumonia frequently kills elderly people who are senile, and it is believed that more people die of pneumonia than the statistics indicate. In addition, a World Health Organization survey found that pneumonia deaths are common throughout the world. Pneumonia and other lower respiratory tract infections are the fourth-leading cause of death, accounting for 2.6 million fatalities in 2019 (9).

The most common cause of death in infants, children, and adults is aspiration pneumonia. Regarding the prevalence of aspiration pneumonia in Pakistan, there is scant information in the medical literature. Even less is known about pediatric and elderly patients, and what is known is largely based on children and adult who have undergone surgery. The goal of this study was to look into potential risk factors for aspiration pneumonia in elderly patients and young patients, to determine the prevalence of aspiration pneumonia in the community, both young and old and to determine aspirating pneumonia risk factors in order to reduce morbidity and mortality in the population. This study is important regarding measuring the frequency distribution and finding the risk factors of aspiration pneumonia. This study will lead the management of both public and private sectors hospitals to know the risk factors and prevalence of aspiration pneumonia. of info it will identify the gap why very little is known about it in Pakistan and will help the government and policy makers to take step for prevention of aspiration pneumonia and decrease the incidence of aspiration pneumonia in Pakistan to overcome the disease burden.

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AIM AND OBJECTIVES

- The goal of this study was to look into potential risk factors for aspiration pneumonia in elderly patients and young patients.
- To determine the prevalence of aspiration pneumonia in the community, both young and old.
- To determine aspirating pneumonia risk factors in order to reduce morbidity and mortality in the population

Chapter 2

LITERATURE REVIEW

An overview of existing literature on aspiration pneumonia is presented, as well as aspects related to risk factor and incidence of aspiration pneumonia. Furthermore, a review of the literature revealed that aspiration pneumonia and other diseases are an issue not just in Pakistan but also in developed nations. The literature review's goal was to find out what is currently known about frequency distribution and risk factor of aspiration pneumonia.

According to a study, the prevalence of aspiration pneumonia may be higher than is widely believed. We discovered that aspiration pneumonia causes an average of over 58,000 deaths per year in the United States. Aspiration pneumonia frequently arises as a result of another ailment and is listed as the underlying cause of death in only 17,616 fatalities annually, which may contribute to the underestimation of the burden of mortality. However, aspiration pneumonia is a serious incident that, particularly in the elderly, may set off a chain of events that ends in death. Those who have aspiration pneumonia, either as the underlying cause or as a contributing factor, may benefit from efforts to prevent aspiration(1).

According to the study conducted in Korea, the patient is more likely to get aspiration pneumonia if the aspiration as a previous event is not visible. Chemical pneumonitis requires a significant amount of stomach contents to develop, which makes aspiration episodes more obvious in aspiration pneumonitis instances. Additionally, hyper-acute hypoxaemia occurs, and serious lung injury can occur and be treated within 48 hours in the clinical course of aspiration pneumonitis. Even in nondependent lung fields, these patients are likely to have symptoms such as bronchospasm, frothy sputum, and bilateral patchy infiltrates(5).

Another study conducted in United Kingdom which state that, there is debate over whether Nasogastric tubes can stop aspiration pneumonia. In a 1260 patient trial, there were no differences in the number of aspiration events between the 630 patients with and without Nasogastric tubes during endoscopic swallowing surveillance. The risk of aspiration is not reduced by post-pyloric feeding being superior to stomach feeding, nor is it reduced by closely monitoring the post-feeding residual volume(12).

According to the study, for some people, certain drugs might be protective. Dopamine levels and the ability to swallow are directly related because low dopamine levels can affect the motor function of the muscles in the throat, which can make it harder to swallow and raise the risk of aspiration pneumonia. The delayed onset of the swallowing reflex in patients with basal ganglia infarctions has been linked to a dysfunction in dopamine metabolism in the basal ganglia. Levodopa, a dopamine-inducing drug commonly used to treat Parkinson's disease, has been shown to improve the swallowing reflex in patients with basal ganglia infarction and a history of aspiration pneumonia, according to a study. Levodopa infusions in these patients resulted in a statistically significant improvement in swallowing reflex time(2).

Another study shows that the proper management of risk variables that can be changed includes enhancing nutritional status, encouraging smoking cessation, and restoring swallowing function. As a result, in keeping with other studies, we advise using an instrumental evaluation to initially check the swallowing ability of frail patients with dysphagia before addressing significant risk factors(11).

The study indicated that aspiration and dysphagia were both strongly associated with pneumonia, especially in our individuals who were selected from the acute care wards. According to earlier research, aspirating food was more frequently associated with aspiration pneumonia than aspirating thin fluids. Similar to this, we discovered that aspiration of food considerably increased the risk of pneumonia compared to aspiration of drink. Aspiration pneumonia was also substantially correlated with other features of dysphagia, including pharyngeal delay, low spilling point, and excess residue. According to a prior study, pneumonia and pharyngeal delay are related(13).

The study claims that the frequent use of a gastric tube in the HAP group may surprise some people because it is known to be protective against aspiration, vomiting, and gastric retention. However, before the tube was put, some patients who get a gastric tube may have previously vomited or had signs of gastric retention, suggesting that they may have aspirated gastric contents. When in the proper position, a stomach tube is probably not a risk factor by itself, but when in the incorrect position, it obviously cannot prevent vomiting and may even increase the risk of vomiting(14).

According to the research, patients should be informed about the value of thickening and that thickening may be useful in reducing penetration or aspiration. This may help minimize the incidence of aspiration pneumonia. Thickening may also be crucial in the management of general diseases, the patient's ability to recognize dysphagia or silent aspiration, and the prevention of pneumonia. Aspiration pneumonia can arise for a variety of reasons, including dysphagia(15).

According to the study, pulmonary aspiration affects a wide spectrum of patients and is a substantial source of morbidity and mortality. The ability to recognize and distinguish between the various aspiration syndromes is mostly clinical/epidemiological in nature. Since most treatments are empirical, it is important to properly differentiate between different aspirations in order to get the greatest results. Recent research has revealed that preventive measures can lower the incidence of aspiration syndromes(16).

According to a study done in Pakistan, which classified pediatric aspiration pneumonia patients based on aspiration syndrome types as well as the causes of pulmonary aspiration. It has also been investigated how the various aspirated materials will affect clinical outcomes. The small sample size (n=107) of this study is one of its shortcomings. The findings of this hospital-based study cannot be applied to the wider public. Additionally, the retrospective study design employed has its own shortcomings due to poor record management and a lack of uniform diagnostic criteria. The study also reveals, people who aspirate milk and oral secretions do relatively worse in the hospital than those who aspirate kerosene. As a result, it is possible to suggest that certain patient groups receive aggressive care and quick antimicrobial medication. Other suggestions include forbidding kids from accessing kerosene oil and prohibiting them from eating betelnuts(17).

Another study on children with neurological impairment conducted in Hong Kong claims that aspiration and its complications significantly increase the morbidity and mortality of such children. Setting particular treatment objectives for every patient depends on early aspiration risk assessment, which includes the use of video fluoroscopic swallow studies. Dysphagia and an infiltration in a dependent Bronchopulmonary tract should raise the suspicion of aspiration in the patient.

Aspiration pneumonia and aspiration pneumonitis are two distinct clinical entities requiring different treatments, despite some overlap(18).

Another study analyzed 1,800 pneumonia patients who were hospitalized and receiving acute therapy. All of the pneumonia patients that were hospitalized were older than 70, with the 80s being the most common age range. We discovered the following from the univariate analyses: (1) Patients with AP had noticeably older ages, lower BMIs, higher numbers of comorbidities, higher rates of AP recurrences, lower normal diet intakes, and shorter stays at home prior to hospitalization. compared to patients without AP; (2) Patients with AP had longer fasted times, greater rates of swallowing assessments and interventions, longer hospital stays, and a higher in-hospital death rate when hospitalized. These findings may be indicative of the current pneumonia hospitalization situation in Japan, the nation with the world's oldest population(19).

In line with the study the risk of aspiration pneumonia in the hospital was decreased by wearing dentures. those nursing home residents who are at aspiration risk are more likely to develop pneumonia. However, wearing dentures lowers the risk of incident pneumonia. Furthermore, Manabe et al. showed that elderly residents of the neighbourhood over the age of 65 who had few remaining teeth had a higher risk of developing pneumonia, though this risk is reduced by wearing dentures. In our study, the ability to swallow and the number of remaining teeth were not linked to the occurrence of aspiration pneumonia, but there was a significant correlation between these factors and the use of dentures. Elderly people without dentures have a decreased ability to masticate. Additionally, masticatory ability causes a decrease in salivary secretion. It's possible that participants who did not wear dentures had a decline in their ability to masticate, which affected their ability to secrete saliva and perform oral self-cleansing. This might then cause the oral environment to deteriorate. Therefore, it's possible that elderly individuals without dentures' oral environments deteriorated, and aspiration pneumonia cases may have increased due to silent aspiration of bacteria that grow in the oral cavity at night (9).

According to another study, Dehydration has been identified as a significant aspiration pneumonia risk factor. Dehydration is an established risk factor for pneumonia, but prior research has not shown that it increases the risk of aspiration

pneumonia specifically. The senior participants in this study received normal care and rehabilitation services in their facility. Dehydration in this situation indicates difficulty eating and drinking. Dehydration may therefore be a reliable sign of elderly individuals' nutritional condition. Aspiration pneumonia can also be a risk for people with dementia. According to recent studies, elderly dementia patients (mean age, 86 years) inevitably acquire dysphagia, which increases their risk of aspiration pneumonia and associated hospital mortality(20).

According to the study one phenotype of community-acquired pneumonia is thought to be aspirating pneumonia. Aspiration of oropharyngeal contents into the larynx and lower respiratory system is a common symptom of aspirating pneumonia, despite the lack of definite diagnostic criteria. In contrast to CAP, aspirating pneumonia manifests at an older age in those with lower BMI, is linked to pneumonia of greater severity, and has a higher long-term death rate, as previous research have shown. The current study discovered that the aspirating pneumonia group's clinical characteristics upon admission were similar to those described in earlier studies, and aspirating pneumonia in COPD patients also exhibits different clinical features(21).

In accordance with the Korean study, older persons are more likely to develop aspiration pneumonia, which is especially important in Korea's increasingly ageing population. Aspiration pneumonia may become more common in Korea, so immediate prevention actions are needed. The high incidence of aspiration pneumonia in older persons is likely due in large part to the progressive obtundation of the swallowing reflex with age. Numerous initiatives have been made to lessen the pathological effects of age-related coughing and swallowing problems. Because repeated silent aspirations brought on by dysphagia, which is a significant factor in the pathophysiology of aspiration pneumonia in elderly persons(22).

A study reported aspiration pneumonia incidences to be 8% out of total 823 patients that were previously intubated in ER department. This also evaluated the association between number of attempts and occurrence of aspiration pneumonia, but the study had not found any strong evidence on that (23). According to the study a pattern in sepsis and acute respiratory failure when there is severe pneumonia in terms of hospital diagnosis and coding practices. Since patients with these diagnoses had not been included in cohorts for pneumonia, we discovered that over time, an increasing

proportion of patients had one of these alternative principal diagnoses, complicating efforts to assess national trends in pneumonia hospitalizations and outcomes. Because patients who receive a principal diagnosis of sepsis or respiratory failure have a higher risk of dying than those who receive a principal diagnosis of pneumonia, variation between hospitals in the application of sepsis and respiratory failure diagnosis codes among cases of pneumonia has skewed efforts to compare hospital performance on CMS mortality and readmission outcome measures (8).

There is another study reporting about micro aspiration which is very much common in patients that are intubated and are candidates of ICU or HDUs. The study have found stronger evidence on micro aspiration being the main cause of ventilator associated pneumonia, technically caused by micro-aspiration, can also be referred as aspiration pneumonia (24). In that study they have used blue methylene dye to identify about micro-aspiration, for that fiberoptic bronchoscopy was done in ICU settings. This study have also established some evidence on the preventive methods or measures for aspiration which includes; semi-recombinant position, polyurethane cuffs and Positive end expiratory pressure (PEEP) (24).

Another Korean study found that older adults are more likely to develop aspiration pneumonia, which is especially important given Korea's rapidly ageing population. Aspiration pneumonia may become more common in Korea, so immediate preventive measures are needed. The high incidence of aspiration pneumonia among older adults is likely due in large part to the progressive obtundation of the swallowing reflex with age. Numerous initiatives have been made to reduce the pathologic effects of age-related coughing and swallowing problems. Dysphagia screening and early intervention may become significant public health issues due to the role that dysphagia and repeated silent aspiration play in the pathogenesis of aspiration pneumonia in older people. Dysphagia affects about 50% of nursing home residents in Korea; however, VFSS is rarely used to test pneumonia patients. In Japan, only 6.2% of pneumonia patients and 5.8% of patients with community-acquired pneumonia in particular were examined using VFSS, according to a prior study. Therefore, VFSS examinations should be performed more frequently as part of a strategy to prevent aspiration pneumonia (7).

Ventilator associated pneumonia a common cause and type of micro aspiration pneumonia diagnosed in ICU patients that are intubated, the tracheal tube cuff is important for prevention of this micro aspiration. Certain study have evaluated that fact by their randomized controlled trials where they have found in their literature review that conical shaped cuffs are much more effective in creating a tracheal seal in doing so preventing micro-aspiration pneumonia leading to Ventilator associated pneumonia (VAP) in ICU patients (24). According to this study, aspiration pneumonia had a cumulative incidence of 131/568 (23.66%) and an incidence density rate of 38/1000 people per day-observation. This cumulative incidence was higher than reports from studies in Nigeria (12.40%), China (13.20%), the United Kingdom (7.12%), and the United States (5%) but lower than studies in Egypt (40%) and India (32 percent). The discrepancy may be brought on by variations in post-stroke patient care, various methods for diagnosing post-stroke aspiration pneumonia, or the chosen study design. In this study, men had a significantly higher risk of developing aspiration pneumonia than women. This result was consistent with findings from studies carried out in China and the United Kingdom. Additionally, the majority of studies cite age as the most significant factor. This study showed that as a patient gets older, their risk of developing aspiration pneumonia increases. Reduced immunity, more comorbidities, a more severe neurological outcome, impaired swallowing function, and old age all go hand in hand. These issues make the patient more vulnerable to aspiration pneumonia following a stroke. This result was consistent with research done in other nations (5).

The study found that tracheotomy helped patients with sputum retention have better pulmonary toilet. However, it falls short in terms of aspiration prevention. The tracheal tube itself may make it more difficult to elevate the larynx during swallowing. More aggressive surgical intervention, such as glottis closure, laryngeal closure, total laryngectomy, and laryngeal-tracheal separation, had been tried with some success for more severe aspiration. The study also suggests that 11 children with neurological impairments who had laryngotracheal separation for untreatable aspiration pneumonia reported their experiences. The trachea was divided obliquely during laryngotracheal separation. The proximal trachea was either closed or anastomosed to the esophagus while the distal end of the trachea was sutured to the skin to create a wide tracheotomy. All parents in the study rated the laryngeal-tracheal separation procedure as excellent or good in terms of its improvement of quality of life. It also decreased the frequency

of pneumonia and the need for suctioning. The authors came to the conclusion that laryngotracheal separation can be suggested as a primary surgical intervention for children with neurological impairment and intractable aspiration (4).

The study found that milk, kerosene oil, and oral secretions were the aspirates that were most frequently observed in this study. In the developing world, kerosene oil is a crucial household item that is used for cooking, heating, and lighting. Kerosene inhalation is frequently unintentional and calls for giving kids access to the substance. No patients who aspirated kerosene oil required ventilation, and none of them passed away, it was observed. This patient's clinical course, which was comparatively benign after inhaling kerosene oil, is consistent with previously published literature. One study found that 78 patients who aspirated kerosene oil needed ventilation and ultimately passed away. Another study found that their series had a mortality rate of 4.5%. Patients aspirating milk or oral secretions required more ventilation and died more frequently than those aspirating kerosene, according to our observations (3).

A study has worked on comparison of pulmonary aspiration between the patients who were intubated in prehospital settings and those who were intubated in emergency department within hospital. Pepsin is sensitive marker with high specificity of gastric contents in PA. which, in proportion, 50% out of 20, positive for the patients intubated in prehospital settings, (PH). And out of 148 patients who were intubated in ER, had 22% individuals with positive pepsin assay (25). A study has reported several risk factors for aspiration pneumonia, which includes, as enlisted by the study, light anaesthesia, intermittent positive pressure ventilation, delayed recovery because of residual effect of muscle relaxants, along with other factors, that are mishaps or failed attempts of intubation, presence of supraglottic airway. These later factors increases the risk of gastric regurgitation which, if weak airway or tracheal seal via endotracheal cuff can be a cause of aspiration in intubated patient (26).

Little literature has been found on risk factors of aspiration pneumonia in older adult population, and yet it has been leading cause of AP associated mortalities. A study conducted in Japan, where 9930 patients were included in the study, of geriatric and nursing centres across the country. The division was made into two groups on bases of patients who had and who had not encountered any AP episode in 3 months. The study concluded that sputum suctioning, person with swallowing problems,

dehydration and memory problems were the risk factors of AP in older adult population (20) .

Chapter 3

METHODOLOGY

3.1. Research Design

This research project was conducted at HMC Hospital Peshawar from October (2024) to January (2025). The research design used for this study is an analytical cross-sectional study that involves selecting groups, upon which a variable is tested, without any random pre-selection processes.

3.2. Clinical Settings

The study was conducted in Medical ICU, Surgical ICU and Cardiac ICU of government hospital in Peshawar. All the patient admitted in the hospital was the source population and patient in ICUs were the study population.

3.3. Sample Size

Sample size was calculated by Cochran sample size formulae where prevalence p was used as 15 percent. Confidence level selected as 95 percent with margin error of 5 %.

$$n=.05$$

$$Z^2 p (1-p) / m^2 = 195.9 = 196$$

So, our sample is $n=196$.

3.4. Sampling Technique

Patient admitted in medical, surgical and cardiac ICUs were selected through Simple systematic sampling technique.

3.5. Duration of Study

Data were collected, analyzed and interpreted over a 6-month period. The participations recorded for analysis took place over the one-year period to avoid inconsistencies in clinical practices and protocols.

3.6. Selection Criteria

3.6.1. Inclusion Criteria

- ASA class 2, 3, and 4 patients admitted to ICUs stayed for more than four days.

3.6.2. Exclusion Criteria

- Patient kept NBM for day case surgery and patient in alert state and those who were stable and fully conscious were excluded.
- Unconscious Patients in HDUs, emergency and wards were also excluded from the study.

3.7. Ethical Consideration

Approval for the data collection was taken from the research Committee of Hayatabad medical complex Peshawar. An informed consent was presented and explained to each participant for his/her agreement as a participant. Anonymity was guaranteed to all the participants. The whole data was kept confidential and only primary data collectors and supervisors' had access.

3.8. Data Collection Procedure

Pre-formed data sheet was used for data collection which was adopted from the literature, reviewed by the experts. Beside biographic information the data sheet consisted of six questions about different risk factors of aspiration pneumonia reported by different literature.

3.9. Data Analysis

Data have been analysed by using SPSS version 22. In descriptive statistics, frequencies and percentages have been calculated for nominal and ordinal data; whereas, mean and standard deviation were calculated for all variables represented in table and graphs.

In inferential statistics, Pearson chi square (χ^2) was used to stratify all the variables with aspiration pneumonia to find out association and risk.

Chapter 4

RESULTS

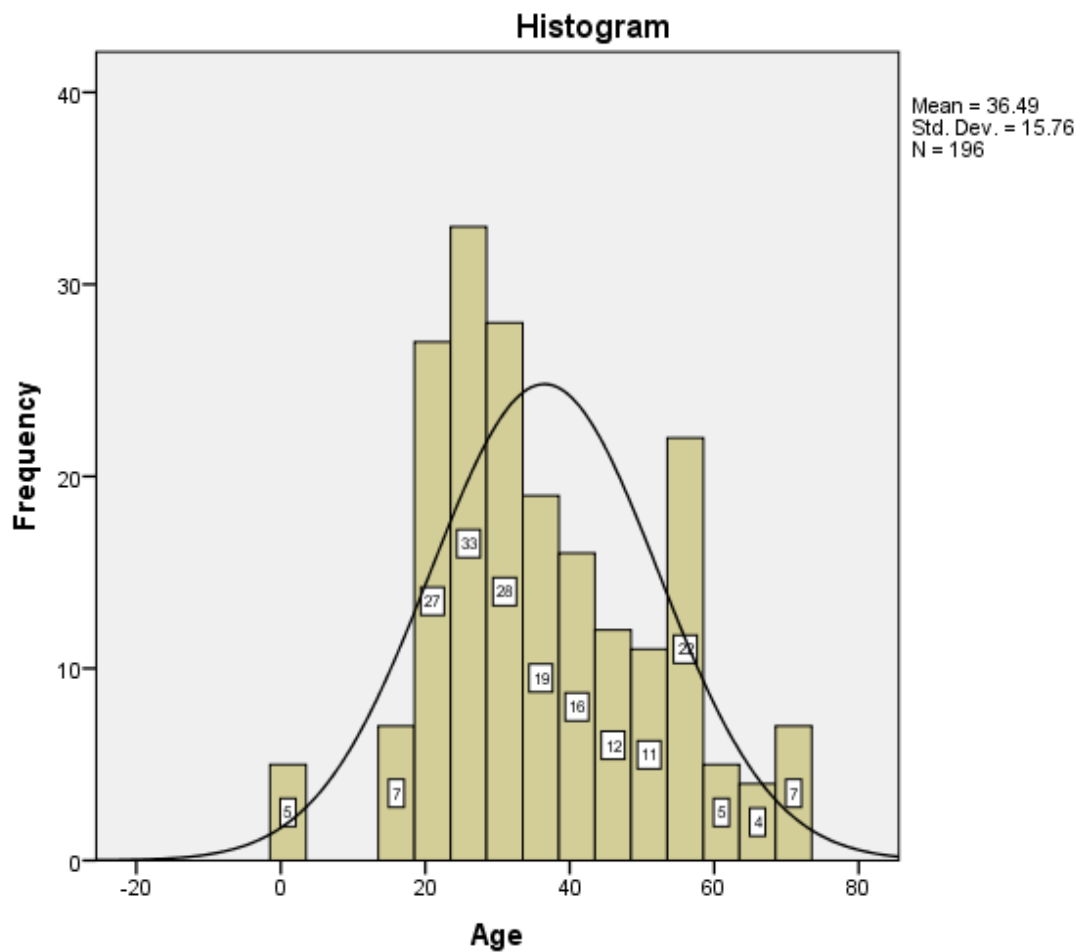


Figure 4.1: Age Distribution

The study concluded with total of 196 patients, as per sample size, admitted or under care of the ICUs of the hospital of in study setting. Analysis brought forward resulted in mean age of 36.49 with the standard deviation of 15.76 that is 36.49 ± 15.76 . More cases of aspiration pneumonia were seen in the youngster, as they had mostly traumatic facial injuries which led to more foreign particles inhalation causing AP.

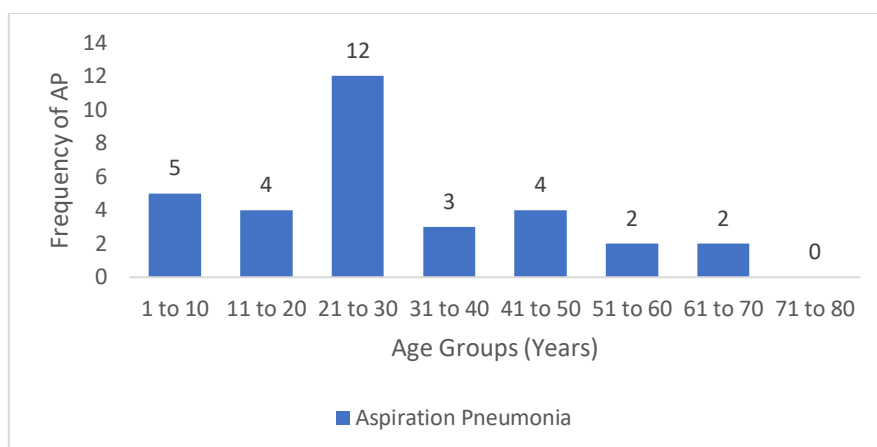


Figure 4.2: Incidences of Aspiration Pneumonia in Age groups

In all 196 patients the male gender accounted for at least 47.4% that in numbers were 93, the counterpart, female gender was reported to be n=103, about 52.6%.

Table 4.1: Gender Distribution

Gender	Frequency	Percent	Cumulative Percent
Male	93	47.4	47.4
Female	103	52.6	100.0
Total	196	100.0	

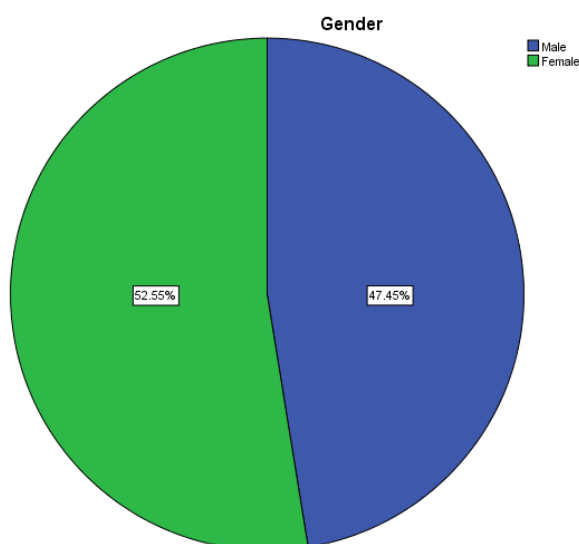


Figure 4.3: Gender Distribution

About 25% of the sample individuals were found to have history of smoking, which in numbers are counted to be n=49, and apart from that n=136 of total 196, that is 69.4%,

were nonsmokers. As of emergency cases included, they had unknown history of smoking which accounted for at least n=11 (5.6%).

Table 4.2: Frequency distribution of smoking status of the patient

Smoking	Frequency	Percent	Cumulative Percent
Yes	49	25.0	25.0
No	136	69.4	94.4
Unknown	11	5.6	100.0
Total	196	100.0	

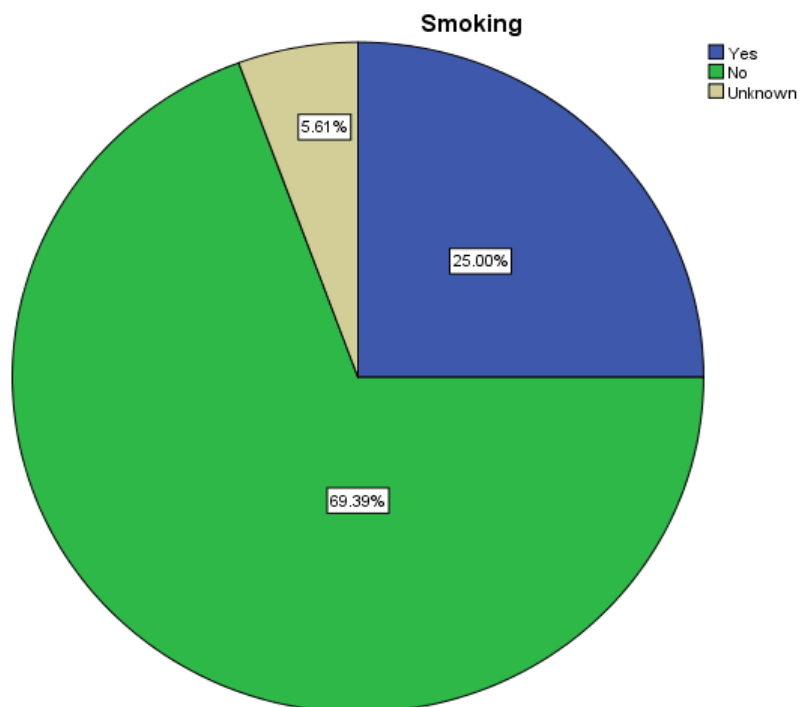


Figure 4.4: Frequency distribution of smoking status of the patient

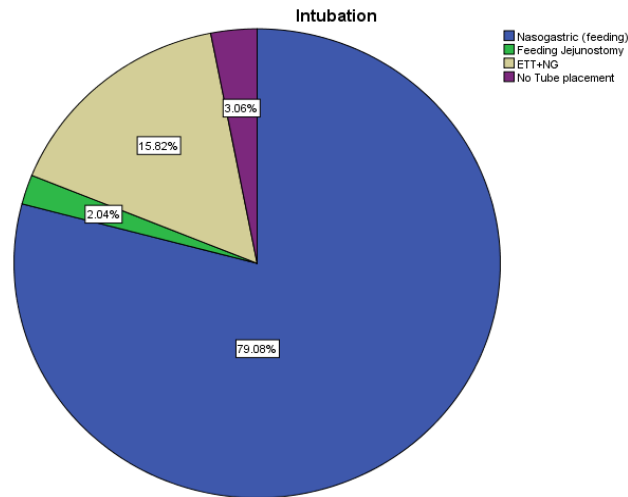


Figure 4.5: Frequency distribution of intubation status of the patient

Data was also analyzed for the patients with tubes placement for airway as well for feeding. In total n=155, about 79.1%, were fed with Nasogastric (NG) tube only, n=4 (2.0%) was provided with surgical feeding tubes via feeding Jejunostomy. Other n=31 (15%) were ICU candidates and were intubated for airway securing and were also provided with NGs, remaining n=6 (3.1%) had no tube placements, they were fed orally.

Table 3.3: Feeding or Airway tube placement

Intubation	Frequency	Percent	Cumulative Percent
Nasogastric (feeding)	155	79.1	79.1
Feeding Jejunostomy	4	2.0	81.1
ETT+NG	31	15.8	96.9
No Tube placement	6	3.1	100.0
Total	196	100.0	

In 196, total of 71 patients, accounting for about 36.2% were found to have events of regurgitation that could have been aspirated (described latter). While remaining 125, making up for 63.8% of the total data had no regurgitation event.

Table 4: Incidences of Regurgitation

Regurgitation Event	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	71	36.2	36.2	36.2
No	125	63.8	63.8	100.0
Total	196	100.0	100.0	

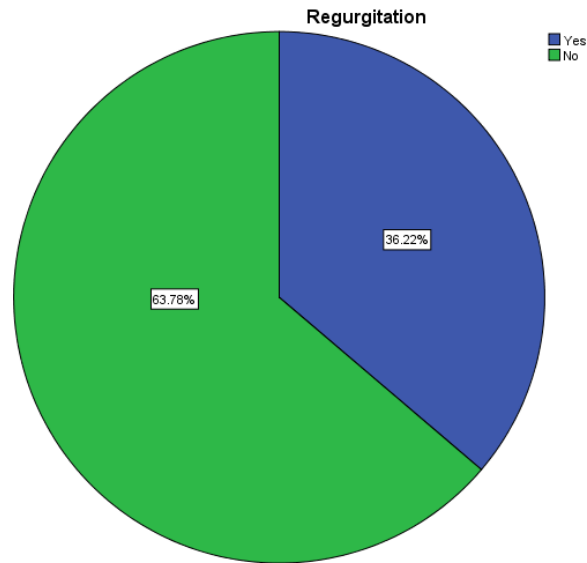


Figure 4.6: Incidences of Regurgitation

In overall sample, 16.3% that is in number of 32 cases to have suffered aspiration pneumonia after regurgitation, or aspirating any other foreign particles including blood after Road Traffic Accidents (RTA) or Fire Arm Injuries (FAI). Remaining n=164 (83.7%) have not been diagnosed with AP.

Table 4.5: Incidences of Aspiration Pneumonia

Aspiration Pneumonia	Frequency	Percent	Cumulative Percent
Yes	32	16.3	16.3
No	164	83.7	100.0
Total	196	100.0	

The variables were stratified with Aspiration pneumonia to check their association as to identify the risk factors for aspiration pneumonia and were cross-tabulated with AP incidences and Chi Squared test applied.

14% (n=13) of total male individuals (n=93), were diagnosed with AP, making up for 40.6% of total 32 (16.3%) AP cases. Female proportions were found to be 59.4% in total AP cases, while 18.4% with in the same gender, females, had aspiration pneumonia during their course of treatment in ICUs.

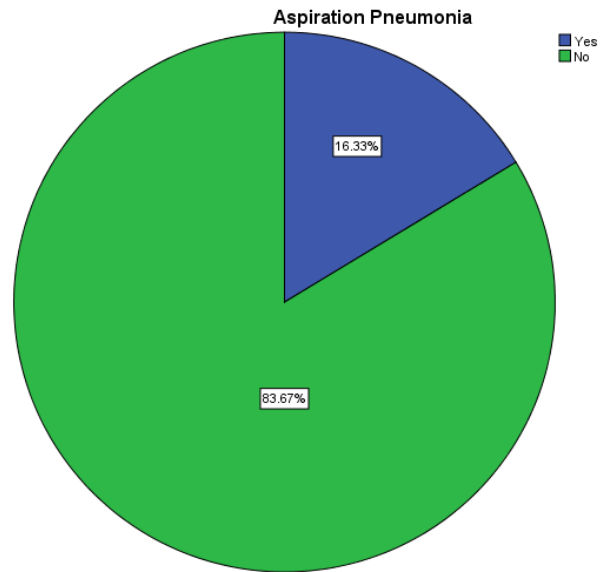


Figure 4.7: Incidences of Aspiration Pneumonia

Table 4.6: Incidence of Aspiration Pneumonia among both genders

			Aspiration Pneumonia		Total
			Yes	No	
Gender	Male	Count	13	80	93
		% within Gender	14.0%	86.0%	100.0 %
		% within Aspiration Pneumonia	40.6%	48.8%	47.4%
	Female	Count	19	84	103
		% within Gender	18.4%	81.6%	100.0 %
		% within Aspiration Pneumonia	59.4%	51.2%	52.6%
Total		Count	32	164	196
		% within Gender	16.3%	83.7%	100.0 %

The Chi Squared Statistics showed that the gender has not much association with Aspiration pneumonia at chi Square value of 0.714 and a P-value of 0.398 (two sided) which is greater than the alpha level of 0.05 suggesting no association between gender and aspiration pneumonia.

Table 4.7: Pearson Chi Square test for Gender X AP

	Value	do	Asymp. Sig. (2-sided)
Pearson Chi-Square	.714	1	.398
Likelihood Ratio	.719	1	.397
Linear-by-Linear Association	.711	1	.399
N of Valid Cases	196		

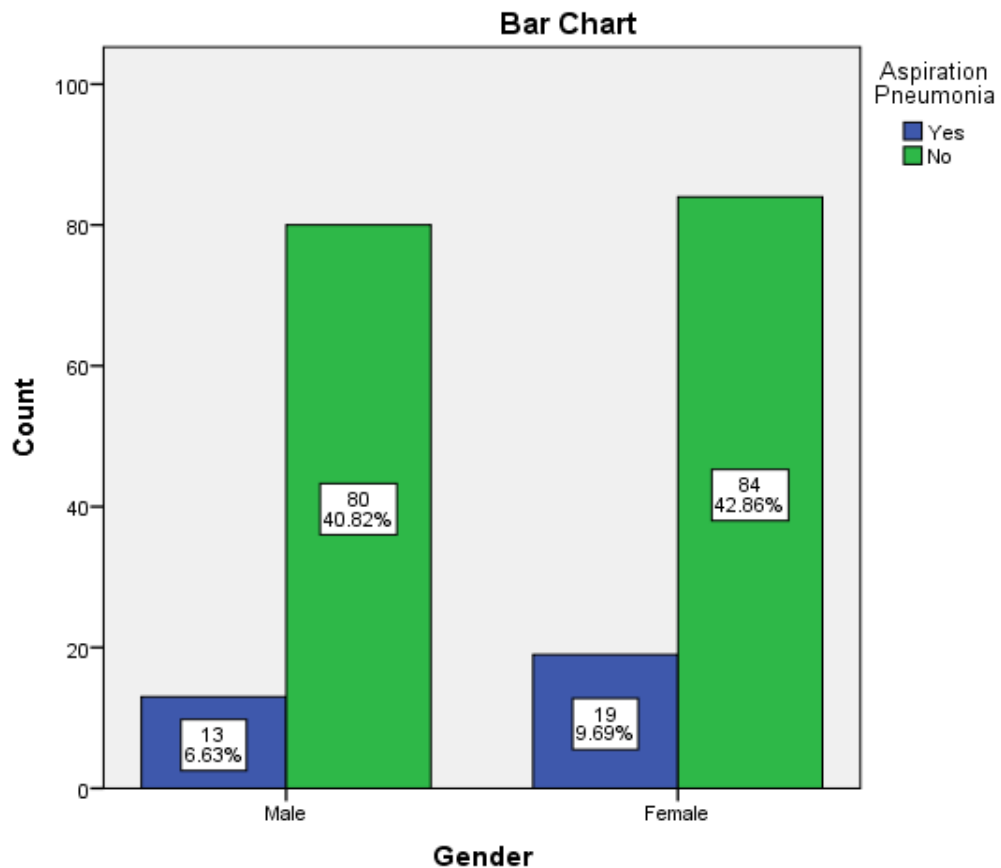


Figure 4.5: Incidence of Aspiration Pneumonia among both genders

Among the 49 patients who had history of smoking, n=6 (12.2%) were diagnosed with AP, accounting for 18.8% out of total AP cases (n=32). 50% (n=16) were nonsmokers that were diagnosed with Aspiration Pneumonia, and 31.3% out of 32 AP cases had unknown history of Smoking which in numbers were total of 10 patients (.).

Table 4.8). Pearson Chi Square test resulted in lower P-Values then the alpha value, and the chi square value is also higher, suggesting statistically significant association

between smoking and Aspiration Pneumonia (

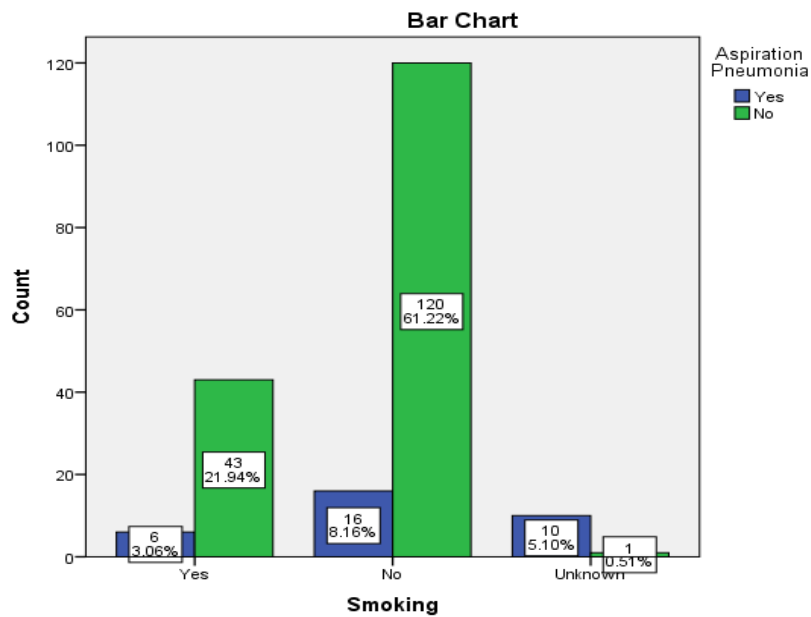


Figure 4.6: Aspiration Pneumonia among patient with Smoking status

Table 4.9).

Table 4.8: Aspiration Pneumonia among patient with Smoking status

			Aspiration Pneumonia		Total
			Yes	No	
Smoking	Yes	Count	6	43	49
		% within Smoking	12.2%	87.8%	100.0%
		% within Aspiration Pneumonia	18.8%	26.2%	25.0%
	No	Count	16	120	136
		% within Smoking	11.8%	88.2%	100.0%
		% within Aspiration Pneumonia	50.0%	73.2%	69.4%
	Unknown	Count	10	1	11
		% within Smoking	90.9%	9.1%	100.0%
		% within Aspiration Pneumonia	31.3%	0.6%	5.6%

Total	Count	32	164	196
	% within Smoking	16.3%	83.7%	100.0%

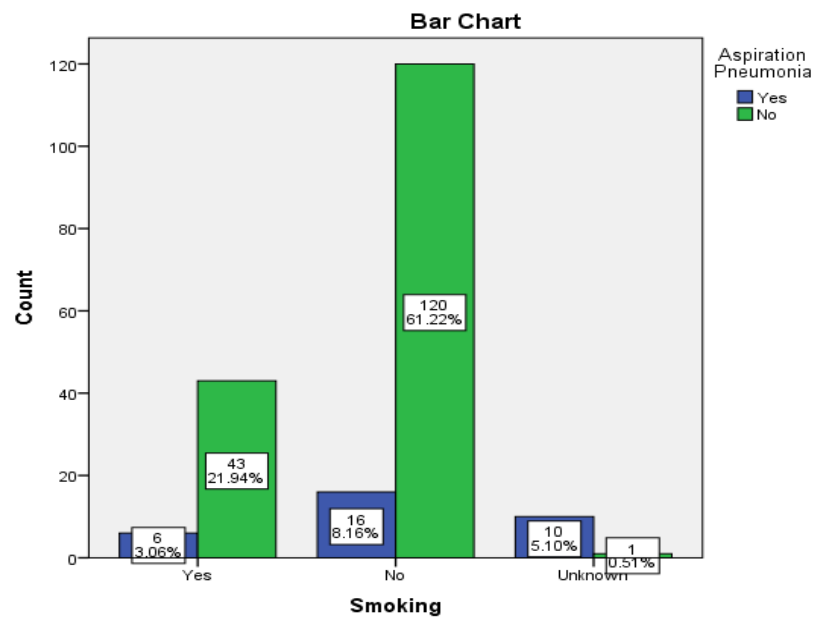


Figure 4.6: Aspiration Pneumonia among patient with Smoking status

Table 4.9: Chi Square test, Smoking X Aspiration Pneumonia

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	47.460 ^a	2	.000
Likelihood Ratio	32.800	2	.000
Linear-by-Linear Association	14.408	1	.000
N of Valid Cases	196		

The maximum hospital stay of these patients was in between 20 to 30 days, about 14 patients stayed in that time span within hospital under care of ICU. These n=14 accounted for about 7.1% of total sample, in which none had aspiration pneumonia making up for at least 8.5% of total non-aspiration pneumonia case (n=164) (See Table 4.10).

The minimum hospital stay was recorded in this study to be of 4 days, observed by 51 patients, in which 14 patients (27.5%) have been diagnosed with aspiration pneumonia, making up 43.8% of total 32 aspiration pneumonia cases. n=10 out of 32 AP diagnosed patients had 4 to 10 days of hospital stay, which in percentage are about 31.3%. n=8 (25%) diagnosed AP cases were reported to have stayed in hospital for not more than 20 days (Table 4.10). The chi-squared test for hospital stay against aspiration pneumonia, at 95% confidence level, with p-value (0.025) of less than 0.05 suggest that there is significant relation between hospital stay and aspiration pneumonia (Table 4.11).

Table 4.10: Hospital stay against Aspiration Pneumonia (Cross Tabs)

			Aspiration Pneumonia		Total
			Yes	No	
Hospital Stay	4 days	Count	14	37	51
		% within Hospital Stay	27.5%	72.5 %	100.0%
		% within Aspiration Pneumonia	43.8%	22.6 %	26.0%
	4-10 days	Count	10	45	55
		% within Hospital Stay	18.2%	81.8 %	100.0%
		% within Aspiration Pneumonia	31.3%	27.4 %	28.1%
	10-20 days	Count	8	68	76
		% within Hospital Stay	10.5%	89.5 %	100.0%
		% within Aspiration Pneumonia	25.0%	41.5 %	38.8%
	20-30 days	Count	0	14	14
		% within Hospital Stay	0.0%	100.0 %	100.0%
		% within Aspiration Pneumonia	0.0%	8.5%	7.1%
Total		Count	32	164	196
		% within Hospital Stay	16.3%	83.7 %	100.0%

Table 4.11: Pearson's Chi Square test for Hospital stay x AP

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.362 ^a	3	.025
Linear-by-Linear Association	9.271	1	.002
N of Valid Cases	196		

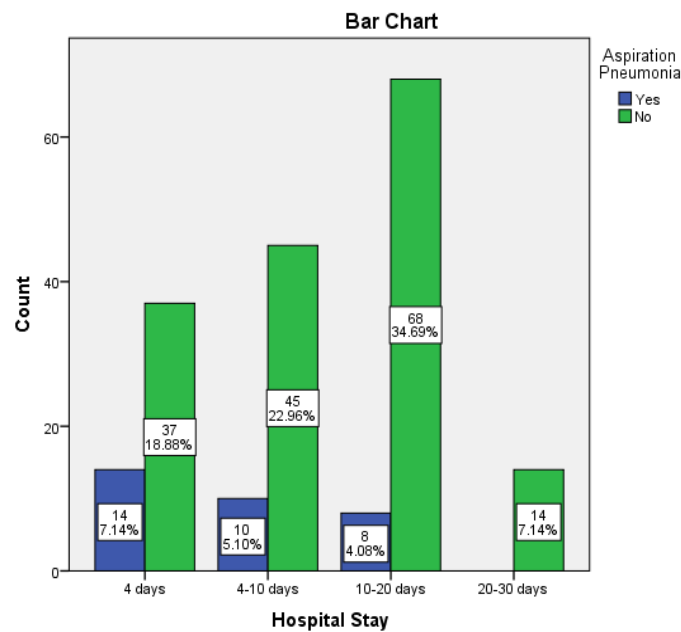


Figure 4.7: Clustered bar chart of Hospital stay x AP

All the cases included from ICUs, total 29 cases were included from Cardiac ICUs, about 14.8% of total sample. n=5 of these cases, about 15.6%, had confirmed AP diagnosis. Other 167 were included from the hospital general, medical and surgical, that is about 85.2% of total 196. In these n=27, with percentages of 84.4%, were confirmed AP patients.

Table 4.12: Suit of care and Aspiration Pneumonia

			Aspiration Pneumonia		Total
			Yes	No	
Care Suit	Cardiac ICU	Count	5	24	29
		% within Care Suit	17.2%	82.8%	100.0%
		% within Aspiration Pneumonia	15.6%	14.6%	14.8%
		Count	27	140	167

	Surgical	% within Care Suit	16.2%	83.8%	100.0%
	Medical General ICUs	% within Aspiration Pneumonia	84.4%	85.4%	85.2%
Total	Count		32	164	196
	% within Care Suit		16.3%	83.7%	100.0%

Pearson's Chi Square provide p-value of 0.885, which is greater than the alpha value of 0.05, representing insignificant association of suit of care with aspiration pneumonia in fact there are more cases of aspiration pneumonia medical, surgical and general ICUs as the influx of patient to these suits were more as compared to cardiac ICU.

Table 4.13: Suit of Care and Ap (Pearson's Chi Square Test)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.021 ^a	1	.885
Likelihood Ratio	.021	1	.886
Linear-by-Linear Association	.021	1	.885
N of Valid Cases	196		

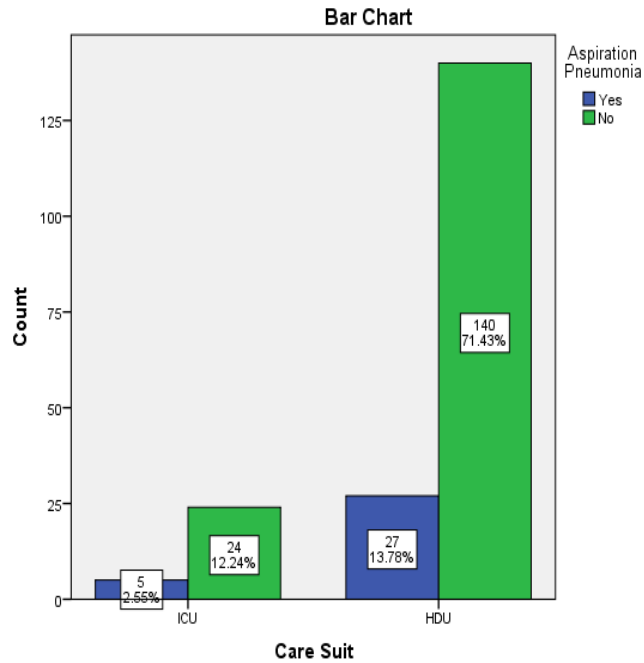


Figure 4.8: Suit of Care and Aspiration Pneumonia

Aspiration pneumonia was stratified with different type of tube being places for certain reasons, like airway management and breathing control, and also somewhere provision of feed via Nasogastric tube, feeding Jejunostomy, or combination of both NG and ETT. Total n=155 had Nasogastric (NG) tube placed for enteral feeding, which was about 79.1% of total sample. Of these 79.1%, at least 11.0% cases had positive aspiration pneumonia, accounting for 17 out of 155.

Surgical feeding tube, feeding Jejunostomy, was performed for about n=4 patients, who had some deformities where NG was unable to be passed. These made up for 2% cases, of which only n=3, had aspiration pneumonia, that is about 75% of 4, in these surgically tubed patients. These accounted for 9.4% in total aspiration pneumonia patients (n=32). Both ETT and NG were passed in 31 cases, in which 21.9% cases contributed to positive aspiration pneumonia, in count they were total 7 patients. Moreover, n=6 had no tube placement of any sort, and 5 of them were found to have aspiration pneumonia, about 15.6% in percentage.

Table 4.14: Aspiration Pneumonia in Patient with Tubes (NG, ETT, Feeding jej.)

			Aspiration Pneumonia		Total
			Yes	No	
Tubes Placement	Nasogastric (feeding)	Count	17	138	155
		% within Intubation	11.0%	89.0%	100.0 %
		% within Aspiration Pneumonia	53.1%	84.1%	79.1%
	Feeding Jejunostomy	Count	3	1	4
		% within Intubation	75.0%	25.0%	100.0 %
		% within Aspiration Pneumonia	9.4%	0.6%	2.0%
	ETT+NG	Count	7	24	31
		% within Intubation	22.6%	77.4%	100.0 %
		% within Aspiration Pneumonia	21.9%	14.6%	15.8%
	No Tube placement	Count	5	1	6
		% within Intubation	83.3%	16.7%	100.0 %
		% within Aspiration Pneumonia	15.6%	0.6%	3.1%
Total		Count	32	164	196
		% within Intubation	16.3%	83.7%	100.0 %

Pearson chi square test for these variables suggested that there is greater and statistically significant relation of aspiration pneumonia and tube placement, as of improper placement, increased placement time, improper airway securing. The p value here was <0.05 for the confidence level of 95%. (Table 4.15)

Table 4.15: Chi Squared Test for Aspiration pneumonia x Tube placement

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33.946 ^a	3	.000
Likelihood Ratio	24.224	3	.000

Linear-by-Linear Association	19.837	1	.000
N of Valid Cases	196		

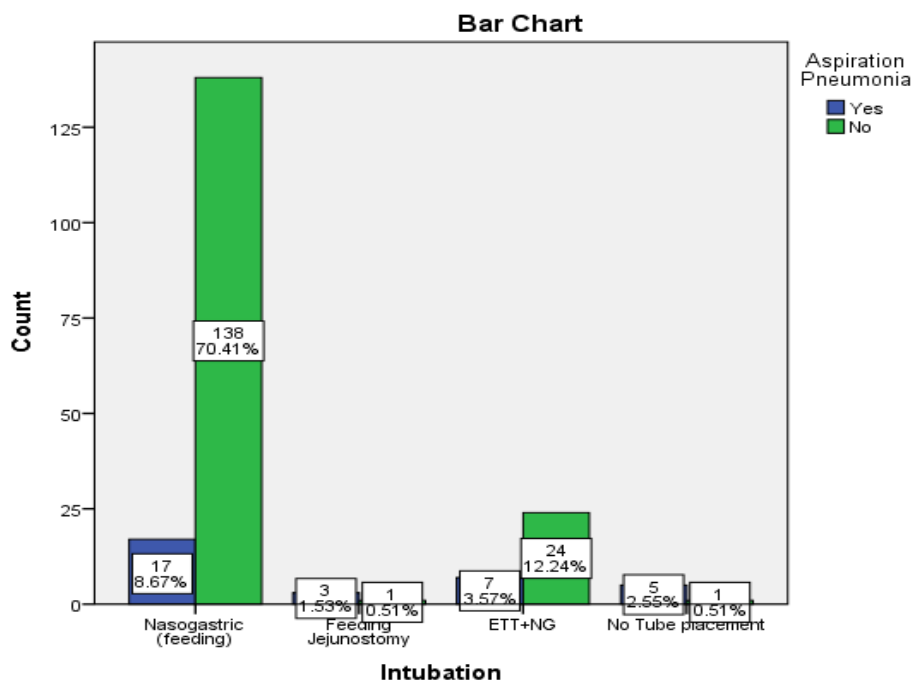


Figure 4.9: Aspiration Pneumonia x Tube Placement

Aspiration chances were more with intermittent feeding as compared to bolus feeding methods. Aspiration pneumonia was seen in n=11 (34.4%) patients with bolus feed, n=16 (50.0%) with intermittent feeding, and n=5 (15.6%) with oral feed. (Table 4.16)

Table 4.16: Aspiration Pneumonia and feeding methods

			Aspiration Pneumonia		Total
			Yes	No	
Feeding Method	Bolus	Count	11	59	70
		% within Feeding Method	15.7%	84.3%	100.0%
		% within Aspiration Pneumonia	34.4%	36.0%	35.7%
	Intermittent	Count	16	105	121
		% within Feeding Method	13.2%	86.8%	100.0%
		% within Aspiration Pneumonia	50.0%	64.0%	61.7%
	Oral Feed	Count	5	0	5

		% within Feeding Method	100.0%	0.0%	100.0%
		% within Aspiration Pneumonia	15.6%	0.0%	2.6%
Total	Count		32	164	196
	% within Feeding Method		16.3%	83.7%	100.0%

This indicates feeding methods have significant relation with aspiration, and aspiration pneumonia, as evident by the chi-Squared test where p value is less than 0.05, with chi square value of 26.497.

Table 4.17: Chi Square test, AP vs Feeding method

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.497 ^a	2	.000
Likelihood Ratio	19.045	2	.000
Linear-by-Linear Association	2.899	1	.089
N of Valid Cases	196		

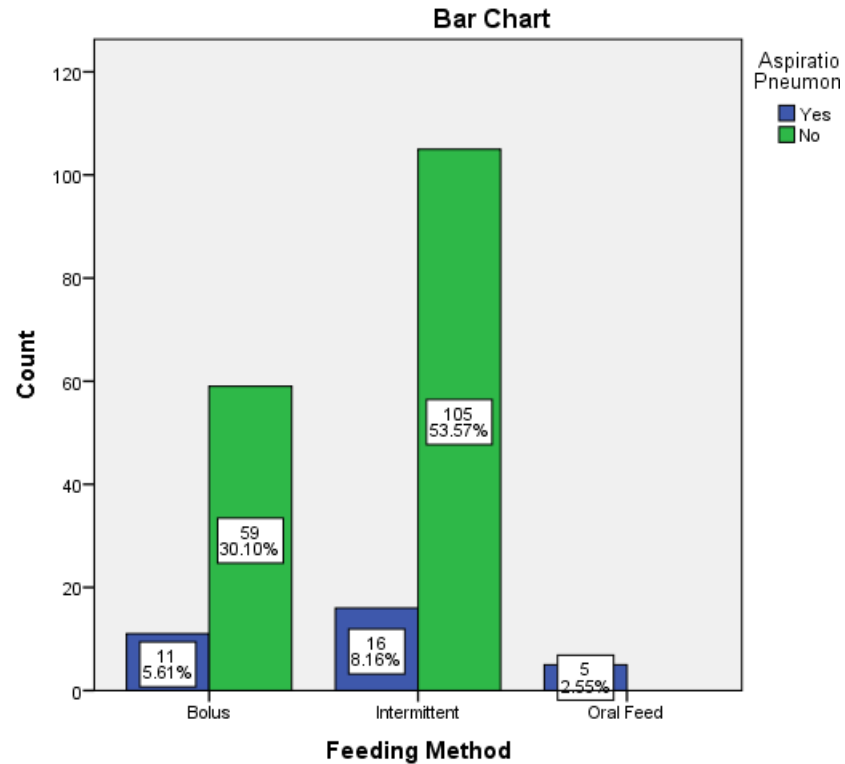


Figure 4.10: AP vs Feeding method

Patient disabilities were stratified with the Aspiration Pneumonia incidences. There was no incidence of AP among the patients with no Disability Symptoms, patient with certain disabilities but no marked symptoms have encounter AP among at least 37.5% of total AP cases, that in numbers are 12 out of 32. Only n=01 Case of AP was seen in patients with mild disability, n=13 (40.6%) in Moderately disabled, n=1 (3.1%) in severely Disabled, while n=5 (15.6%) was seen in Markedly sever disabled patients.

Table 4.18: Aspiration Pneumonia X Patient Disabilities

			Aspiration Pneumonia		Total
			Yes	No	
Patient Disability	No Symptoms	Count	0	7	7
		% within Patient Disability	0.0%	100.0%	100.0%
		% within Aspiration Pneumonia	0.0%	4.3%	3.6%
	No Marked	Count	12	117	129
		% within Patient Disability	9.3%	90.7%	100.0%

		% within Aspiration Pneumonia	37.5%	71.3%	65.8%
	Mild Disability	Count	1	14	15
		% within Patient Disability	6.7%	93.3%	100.0 %
		% within Aspiration Pneumonia	3.1%	8.5%	7.7%
	Moderate Disability	Count	13	20	33
		% within Patient Disability	39.4%	60.6%	100.0 %
		% within Aspiration Pneumonia	40.6%	12.2%	16.8%
	Severe Disability	Count	1	5	6
		% within Patient Disability	16.7%	83.3%	100.0 %
		% within Aspiration Pneumonia	3.1%	3.0%	3.1%
	Markedly Severe	Count	5	1	6
		% within Patient Disability	83.3%	16.7%	100.0 %
% within Aspiration Pneumonia		15.6%	0.6%	3.1%	
Total		Count	32	164	196
		% within Patient Disability	16.3%	83.7%	100.0 %

There was statistically significant relation between the two variables, suggesting that patient disability has also greater role in regurgitation leading to aspiration pneumonia. As the Pearson's Chi square test revealed the p-value to be less than the alpha of 0.05. (Table 4.19).

Table 4.19: Chi-Squared test for AP X Patient Disability

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	39.624 ^a	5	.000
Likelihood Ratio	32.200	5	.000
Linear-by-Linear Association	29.856	1	.000
N of Valid Cases	196		

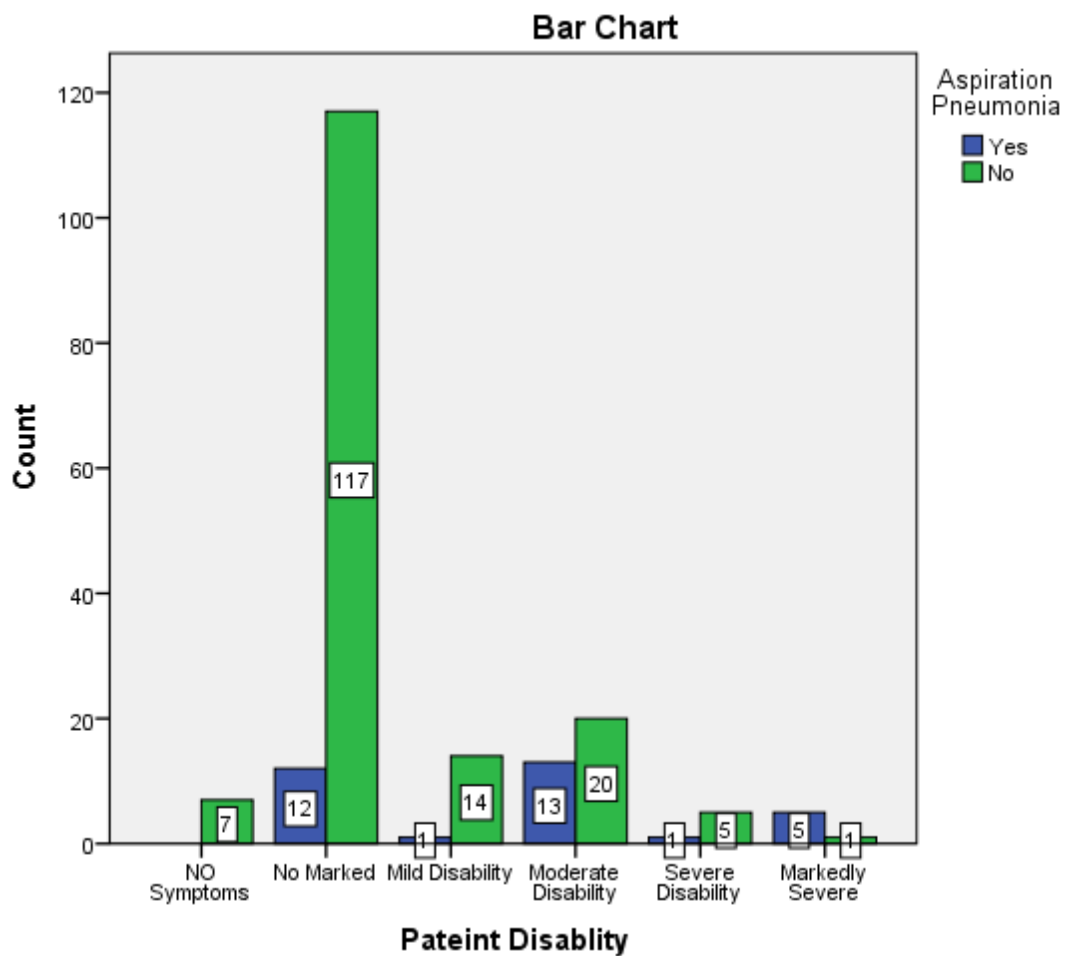


Figure 4.11: Aspiration Pneumonia X Patients Disability

As per Patient positioning, all of the Aspiration pneumonia cases were associated with supine position, which makes up for 16% of total n=196, while making a percentage of 24.2% of total 132 patients who were positioned in supine.

Table 4.20: AP and Patient Positioning

			Aspiration Pneumonia		Total
			Yes	No	
Position	Supine	Count	32	100	132
		% within Position	24.2%	75.8%	100.0%
		% within Aspiration Pneumonia	100.0%	61.0%	67.3%
	Lateral	Count	0	64	64
		% within Aspiration Pneumonia	0.0%	39.0%	32.7%
Total		Count	32	164	196
		% within Position	16.3%	83.7%	100.0%

Pearson Chi Square for these variables is suggestive of statistically significant association of patient positioning with aspiration pneumonia.

Table 4.21: AP and Patient Positioning (Chi Squared Test)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.542 ^a	1	.000
Continuity Correction	16.810	1	.000
Likelihood Ratio	28.239	1	.000
Fisher's Exact Test			
Linear-by-Linear Association	18.448	1	.000
N of Valid Cases	196		

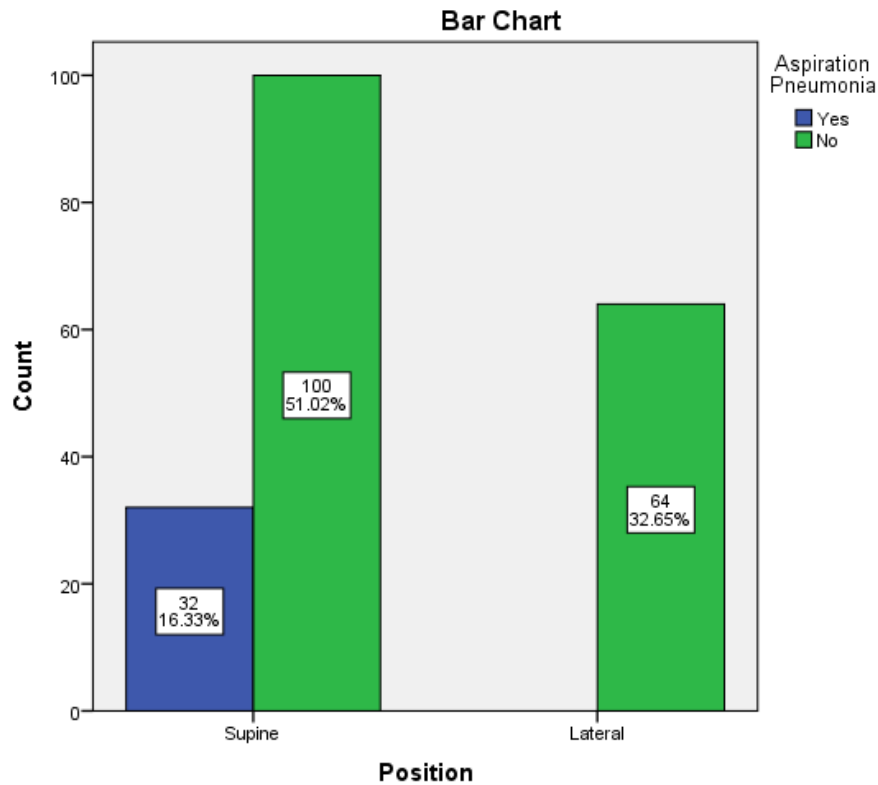


Figure 4.12: AP and Patient Positioning

Aspiration pneumonia (n=32) incidence were observed in n=9 (28.1%) deeply sedated patients, in n= 13 (40.6%) and in n=10 (31.3%) cases who were not sedated. (Table 4.22). For their Chi Square results, I was seen that p- value was less than the alpha level at 0.05, for confidence level of 95%, indicating significant association between the two. (Table 4.23).

Table 4.22: AP and Sedation

			Aspiration Pneumonia		Total
			Yes	No	
Sedation	Deep Sedation	Count	9	28	37
		% within Sedation	24.3%	75.7%	100.0%
		% within Aspiration Pneumonia	28.1%	17.1%	18.9%
	Light Sedation	Count	13	31	44
		% within Sedation	29.5%	70.5%	100.0%
		% within Aspiration Pneumonia	40.6%	18.9%	22.4%
	No Sedation	Count	10	105	115

		% within Sedation	8.7%	91.3%	100.0%
		% within Aspiration Pneumonia	31.3%	64.0%	58.7%
Total		Count	32	164	196
		% within Sedation	16.3%	83.7%	100.0%
		% within Aspiration Pneumonia	100.0%	100.0%	100.0%

Table 4.23: AP and Sedation (Chi-Square Test)

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.262 ^a	2	.002
Likelihood Ratio	12.039	2	.002
Linear-by-Linear Association	8.291	1	.004
N of Valid Cases	196		

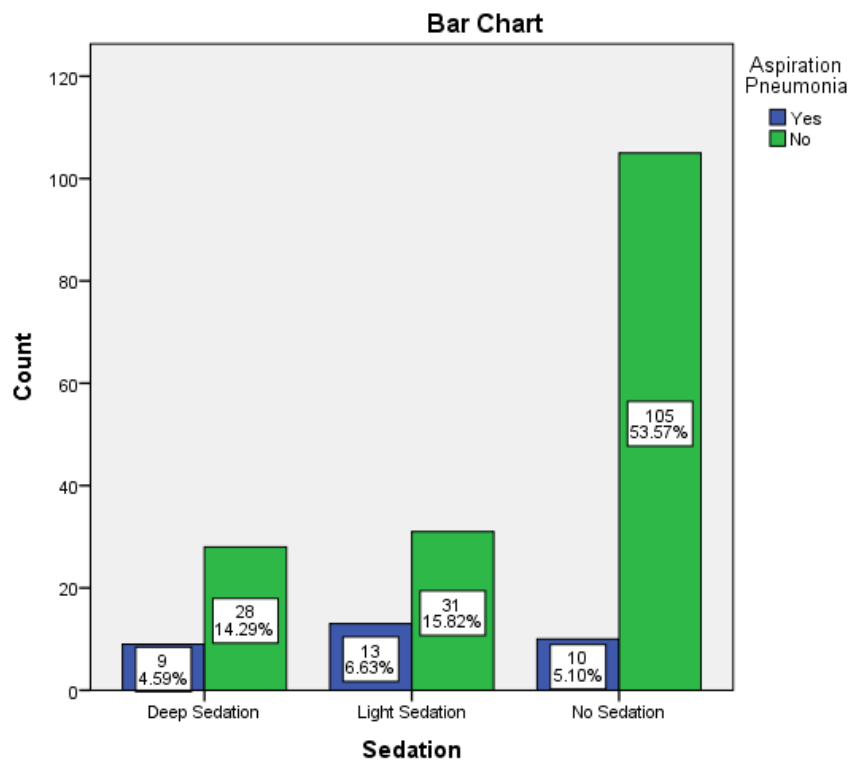


Figure 4.13: AP and Sedation

.Chapter 5

DISCUSSION

This study conducted was cross-sectional and convenience based which included only ICU patients, though it is observed that more chances of aspiration are there in medical, surgical and general ward settings than in ICU (See Table 4.12). AS in ICU the patients are Intubated, and their airway are secured mostly, and also there are less reporting from ICUs because of their longer periods of stay in hospital and limitation of new cases to be admitted in ICU as of complete beds occupation. Which is in close relevance to a systemic review done by Kumiya K. and Rubin et al., where they also have observed less cases of aspiration pneumonia in ICU settings but contradicting the factor of increase hospital stay association with aspiration pneumonia, as already discussed that more hospital stays were seen in ICU rather than in HDUs. This systemic review also reported insufficient data for meta-analysis to exactly evaluate exact nature of incidences of AP in ICU settings, along with the mortality rate they pose. But it was clear that AP has drastically deteriorated patient Outcomes (27).

Another comparative study, which compared effects of AP in ICU patients with non-AP patients in ICU, reported 15.9% cases of AP in about 503 patients (28). In comparison this study reported at least 2.5% Cases of total Sample of 196, while 17.2% out of 29 ICU patients who were part of the study (See Table 4.12). Though Increased hospital stay is a risk factor for the aspiration pneumonia but in the study, we have seen more cases of aspiration pneumonia in lesser days of hospital stay (See Table 4.10), as the patient underlying pathologies were making them more prone to regurgitation, and their sedative state were keeping them from reflex defenses, and hence aspired the contents of regurgitation, or foreign objects as of trauma. Study have reported 30 days increased mortality rate by 21% in Ap patients (29). There has been less data and literature on whether hospital stay can be a reason of Hospital acquired pneumonia, rather most have not differentiated between Aspiration pneumonia and Aspiration Pneumonitis, as evident from the Metanalysis of Kumiya and Ishi et al. (30)

Age has been reported as risk factor for aspiration pneumonia in paediatrics and in elderly, 80.1% out of 382 were diagnosed with Ap who were aged 70 or more

(31). But in contrast, the current study found more aspiration in adults aged 20 to 30 Years. As evident from their underlying pathologies and morbidities, as this age group were more of facial or head traumas which have increased risk of aspiration of blood or gastric content or any other foreign matter. Traumatic brain injuries have been reported to have greater risk as well. A study reported about 17.67% of total 396 have developed in-hospital aspiration pneumonia (32). As the sample inclusion here in this study was not much specific for age groups, a limitation, few of elderlies were included in the study hence lower percentages, about 6.1%, of aspiration was encountered in the age groups of 70 and above years.

Gender being another factor was, also stratified in this study with aspiration pneumonia, to check if it is the risk factor or not. The study concluded with more cases in females then in males. About 19 out of 103 females, 18.4% had been diagnosed with Aspiration pneumonia, comparatively male counterparts have low numbers, 13 out of 93, 18.4%. a study reported that male gender is more prone to develop aspiration pneumonia whether it is community acquired or hospital acquired pneumonia, the study analysed one case control, and two cross sectional studies (33).

Smoking habits of patients prior to their elective surgeries, under GA, have been evaluated for being a risk factor for aspiration pneumonia. This study reported significant relation of smoking habits with AP, but fewer cases of AP have been found smokers, suggesting this not being a risk factor for Aspiration Pneumonia. As also reported by a comparative study, where they also have found little to no association of smoking and aspiration pneumonia. As the acid aspiration for nonsmokers were not so much different than for smokers (34). Another study also reported such conclusions, that smoking is not associated with Aspiration Pneumonia, that study kept the smokers from smoking way before their elective surgeries and were evaluated for gastric regurgitation and aspiration. They found no significant difference in the ones refrained and the one who were not for pH changes in aspired content or gastric contents. Indicated no change in risk of aspiration for smokers or non-smokers, or the one who are acutely withheld from smoking (35).

Most of the cases in HDU and ICU are being fed through specific feeding tubes depending upon their conditions of enteral tract, or their need. This current study has found 8.6% of total 196 to have Aspiration Pneumonia among patients with

Nasogastric (NG) Tubes. A study has evaluated for such cases, with NG, for the possible reasons of aspiration. They concluded with the fact that NG can possibly cause colonization and increased salivation, when sedated or upper airway disabilities, esophageal sphincters weak integrity, desensitization of upper airway reflexes, or pharyngeal reflexes have increased risk of Aspiration (36).

Feeding methods have another possibility of creating risks for aspiration, as in bolus or continuous feeding via NG are reported to be riskier than Intermittent Feeding. although feeding gastrostomy or Jejunostomy have decreased risk of aspiration. The important factor is to keep oral hygiene (37). Our study reported slightly different results, as there was not much of higher difference, in Aspiration pneumonia among patients who were fed in bolus/continuous (5.6%) while intermittent feed had led to 8.1% Cases of aspiration Pneumonia.

As with age, disabilities increase, most importantly, Glossopharyngeal reflexes, cough reflex where the chances of aspiration are increased. While disability doesn't only come with age, but also with certain pathophysiology, anatomical deformities, syndromes, autonomic reflex systems (38). This study has evaluated patients for their disabilities, not specifying the type, but severity. It was found that as severity of disabilities have increased so are the chances of aspiration. More cases were seen in patients with moderate to extremely severe disabilities. 19 of total 196 (9.6%) were having aspiration pneumonia, with in the patients of moderate to extremely severe disability.

Positioning has also a role in aspiration pneumonia as evident by the fact that in certain position airway is exposed to foreign material entrance in absence of reflexes, or in presence of dysphagia or any other oral pathology or trauma. 12% of cases, (3/25) were reported in a study to evaluate effect of positioning (39). In our study total 32 cases were diagnosed with aspiration Pneumonia, all of which were in supine position. This suggested that there is greater proportion of aspiration pneumonia in supine position than in lateral position (39).

A case study reported that sedation level as increased had led to aspiration as airway was not secured, and the NBM status was not fulfilled, and light sedation or deep sedation of such patient would lead to regurgitation and eventually aspiration (40). In the current study we found more cases of Aspiration pneumonia in lightly

sedated patients and also in deeply sedated patients. In both the cases the main reason is diminished reflexes of the airway and decreased upper esophageal sphincters after induction of anaesthesia or provision of sedation in HDU or ICU. Total of 22 / 196 (11.2%) cases were having aspiration Pneumonia after sedation, 13 in light sedation and 9 in deep sedation.

CONCLUSIONS

It is concluded that there is greater risk of Aspiration Pneumonia in patients with increased severity of disabilities, Increased level of sedation, supine positioning, longer period of the tube placed in oral cavity causing colonization and salivation to be aspired, increased hospital stays, and maxillofacial and head traumas. This study ended up with conclusion that smoking is not a stronger risk factor for aspiration pneumonia, neither is the age and nor is gender. is no significant difference has been seen. It is possibly because, small sample size, and other limitations of this study.

Limitations

This study is conducted in short period of time, with small sample size and no demarcation for age differences, so it was not able to properly stratify the increasing age as risk factor, also same is with the case of genders association with age.

Recommendations

- As literature has very little work done on aspiration pneumonia, rather most studies have done work on pneumonitis. Further studies need to be done in this area, cross-sectional studies are needed, comparative studies would yield better results in term of identifying whether a risk factor is associated or not. This area needs a lot of exploration as there is more to it than what's available in literature.
- It's also recommended to evaluate patients for risk factors of aspiration, as this may lead to re-admission and longer duration of stay, plus increasing chances of other nosocomial infections. Which will be better prevented if acted promptly on the factors.

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APPENDICES

ENGLISH CONSENT FORM

The study you are about to participate is a randomized control trial survey titled as;

“FREQUENCY AND ASSOCIATED FACTOR OF ASPIRATION PNEUMONIA
AMONG THE PATIENTS VISITED TO THE ICUS OF HAYATABAD MEDICAL
COMPLEX PESHAWAR”

The study has no potential harm to participants. All data collected from you will be coded in order to protect your identity, and should not be disclosed to anyone. Following the study there will be no way to connect your name with your data. Your answers to the questions will not affect the quality of education given to you. Any additional information about the study results will be provided to you at its conclusion, upon your request.

You are free to withdraw from the study at any time. You agree to participate, indicating that you have read and understood the nature of the study, and that all your inquiries concerning the activities have been answered to your satisfaction.

NAME_____

SIGNATURE_____

DATE_____

URDU CONSENT FORM

میں _____ تصدیق کرتا/ کرتی ہوں کہ **شعیب** نے اپنی اس تحقیق

“Frequency And Associated Factor Of Aspiration Pneumonia Among The Patients Visited To The ICUs Of Hayatabad Medical Complex Peshawar”

زیرنگرانی ڈاکٹر امداد علی فاروقی کے متعلق بتا دیا ہے۔ مجھے اس تحقیق کی نوعیت، مقاصد، اہداف، توقعات، فوائد اور خطرات کے متعلق ، ساری معلومات فراہم کر دی گئی ہیں

اس تحقیق کے دوران ساری معلومات صیغۂ راز میں رہیں گی اور مریض کا نام اور دیگر معلومات صرف تحقیق کے لیے استعمال ہوں گی۔ مجھے یہ بھی بتا دیا گیا ہے کہ میں اس تحقیق سے متعلق ہر قسم کے سوال پوچھنے کا مجاز ہوں اور یہ تحقیق صرف ایک شخص کا مفاد میں نہیں ہے بلکہ بحسنیت مجموعی انسانیت کا مفاد اس سے وابستہ ہے۔ تمام تفصیلات جاننے کے بعد یس تحقیق میں شامل ہونے یا نہ ہونے پر کسی کا قائل نہیں ہوں۔ اس تحقیق سے کسی بھی وقت علیحدہ ہونے پر مجھ پر کوئی پابندی نہیں ہو گی۔ میں بذاتِ خود بقائمی حوش و حواس اور رضا مندی سے اس تحقیقاتی عمل میں شامل ہوتی/ ہوتا ہوں

دستخط محقق _____

دستخط شرکت کار _____

تاریخ _____

DEMOGRAPHICS FORM & QUESTIONNAIRES

Demographic Variables:

1. Age Distribution:

2. Gender Distribution:

- Male
- Female

3. Smoking Status:

- Smokers:
- Non-smokers:
- Unknown:

4. Hospital Stay :(Days)

Risk Factors Assessment

5. Tube Placement:

- Nasogastric (NG) tube
- Feeding Jejunostomy
- ETT + NG
- No tube placement

6. Regurgitation Events:

- Regurgitation
- No regurgitation

7. Feeding Methods:

- Bolus feed
- Intermittent feeding
- Oral feed

8. Patient Disability:

- No symptoms
- No marked symptoms
- Mild disability
- Moderate disability
- Severe disability
- Markedly severe

9. Patient Positioning:

- Supine position
- Lateral position

10. Sedation Level:

- Deep sedation
- Light sedation
- No sedation

PERMISSION LETTER



OFFICE OF THE DEAN-FAHS

SUPERIOR UNIVERSITY

Ref.: IRB/FAHS/Allied-HS/10/24/MS/RS-3578

Date: 29th October 2024

Name: Shuaib (MS Allied Health Sciences)

Registration: SU91-MSAHW-S23-110

Subject: Ethical Approval Letter

The Research Ethical Committee convened on Dated: **17th October, 2024** to discuss your protocol titled "**Frequency of associated factor of aspiration pneumonia among the patients visited to the ICUs of Hayatabad medical complex Peshawar**"

No further corrections and recommendations were suggested. The above-mentioned protocol has been approved after considering various research issues including ethical concerns with condition that the researcher will submit completion report at the end of his/her research.

Prof. Dr. Muhammad Naveed Babur
Dean/Convener REC
Faculty of Allied Health Sciences
Superior University, Lahore

17-KM, Main Raiwind Road, Lahore.
UAN: 042 111 00 00 78 | www.superior.edu.pk

ETHICS COMMITTEE LETTER

Synopsis entitled as “Frequency and associated factor of aspiration pneumonia among patients in the ICUs of Hayatabad medical complex Peshawar”. Submitted by Muhammad Shuaib Roll no SU91-MSAHW-S23-110 has been approved for research work.

_____ Dr. Hafiz Shehzad Muzammil Convener Research Review Board	
_____ Dr. Tahira Batool (Member)	_____ Dr. Adnan Hafeez (Member)