

Identify the Iatrogenesis of Nasogastric Tube Feeding (NGTF) Among Adult Patients

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Abstract: This is a prospective study aimed to identify the most frequent iatrogenesis (iatrogenic events) of (NGTF) among adult patients. A convenience sample of 30 adult patients fed via (NGT) at least for period of 5 days, both sex and their ages were ranged from 19 to 65 years old. The study was conducted at the ICU and general wards of the Main University Hospital in Alexandria. Data was collected in period of 6 months. Assessment sheet was developed by searcher and utilized for data collection about associated iatrogenic events among (NGT) fed adult patients. This included condition of tube feeding as patency or cleansing, condition of nostrils as cleansing, skin events of nose as irritation, ulceration or bleeding as well as sinusitis, condition of oral cavity as mucous membrane and tongue; As well as checking the presence of changes in body weight or unexplained weight loss, skin condition like edema or dryness, pressure source as well as condition of muscle, presence of nausea, vomiting, diarrhea, constipation, or dehydration as well as impaction and distention. This study revealed that, the age was ranged from 19 to 68 years old with mean & SD 36.13 ± 14.72 years. The diagnosis of the studied subject was including trauma, metabolic and neurological conditions with ratio of (30%, 20% & 10%) respectively. It was noticed that, half of subject, whom fed via the (NGFT) their intubated period was ranged from >5 to less 10 days, while the periods of feeding via (NGFT) among the 70% of those subjects was 5 days and >10 days as (30 % & 20%) respectively. As well as ten percent only was noticed with decrease of their body weight (BWT) in period of intubation. Moreover, generalized edema was observed among most of the studied subjects (80%). Additionally to the vast majority of them (90%) were noticed with altered swallowing and the iatrogenic events of nostrils were observed among half of the subjects as inflamed nostrils. While ulceration or others like bleeding were shown among $\frac{1}{3}$ of them as (10% & 20%) respectively. The blockage or chinking tube was detected among (70%) from all studied subjects. As well as it was noticed that, there is a highly statistical significance correlation was detected regarding the nostrils events and setting with $X^2 = 20.000$ as well as P value = .000. ** between the nostril events and setting as inflammation events. In relation to the events of the tube itself and the cause of intubation a positive correlation was observed as $X^2 = 23.750$ as well as P value = .000. *** in the correlations between tube events and the cause of intubation with highly significance As well as the nostrils events were noticed as inflammation, ulceration, dirty nose and others as discharge, bleeding or passage of gastric content through the nostrils in (50%, 10%, 20% & 20%) respectively. So that, (HCGs) must be alert about the serious and preventable iatrogenic events which usually a raised among (TF) patients to safe their life as well as minimize the cost of dealing with it. As evidenced there is urgency to training the staff about the proper ways to manage those patients safely. Thus systematically and consistently conduct chart audits usually needed to determine if any events exist.

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1. Introduction

Nasogastric feeding (NGF) is a relatively common practice but it carries a potential risk of death or medical health iatrogenic events because of the possibility of misplacement or displacement of the tube as well as malpractices which associated with this procedure. ⁽¹⁾ There can also be ethicolegal implications of instigating artificial feeding and the practitioner should refer to trust policy on consent for examination, assessment, safely intervention of caring protocol. ⁽²⁾

However, feeding (F) via enteral tubes (ETs) might be needed for patients who are malnourished or at risk for malnutrition; especially, but not exclusively, those with swallowing problems. ⁽³⁾ In spite of the

insertion of (ETs) usually urgent. It is uncomfortable procedure for those patients and should only be performed by, or under the supervision of, a practitioner who is competent in this task. Thus, the (HCGs) must be follow the standardized policy regarding insertion's guidance and checking tube placement at time of insertion and during utilization to control the possibility of resulting events. ^(4,5)

Iatrogenesis refers to any unintended and untoward consequence of well-intended healthcare interventions. It is a series of adverse effects triggered by an initial medical or nursing intervention initiating of decline. It occurs most frequently among the most functionally impaired patients and those with a higher severity of illness upon admission. It is a very

common, often preventable, hazard for hospitalization and is associated with significantly longer hospital stays, increased patient mortality and cost. Although most of (HCGs) may have a better understanding of iatrogenesis there has not been much progress in decreasing this phenomenon. It is most likely to the tip of iceberg. As evidenced the most common preventable and potentially life threatening iatrogenic events due to ETF are nosocomial infections, aspirating pneumonia, functional decline, mechanical events, malnutrition, pressure ulcers, constipation, diarrhea as well as fecal impaction and events of dehydration or alter urinary out put.^(6,7,8)

Mechanical events may be minor as nose irritation, ulceration, bleeding, sinusitis, and sore throat. Sometimes more significant iatrogenic events occur including nostrils erosion where the tube is anchored, esophageal perforation, pulmonary aspiration, as well as collapsed lung. The last one are very serious because often lead to life threat events.^(7, 9) However, the risk factors for iatrogenic aspirating events include decreased level of consciousness, diminished gag reflex, neurological alterations, GI reflux, poor patient's position, use of large-bore feeding tubes and large gastric residuals. In addition to tube mal-position which leads to bleeding as resulting from tracheal or GI tract perforation. On the other hand mal practices as tube clogging is more likely with intact protein, medications and viscous products.⁽⁸⁾

Whatever, metabolic events of ETF are similar to those, that occur during parenteral nutrition, although the incidence and severity may be less.^(9, 10) These events include hyponatremia due to over hydration, hypernatremia which resulting from inadequate fluid intake. Dehydration as caused by diarrhea or inadequate fluid intake. Further more hyperglycemia caused by excessive calories intake or inadequate insulin as well as insulin resistance.⁽¹¹⁾ By the way, re-feeding syndrome and diarrhea usually resulting in hypokalemia due to loss of potassium (K^+). Otherwise, hyperkalemia it could be attributed to excess (K^+) intake or renal insufficiency.^(12, 7)

Re-feeding syndrome in severely mal-nourished patients may result in iatrogenic events which there are acute decrease in circulating levels of potassium, magnesium, as well as phosphate.^(13, 7) Additionally the progressive loss of muscles mass and function termed "poverty of the flesh" by the Greeks. The current description states sarcopenia "the -associated loss of skeletal muscle mass, which leads to decreased strength and impaired of functional capacity."¹⁴

Sarcopenia is a multi-factorial iatrogenic event process that may result from suboptimal hormonal levels (primarily estrogen and testosterone),¹⁵ protein and vitamin D deficiency, decrease in physical

activity, chronic inflammation, and insulin resistance.¹⁶ Thus (HCGs) must be focus on careful monitoring of tube placement, patient's position, vital signs, as well as intake and output, gastric residuals, fluid and electrolytes balance plus nutritional status. Finally through proper assessment the (HCGs) can minimize or prevent the metabolic event, sarcopenia or others iatrogenesis which may occur^(13,17). So this study was done to identify the most frequent iatrogenic events resulting from (ETF). Additionally to it help the (HCGs) to overcoming or minimizing the expected events.

Aim of the study.

The purpose of this study is to identify the frequent iatrogenic events of (NGFT) among adults and to examine possible solutions.

2. Material and Method

1. Material

Research Design:

Prospective research design was utilized.

Setting:

The study was conducted at the ICU and general wards of the Main University Hospital in Alexandria.

Subjects:

A convenience sample of 30 adult patients fed via (NGT) at list form 5 to 15 days has been included in the study according to the following criteria.

1. Assume their nutrition via the (NGT).
2. Agreed to participate in this study or approval of their family member.
3. Box sex.
4. Their ages 19 to 65 years old
5. The period of fed via ETF not less than 5 days.

Tool for data collection

Assessment sheet was developed by searcher to assess the associated iatrogenic events among (NGT) fed adult patients.

This tool was consisted of two parts:

Part I. Included the following:

1- Socio-demographic and clinical data: This part was intended to obtain information about patients' characteristics as sex, age, area of residence, educational level, job, and social status, section of health care as well as data of admission.

2. Clinical data: was utilized to obtain data about:

Diagnosis.

General appearance.

Level of conciseness

Patient's history: as causes of previous hospitalization and medical history, duration of nutrition via the (ETF).

Part II.

This part was included items regarding the tube fed patient, a risk assessment as confused altered consciousness, swallowing dysfunction or recurrent

retching or vomiting, the risks of placement errors or migration of the tube and nutritional events.

It includes the following component: an item has been inquired about:-

The condition of tube feeding as patency and cleansing

Condition of nostrils as cleansing level, skin events of nose as irritation, ulceration or bleeding as well as sinusitis.

Condition of mouth, mucous membrane and tongue.

Tube fixation

Patient's position during administration of ETF

Using universal precautions and clean technique of the feeding tube.

Nutritional status was being assessed as periodically changes of body weight or unexplained weight loss, skin condition like edema or dryness, pressure source as well as condition of muscle.

The gastrointestinal iatrogenic events as, nausea, vomiting, diarrhea, constipation, dehydration as well as impaction and distention or edema.

Urinary elimination as oliguria, polyuria or others

Vital signs

METHOD

1. Official approval to carry out the study was obtained from the responsible authorities at the previously mentioned research settings after explanation of study purpose.
2. Content validity of the tool was tested by five experts in the field of medical surgical nursing and nutrition to test content validity, the needed correction and clarifying of items was done.
3. The tool was tested for reliability by test retest technique, by five adult patients fed via (NGT), who were admitted in the above-mentioned settings.
4. The patients were interviewed twice at an interval of 5 days period.
5. A pilot study was carried out on five patients adult patients fed via (NGT); to test the clarity and applicability of the tool as well as the necessary modification was done. Data obtained was excluded from the actual study.
6. The final draft of the structured tool was utilized to collect data in order to achieve the objective of this study. Data collected through individualized interview with each patient by researcher using (the assessment sheet).
7. Data collected in period of 6 months.
8. The interview ranged from (20 -45) minutes on individual base depending on the degree of tolerance, response of patients or the circumstances of the setting.

9. The data was collected and analyzed to assess the frequent iatrogenic events of (NGFT) among adults.

Ethical consideration:

- Informed Consent of the patients was obtained after explanation of the aim of the study for alert one and from one of the family member for unconscious patients.
- Confidentiality and privacy of the patient's data was assured.

Statistical analysis:

- The data coded and transferred into specially designed formats, for computer feeding. As well as verification, processes were carried out to avoid any errors during data entry.
- The suitable statistical program was utilized (SPSS version 16 soft ware) for data presentation and statistical analysis of result.
- The less than 0, 05 level was used as the cut off value for statistical significance to assess significance of the result.
- Simple frequency table and cross tabulations with numbers and percentage used for describing and summarizing qualitative data.
- χ^2 Test: it was used to compare qualitative data.

3.Results

The current study was reflected a very important points regarding the most frequent iatrogenic events of (NGFT) among adult subjects. Table (1) shows that, the sex percentile of studied subjects was equal male and females. As well as (50%) were single, while the married and widows were noticed as (30% & 20%) respectively. The ages of were (Mean & SD 36.13 ± 14.72 and the ages were ranged from 30 to <40 and 40 to <50 years old in (36%&27%) respectively. Moreover, one quarter of their ages were noticed between 50 or more years old. As regards the diagnosis it was detected as trauma, metabolic, neurological and others with ratio (30%, 20%, 10%&40%) respectively. On the other hand it was shown that 2/3 of subject with disturbed level of consciousness and (40%) was comatose. As well as it was noticed that, (60%) from the distributed consciousness's subjects from ICU and (40%) in wards. As regards past medical history it was observed that, (60%) with negative history and (40%) with positive medical history as DM and hypertension with equal percentage. Otherwise the cause of intubation was observed as (60%) with neurological conditions and (40%) due to poor ventilation. However, the period of nutrition via (NGT) revealed that, half of the subject, their period of intubation was ranged from >5 to less 10 days, while the other their periods of intubation was classified as 5 days or > than 10 days (30 % & 20%) respectively.

Table (2): As regards the nutritional condition table (2) was shown that, the same percentage was noticed that, obesity and within normal body WT appearance observed among 30% for each one. As well as, ten percent only were noticed with decreased in their body WT during period of NGTF. As well as generalized edema was observed among (80%) from the studied subjects. On the other hand the abdominal events were discovered among all of the subjects as distention for half of them, 10% only as enlarged abdomen and 40% were suffer from other abdominal events. Furthermore, 70% were noticed with weak & flappy muscles. Moreover, vomiting was discovered among (70%) from the subjects. Otherwise, nausea and plotting were observed among (10% & 30%) respectively. The bowel events were noticed as diarrhea, constipation and fecal impaction among (50%, 20% & 10%) respectively. Furthermore, the event of urinary out put was shown as polyuria and oligurea. among 50% & 40% respectively.

The table (3) was reflected that, skin color was noticed pale and cyanotic among majority of the subjects (60% & 20%) respectively. On the other hand flashed skin was observed in 20%. Otherwise, skin turgor, events were observed in all of the subjects from moderate to poor turgor as (90% & 10%) respectively. Otherwise, pressure source was detected in (70%) of them. Regarding oral cavity, it was noticed that, 50% in the studied subjects were suffering from inflamed lips, as well as dry and ulcerated lips were discovered among (30% & 20%) respectively and, tongue was noticed as, cyanotic as well as coated among (30%). More over dryness as well as inflammation of mucus membrane and tongue were observed with same percentage among (10%). Otherwise pale tongue was detected in (20%) from the subjects and oral hygiene events was detected among the majority of the subjects as poor and very poor among (20%) in subjects. Moreover, the vast majority of them (90%) were noticed with alliterated swallowing. Additionally to nostrils event were noticed in half of subjects as inflamed nostrils. While ulceration or others like bleeding, sinusitis & reflux of gastric contents were shown among 1/3 of them as (10% & 20%) respectively. As well as events tube as blockage or chinked was detected among (70%) from the subjects.

In relation to respiratory events, table (4) revealed that, (70%) from the subject were suffering from alter the depth of respiration. While coughing and shocking were noticed among 20% from total subjects and productive cough with excessive amount of sputum was discovered among half of them. Otherwise the moderate and small amounts of sputum were observed in (20% & 30%) respectively and greenish color of sputum was noticed among 50% and

yellow or others color were detected among (20% & 10%) respectively. Further more sticky sputum with offensive odor was noticed among (70%) as well as the body temperature was detected elevated in 70% from the subject.

Table (5) illustrates the relationship between iatrogenic events of tube feeding and period of intubation, section, cause of intubation, past medical history and level of consciousness. As regards the condition of nostrils table (5 A-) revealed that, the half of subjects were exposed to different types of nasal events during period of EF between >5days & 10 days as poor hygiene with hard crust, inflammation and others as bleeding, sinusitis as well as reflux of feeding consents among (10%, 20% & 20%) respectively. Otherwise nostrils ulceration was notice among 1/3 from total subjects as the following (10% in period of 5 days and (20%) from the subject in period of >5days & 10 days. Moreover, a positive significant correlation was detected in this area as $X^2 = 18.800$ as well as P value = .005. ** Furthermore, there is also statistical significance correlation was noticed regarding the nostrils events with medical diagnosis as $X^2 = 23.750$ & $P = .005$. ** As well as highly statistical correlation was detected regarding the nostrils events with setting as ($X^2 = 20.000$ as well as P value = .000. ** and inflammation events of nostrils were detected among 50% from total subject as (10% & 40%) in ICU & ward respectively. In relation to nostrils events with the cause of intubation a highly positive correlation was observed as $X^2 = 23.750$ as well as P value = .000. ** between the cause of intubation and nostrils events were noticed as inflammation, ulceration, dirty nose and others as bleeding among (50%, 10%, 20% & 20%) respectively. As well as there is a little significant relationship was noticed between the nostrils events, past medical history and conscious level as follow ($X^2 = 14.000$ and P value = .030. & $X^2 = 8.750$ and P value = .033. On the other hand table (5-B) revealed that, tube blockage or kinking were noticed among half of subject in ICU and 20% in ward and ($X^2 = 3.810$ & $P = .051$) with no significance correlation difference detected.

Table (5-C) illustrates that, the general iatrogenic event of NGTF with the last mentioned variables as dry lips was observed among the same percentage as 50% in both setting. The inflamed as well as ulcerated lips were detected among 30 % form total in ward only .Otherwise the ulcerated lips was noticed with the same percentage as 10% for both setting. However, there is a statistical significance correlation was found with ($X^2 = 22.333$ & $P = .001$ & $X^2 = 8.750$ & $P = .013$) respectively. Moreover, inflamed lips were observed among equal percentage as 50% regarding the cause of intubation & period of intubation in total subjects with statistical significance correlation was

found as ($X^2 = 20.000 \& P = .000^{***}$ and $X^2 = 11.633 \ P = .020^{**}$) respectively. However there is no statistical significance correlation was detected with the level of conciseness as ($X^2 = .417 \& P = .812$). As regards the tongue & mucus membrane events as dryness, cyanosis, inflammation & pallor in relation to diagnosis, setting, period of intubation and level of conciseness, there is a high statistical significance correlation was observed as ($X^2 = 60.000 \& P = .000^{***}$, $X^2 = 21.66 \& P = .001^{**}$, $X^2 = 31.333 \& P = .001^{**}$ and $X^2 = 21.667 \& P = .001^{**}$) respectively.

The abdominal events as distention were noticed among 40% & 10% in the ward and ICU respectively with statistical significance correlation with ($X^2 = 11.667 \& P = .009^{**}$). The result regarding the period of intubation was reflected that 50% from the subjects were suffered from abdominal distention during period of >5 to 10 days for intubation, with a highly statistical significance correlation difference as ($X^2 = 34.800 \& P = .000^{***}$). Furthermore, the events of skin and mucus membrane inform of sweaty or dry with setting, cause of intubation and diagnosis were noticed with no the statistical significance correlation as ($X^2 = .238 \& P = .626$, $X^2 = .106 \& P = .745$ and $X^2 = 2.751 \& P = .423$) respectively. However, a positive statistical significance correlation was noticed as ($X^2 = 16.243 \& P = .000^{***}$ and $X^2 = 8.571 \ P = .003^{**}$) regarding skin events with period of intubation and level of conciseness and correlation of skin turgor events with all variables were noticed without any significance correlation difference. Poor skin turgor was observed among majority of the subject with equal percentage as (90%) for all variables and pressure sores were noticed among all subjects in ward (40%) from total subjects, while it observed among half of subjects in ICU (30%) from total. There is a positive statistical significance correlation was noticed as ($X^2 = 8.571 \& P = .003^{**}$). Additionally there is also statistical significance difference was found in relation to presence of pressure sores and the cause of intubation and minimum significance difference was detected in relation to the period of intubation as well as no significant difference with the level of conciseness and diagnosis as the following ($X^2 = 19.286 \& P = .000^{***}$, $X^2 = 9.048 \& P = .011$, $X^2 = .238 \& P = .021$ and $X^2 = 9.762 \& P = .626$) respectively. On the hand generalized edema was noticed among the majority of total subjects (80%) from both setting as 40% in wards and 40% in ICU which equal (66.7%) from total ICU's subjects with $X^2 = 5.000 \& P = .025$ with out a apparent significance difference. Other wise there is also no significant correlation was detected between edema and period of intubation as well as diagnosis as ($X^2 = 7.500 \& P = .024$ and $X^2 = 8.125 \& P = .043$) respectively.

Further more muscular weakness was observed among 70% and the relation to setting, diagnosis, cause and period of intubation, level of conciseness and past medical history as ($X^2 = 15.000 \& P = .001^{**}$, $X^2 = 26.833 \& P = .000^{***}$, $X^2 = 26.833 \& P = .000^{***}$, $X^2 = 20.033 \& P = .000^{***}$, $X^2 = .417 \& P = .000^{***}$ and $X^2 = 20.000 \& P = .812$) respectively. So there is a highly statistical significant correlation was detected between edema and all variable except past medical history. Furthermore, bowel events were noticed among (70%) and the relation regarding all variables as follow setting, diagnosis, cause and period of intubation, and past medical history with a highly statistical significant correlation was observed between the last items as ($X^2 = 17.500 \& P = .004^{**}$, $X^2 = 55.000 \& P = .000^{***}$, $X^2 = 20.625 \& P = .001^{**}$, $X^2 = 30.000 \& P = .001^{**}$ and $X^2 = 26.250 \& P = .003^{**}$) respectively.

Urinary elimination events as polyurea was observed among (50%) from total subject in relation to setting, diagnosis and period of intubation. What ever there is a positive significance correlation was detected between the last variables and polyurea as ($X^2 = 10.625 \& P = .005^{**}$, $X^2 = 19.500 \& P = .003^{**}$ and $X^2 = 15.45 \& P = .004^{**}$) except the past medical history there is no statistical significant correlation was detected in relation to polyurea as ($X^2 = 2.500 \& P = .645$). Otherwise, the oligurea was observed among $\frac{3}{4}$ in the ward's subjects which equal 30% from total. On the other hand it was discovered among (16.7%) in the ICU's subjects which equal 10% from total. As well as it was noticed also among 40% from total subject in relation to setting, diagnosis and period of intubation.

It was shown in the current study the of elevated body temperature among all with equal percentage (70%). However the elevated temperature associated with the setting was noticed in (83.3%) from subject in ICU as 50% from total subjects and 50% from subjects in the ward which means 20% from total. As evidenced there is no significance correlation was detected between the body temperature event and setting as ($X^2 = 3.810 \& P = .051$). On the other hand there is a highly significance correlation was detected between the elevated body temperature and past medical history as ($X^2 = 22.857 \& P = .000^{***}$). However, the body temperature event with past medical history was noticed among 60% in total subject with negative history. As well as the cause of intubation revealed a significance correlation with the body temperature event as noticed among 70% from total subject, which divided as 40% & 30% from poor ventilation and neurological condition respectively with ($X^2 = 8.571 \& P = .003^{**}$). Otherwise there is no significance correlation was detected in relation to body temperature event and other variables.

Moreover the current study was shown that, the presence of sputum event was observed as greenish color in 50% and same percentage for different variables, as well as the significance positive

correlation was noticed between event of greenish sputum color with diagnosis and past medical history as ($X^2 = 36.250$ & $P = .000^{***}$ and $X^2 = 20.000$ & $P = .003^{**}$) respectively.

Table (1):- Distribution of studied subjects based on Socio-demographic and clinical data

Variable	Frequency N=30 %	Total N=30 %
1-Sex		
Male.	15 50	
Female	15 50	30 100
2-Marital status		
Single	15 50	
Married	9 30	30 100
Widow	6 20	
3- Age		
-19- >30	5 17	
-30> 40	11 36	30 100
-40>50	8 27	
-50 or more	6 20	
4-Diagnosis		
Trauma	9 30	
Metabolic	6 20	30 100
Neurological &Others	15 50	
5- Educational Level		
Illiterate	6 20	
Read & write or primary level	15 50	30 100
Secondary level	6 20	
University level	3 10	
6-Level of consciousness		
Disturbed	18 60	30 100
Comatose	12 40	
7-setting		
ICU	18 60	30 100
Medical wards	12 40	
8- Past medical history		
Negative	18 60	30 100
DM	6 20	
Hypertension	6 20	
9- causes of intubation		
Poor ventilation	12 40	
Neurological alterations &others	18 60	30 100
10- period of intubation		
5 days	9 30	
>5- 10 days	15 50	30 100
>10 days	6 20	

Table (3): Distribution of studied subjects based on condition of skin, oral, nostrils and tube condition

Skin assessment	Frequency N=30 %		Total N = 30 %
1-skin color			
pale	18	60	
cyanotic	6	20	30 100
flushed	6	20	
- skin turgor			
-Poor	27	90	
- moderate	3	10	30 100
- pressure sores			
- Yes	21	70	
- No	9	30	30 100
Lips condition			
-inflamed	15	50	
- ulcerated	6	20	30 100
-dry	9	30	
Tongue &mucus .m			
-dry	3	10	
-Pale	6	20	
-Cyanotic	9	30	
-Inflamed	3	10	30 100
-Coated &Tongue	9	30	
Alter of swallowing			
-Yes	27	90	
-others	3	10	30 100

<u>Oral hygiene</u>	-Poor	24	80	
	-Very poor	6	20	30 100
<u>-condition of nostrils</u>	-clean & healthy	6	20	
	-Inflamed	15	50	30 100
	-ulcerated	3	10	
	-others	6	20	
<u>-Tube condition</u>	-Patent & clean	9	20	
	-blockage tube	21	70	30 100

Table (4):- Distribution of studied subjects based on assessment of pattern of breathing, character of sputum & body Temperature

Variables	Frequency		Total N = 30 %
	N=30	%	
<u>1-breathing pattern</u>			
-with in normal	3	10	
-cough &shocking	6	20	30 100
-alter the depth of respiration	21	70	
<u>2-Productive cough character.</u>			
-small amount of sputum	9	30	30 100
- moderate	6	20	
- excessive	15	50	
<u>3-Viscosity & odor of sputum</u>			
-Slight thickness & odor less	6	20	30 100
-Sticky with offensive odor	21	70	
-Sticky with out odor	3	10	
<u>4-Sputum color</u>			
-normal	6	20	
- yellowish	6	20	30 100
- greenish	15	50	
- others	3	10	
<u>5- body temperature</u>			
- Elevated temperature.	21	70	30 100
- With in normal temperature.	9	30	

Table (5):-The correlation between iatrogenic events of tube feeding with period of intubation, section cause of intubation, past medical history and level of consciousness

(5-A) The correlation between conditions of nostrils with last variables.

Variables	Nostrils events				Total N %	X ² P: <u>value</u>
	Dirty N %	inflamed N %	ulcerated N %	others N %		
<u>2-periods of intubation</u>						
5days	3 10	3 10	3 10	0 -	9 30	
> 5to 10 days	3 10	6 20	0 -	6 20	15 50	X ² =18.800 P=.005 ^{***}
>10 days	0 -	0 -	6 20	0 -	6 20	
<u>Total</u>	6 20	9 30	9 30	6 20	30 100	
<u>2-Diagnosis</u>						
trauma	3 10	0 -	3 10	3 10	9 30	X ² =23.750 P=.005 ^{**}
metabolic	0 -	3 10	0 -	3 10	6 20	
neurologic &others	3 10	12 40	0 -	0 -	15 50	
<u>Total</u>	6 20	15 50	3 10	6 20	30 100	
<u>3- section</u> a-ICU	6 20	3 10	3 10	6 20	18 60	X ² =20.000 P=.000 ^{***}
b-ward	0 -	12 40	0 -	0 -	12 40	
<u>Total</u>	6 20	15 50	3 10	6 20	30 100	
<u>4- cause of intubation</u>						
poor ventilation	6 20	0 -	3 10	3 10	12 40	X ² =23.750 P=.000 ^{***}
b-neurologic& others	0 -	15 50	0 -	3 10	18 60	
<u>Total</u>	6 20	15 50	3 10	6 20	30 100	
<u>5- past medical history</u>						
a- Negative	3 10	6 20	3 10	6 20	18 60	X ² =14.000 P=.030 ^{**}
b-DM	3 10	3 10	0 -	0 -	6 20	
c-hypertension	0 -	6 20	0 -	0 -	6 20	
<u>Total</u>	6 20	15 50	3 10	6 20	30 100	
<u>6- level of consciousness</u>						
a- disturbed	6 20	6 20	3 10	3 10	18 60	X ² =8.750 P=.033 ^{**}
b- comatose	0 -	9 30	0 -	3 10	12 40	
<u>Total</u>	6 20	15 50	3 10	6 20	30 100	

Positive significant relation (P≤0.05)

(5-B) The correlation between iatrogenic events of the tube itself with last variables

Variables	iatrogenic of tube				Total No %	X ² & . P :value
	Patent & clean		clogged or kinked			
	No	%	No	%		
1-Diagnosis						
Trauma	3	10	6	20	9	30
Metabolic	0-		6	20	6	20
Neurologic& others	6	20	9	30	15	50
Total	9	30	21	70	30	100
2 section						
ICU	3	10	15	50	18	60
Ward	6	20	6	20	12	40
Total	9	30	21	70	30	100
3-Periods of intubation						
a-Less than 5days	3	10	6	20	9	30
b-5to 10 days	3	10	12	40	15	50
c-More than 10 days	3	10	3	10	6	20
Total	9	30	21	70	30	100
4- Cause of intubation						
a- Poor ventilation	3	10	9	30	12	40
b-Neurologic & others	6	20	12	40	18	60
Total	9	30	21	70	30	100
5-past medical history						
a-Negative	9	30	9	30	18	60
b-DM	0	-	6	20	6	20
c-hypertension	0	-	6	20	6	20
Total	9	30	21	70	30	100
6-level of consciousness						
a- disturbed	3	10	15	50	18	60
b- comatose	6	20	6	20	12	40
Total	9	30	21	70	30	100

Positive significant relation (P≤0.05)

(5-C)The correlation between iatrogenic events of GIT with last variables

Variables	Iatrogenic problems of oral cavity A- lips						Total No %	X ² & P
	Dry		inflamed		ulcerated			
	N	%	N	%	N	%		
1Section								
-ward	6	20	9	30	3	10	18	60
-ICU	9	30	0	-	3	10	12	40
Total	15	50	9	30	6	20	30	100
2-cause of intubation								
a-poor ventilation	9	30	3	10	0	-	12	40
b-neurologic & others	0	-	12	40	6	20	18	60
Total	9	30	15	50	6	20	30	100
3-periods of intubation								
a- 5days	6	20	3	10	0	-	9	30
b->5to 10 days	3	10	9	30	3	10	15	50
c->10 days	0	-	3	10	3	10	6	20
Total	9	30	15	50	6	20	30	100
level of consciousness								
a-disturbed	6	20	3	10	9	30	18	60
b-comatose	3	10	6	20	3	10	12	40
Total	9	30	9	30	12	40	30	100
-Diagnosis	B-Mucous membrane & tough							
	Dry	cyanotic	inflamed	coated	pale	Total		
	N %	N %	N %	N %	N %	N %		
a. trauma	0	-	3	10	0	-	9	30
b. metabolic	0	-	0	-	0	-	6	20
c. neurologic& other	3	10	0	-	3	10	6	20
Total	3	10	3	10	3	10	18	60
Section Ward	3	10	3	10	3	10	6	20
-ICU	0	-	0	-	6	20	6	20
Total	3	10	3	10	9	30	12	40
3-periods of intubation								
a- 5days	0	-	3	10	3	10	0	-
b->5to 10 days	0	-	3	10	6	20	3	10
c->10 days	3	10	0	-	0	-	3	10
Total	3	10	6	20	9	30	3	10
4-level consciousness								
a-disturbed	3	10	0	-	3	10	6	20
b-comatose	0	-	3	10	0	-	6	20
Total	3	10	3	10	3	10	12	40

abdominal condition	Diagnosis						Total	X ² = 14.333 P=.111	
	Trauma		Metabolic		neurologic & others				
-enlarged	0	-	0	-	3	10	3	10	
-distended	6	20	3	10	9	30	18	60	
-others	3	10	0	-	6	20	9	30	
Total	9 30		3 10		18 60		30 100		
abdominal condition	Section						Total		X ² =11.667 P=.009 ^{**}
	Ward			ICU			No	%	
-enlarged	0	-			3	10	3	10	
distended	12	40			3	10	15	50	
-others	6	20			6	20	12	40	
Total	18 60			12 40			30 100		
abdominal condition	periods of intubation						Total	X ² = 34.800 P=.000 ^{**}	
	less than5days		5to 10 days		more than 10 days				
-enlarged	0	-	3	10	0	-	3	10	
-distended	0	-	12	40	6	20	18	60	
-others	9	30	0	-	0	-	9	30	
Total	9 30		15 50		6 20		30 100		

Table (5-D) The correlation between iatrogenic events of skin with last variables.

Variables Section	Iatrogenic events of general skin				Total	No	%	X ² & P:value
	Dry		sweaty					
	No	%	No	%	30	100		
-Ward	3	10	9	30	12	40	X ² =.238 P=.626	
-ICU	6	20	12	40	18	60		
Total	9 30		21 70		30 100			
2-cause of intubation							X ² =.106 P=.745	
a-poor ventilation	4	13.3	8	26.7	12	40		
b-neurologic& others	5	16.7	13	43.3	18	60		
Total	9 30		21 70		30 100			
3-periods of intubation							X ² =16.243 P=.000 ^{**}	
a- 5days	7	23.3	2	6.7	9	30		
b->5to 10 days	0	-	15	50	15	50		
c->10 days	2	6.7	4	13.3	6	20		
Total	9 30		21 70		30 100			
4-level of consciousness							X ² =8. 571 P=.003 ^{**}	
a-disturbed	9	30	9	30	18	60		
b-comatose	0	-	12	40	12	40		
Total	9 30		21 70		30 100			
1-Diagnosis -trauma	2	6.7	7	23.3	9	30	X ² =2.751 P=.423	
-metabolic	3	10	3	10	6	20		
-neurologic& others	4	13.3	11	36.7	15	50		
Total	9 30		21 70		30 100			
1-Diagnosis	Skin turgor				Total	No	%	X ² & P
	Poor		within normal					
	N	%	N	%	30			
a. trauma	6	20	3	10	9	30	X ² =7.778 P=.051	
b. metabolic	6	20	0	-	6	20		
c. neurologic & others	15	50	0	-	15	50		
Total	27 90		3 10		30 100			
2-Section -ICU	15	50	3	10	18	60	X ² =2. 222 P=.136	
-Ward	12	40	0	-	12	40		
Total	27 90		3 10		30 100			
3- cause of intubation							X ² =5.000 P=.025	
a-poor ventilation	9	30	3	10	12	40		
b-neurologic& others	18	60	0	-	18	60		
Total	27 90		3 10		30 100			
4-periods of intubation							X ² =7.778 P=.051	
a- 5days	6	20	3	10	9	30		
b->5to 10 days	15	50	0	-	15	50		
c->10 days	6	20	0	-	6	20		
Total	27 90		3 10		30 100			
Total	27 90		3 10		30 100			

Variables Section	Presence of pressure sores			X ² & P :value
	Yes	No	Total	

-ward -ICU	12 40 9 30	0 - 9 30	12 40 18 60	$K=8.571$ $P=.003$
Total	21 70	9 30	30 100	
2-cause of intubation				$X^2=19.286$ $P=.000$
a-poor ventilation	3 10	9 30	12 40	
b-neurologic& others	18 60	0 -	18 60	
Total	21 70	9 30	30 100	
3-periods of intubation				$X^2=9.048$ $P=.011$
a- a- 5days	3 10	6 20	9 30	
b->5to 10 days	12 40	3 10	15 50	
c->10 days	6 20	0 -	6 20	
Total	21 70	9 30	30 100	
4-level of consciousness				$X^2=.238$ $P=.021$
a-disturbed	12 40	6 20	18 60	
b-comatose	9 30	3 10	12 40	
Total	21 70	9 30	30 100	
1-Diagnosis				$X^2=9.762$ $P=.626$
trauma	3 10	6 20	9 30	
metabolic	6 20	0 -	6 20	
neurologic& others	12 40	3 10	15 50	
Total	21 70	9 30	30 100	
1-Section	Presence of edema		Total	$X^2=5.000$ $P=.025$
	Yes	no	No %	
-ICU	12 40	6 20	18 60	
-ward	12 40	0 -	12 40	
Total	24 80	6 20	30 100	
2--periods of intubation				$X^2=7.500$ $P=.024$
a- 5days	9 30	0 -	9 30	
b->5to 10 days	9 30	6 20	15 50	
c->10 days	6 20	0 -	6 20	
Total	21 70	9 30	30 100	
1-Diagnosis				$X^2=8.125$ $P=.043$
trauma	6 20	3 10	9 30	
metabolic	3 10	3 10	6 20	
neurologic& others	15 50	0 -	15 50	
Total	24 80	6 20	30 100	

Positive significant relation ($P \leq 0.05$)

Table (5-E) The correlation between iatrogenic events with last items

Variables Section	Muscular alteration events				Total	X^2 & P :value
	Within normal		Weak & flappy			
	No	%	No	%		
-ward	0	-	12	40	12 40	$X^2=15.000$ $P=.001^{***}$
-ICU	9	30	9	30	18 60	
Total	9	30	21	70	30 100	
-Diagnosis						$X^2=26.833$ $P=.000^{***}$
trauma	6	20	0	-	6 20	
metabolic	0	-	6	20	6 20	
neurologic& others.	3	10	12	40	15 50	
Total	9	30	21	70	30 100	
cause of intubation						$X^2=26.833$ $P=.000^{***}$
a-poor ventilation	9	30	3	10	12 40	
b-neurologic& others	0	-	18	60	18 60	
Total	9	30	21	70	30 100	
-periods of intubation						$X^2=20.033$ $P=.000^{***}$
a- 5days	6	20	3	10	9 30	
b->5to 10 days	3	10	12	40	15 50	
c->10 days	0	-	6	20	6 20	
Total	9	30	21	70	30 100	
level of consciousness						$X^2=.417$ $P=.000^{***}$
a-disturbed	6	20	12	40	18 60	
b-comatose	3	10	9	30	12 40	
Total	9	30	21	70	30 100	
past medical history a-Negative						$X^2=20.000$ $P=.812$
b-DM	9	30	9	30	18 60	
c-hypertension	0	-	6	20	6 20	
Total	9	30	6	20	6 20	

Total	9	30	21	70	30	100			
Variables Section	diarrhea		bowel elimination constipation		impaction others&		Total		X ² P&
	No	%	No	%	No	%	No	%	
-ward	15	40	0	-	0	-	15	50	X ² =17.500 P=.004*
-ICU	6	30	6	20	3	10	18	60	
Total	21	70	6	20	3	10	30	100	
<u>Diagnosis</u>	6	20	3	10	0	-	9	30	X ² =55.000 P=.000***
metabolic	3	10	0	-	3	10	6	20	
neurologic& others	12	40	3	10	0	-	15	50	
Total	21	70	6	20	3	10	30	100	
<u>Past medical history a-</u>	9	30	6	20	3	10	18	60	X ² =30.000 P=.001**
Negative	6	20	0	-	3	-	6	20	
b-DM	6	20	0	-	0	-	6	20	
c-hypertension	6	20	0	-	0	-	6	20	
Total	21	70	6	20	3	10	30	100	
<u>periods of intubation</u>	6	20	3	10	6		9	30	X ² =26.250 P=.003**
5days	9	30	3	10	3	10	15	50	
b->5to 10 days	6	20	0	-	0	-	6	20	
c->10 days	6	20	0	-	0	-	6	20	
Total	21	70	6	20	3	10	30	100	
<u>cause of intubation</u>	diarrhea		bowel elimination constipation		impaction others&		Total		X ² & P :value
poor ventilation	No	%	No	%	No	%	No	%	
b-neurologic& others	6	20	6	20	3	-	12	40	X ² =20.625 P=.001**
Total	15	50	0	-	3	10	18	60	
Total	21	70	6	20	3	10	30	100	
Variables Section	Polyurea		Urinary elimination Oligurea		Others		Total		X ² & P X ² =10.625 P=.005**
	No	%	No	%	No	%	No	%	
-ward	3	10	9	30	9		12	40	
-ICU	12	40	3	10	3	10	18	60	
Total	15	50	12	40	3	10	30	100	
<u>Diagnosis</u>	6	20	3	10	3	-	9	30	X ² =19.500 P=.003**
trauma	3	10	3	-	3	10	6	20	
metabolic	6	20	9	30	0	-	15	50	
neurologic & others	6	20	9	30	0	-	15	50	
Total	15	50	12	40	3	10	30	100	
<u>Past medical history</u>	9	30	6	20	3	10	18	60	X ² =2.500 P=.645
Negative	3	10	3	10	-	-	6	20	
DM	3	10	3	10	-	-	6	20	
hypertension	3	10	3	10	-	-	6	20	
Total	15	50	12	40	3	10	30	100	
<u>periods of intubation</u>	9	30	0	-	0	-	9	30	X ² =15.450 P=.004*
5days	3	10	9	30	3	10	15	50	
b->5to 10 days	3	10	3	10	0	-	6	20	
c->10 days	3	10	3	10	0	-	6	20	
Total	15	50	12	40	3	10	30	100	

Table (5-F) The correlation between iatrogenic events of vital sings with diagnosis, section, cause of intubation ,past medical history level of consciousness, and period of intubation.

Variables Section	Body Temperature				Total		X ² & P:value
	Elevated		Subnormal		No	%	
	No	%	No	%			
-ward	6	20	6	20	12	40	X ² =3.810 P=.051
-ICU	15	50	3	10	18	60	
Total	21	70	9	30	30	100	
<u>Diagnosis</u>	9	30	0	-	9	30	X ² = 8.571 P=.036
trauma	3	10	3	10	6	20	
metabolic	9	30	6	20	15	50	
neurologic& others	9	30	6	20	15	50	
Total	21	70	9	30	30	100	
<u>Past medical history</u>	18	60	0	-	18	60	X ² =22.857 P=.000***
a-Negative	3	10	3	10	6	20	
b-DM	0	-	6	20	6	20	
c-hypertension	0	-	6	20	6	20	
Total	21	70	9	30	30	100	

periods of intubation											
a- 5days	6	20		3	10	9	30	X2 = 1.905 P = .386			
b->5to 10 days	12	40		3	10	15	50				
c->10 days	3	10		3	10	6	20				
Total	21	70		9	30	30	10				
cause of intubation											
a-poor ventilation	12	40		0	-	12	40	X2 = 8.571 P = .003* *			
b-neurologic& others	9	30		9	30	18	60				
Total	21	70		9	30	30	10				
level of consciousness											
a-disturbed	12	40		6	20	18	60	X2 = .238 P = .626			
b-comatose	9	30		3	10	12	40				
Total	21	70		9	30	30	10				
Variables	Color of sputum					Total		X2 & P:value			
Diagnosis	White		yellow	greenish	others	No	%				
	N	%	N	%	N	%					
trauma	3	10	0	-	6	20	0	-	X2 = 36.250 P = .000* **		
metabolic	0	-	6	20	0	-	0	-			
neurologic& others	3	10	0	-	9	30	3	10			
Total	6	20	6	20	15	50	3	10			
Section	-ward	3	10	3	10	3	10	12	40	X2 = 7.500 P = .058	
	-ICU	3	10	3	10	4	0	18	60		
Total		6	20	6	20	15	50	3	10		
Past medical history											
a-Negative	6	20	3	10	9	30	0	-	18	60	X2 = 20.000 P = .003 **
b-DM	0	-	3	10	3	10	0	-	6	20	
c-hypertension	0	-	0	-	3	10	3	10	6	20	
Total	6	20	6	20	15	50	3	10	30	10	
cause of intubation											
			White		yellow	greenish	others	Total			
			N	%	N	%	N	%	No	%	
a-poor ventilation	3	10	0	-	9	30	0	-	12	40	X2 = 8.750 P = .033
b-neurologic& others	3	10	6	20	6	20	3	10	18	60	
Total	6	20	6	20	15	50	3	10	30	10	
periods of intubation											
a- 5days	3	10	3	10	3	10	0	-	9	30	X2 = 10.800 P = .095
b->5to 10 days	3	10	3	10	6	20	3	10	15	50	
c->10 days	0	-	0	-	6	20	0	-	6	20	
Total	6	20	6	20	15	50	3	10	30	10	

4. Discussion

Feeding tubes are commonly used in the health care setting. Its use may be associated with many iatrogenic events such as aspiration, diarrhea, nausea, abdominal bloating, and metabolic or mechanical events. (2, 9) A systematic and careful analysis of the underlying cause of these iatrogenic events is a cornerstone to a successful EF program. (12, 1) However, the current study revealed that, there are a number of serious events usually facing those subjects. As regards the mechanical events this study revealed that, half of subjects were exposed to different types of nostril events in the period between 5 days & 10 days as poor hygienic level with hard crust, inflammation and others as bleeding, sinusitis as well as reflux of feeding contents. Otherwise ulceration and inflammation of nostrils was noticed also. In relation to nostril events with the cause of intubation a highly positive correlation was observed in this finding. It was lined with the recent studies as mentioned that, feeding tubes are associated with many mechanical iatrogenic events as discomfort, rhinitis, nasal

irritation, ulceration, bleeding due to mucosal trauma, infection, esophageal reflux and strictures, esophagitis, perforation of a pharyngeal or esophageal pouch, intracranial insertion, and accidental bronchial insertion and perforation. (2, 4) Intracranial insertion is a small but documented risk. This risk is minimized by the use of flexible polyurethane or silicone tubes; however, modern tubes with internal wires increase this risk. Reinsertion of guide wires with feeding tubes in situ should not be attempted due to the risk of wire passing either through an outflow port or perforating the tube, and then perforating the viscous. (12, 13) Local pressure of malpractices as pressure on the tubes may cause nasal erosions, abscess formation, sinusitis, and otitis media. (5, 14) These events may be due to lack of awareness regarding the urgency of proper hygiene and care of nostrils as skin care, lubrication, tube fixation as well as and patency. Otherwise lack of skills or work loads many are another factors.

As evidenced the recent studies mentioned that ETF are associated with discomfort, sore mouths, thirst, dry of lips, mucous membranes, and hoarseness

(2,3) However these findings are supported by the results of the current study as noticed regarding oral cavity events with highly significant correlations with the period and section with high percentage. These symptoms may be remedied by mouthwashes and artificial saliva. Esophageal complications can include esophagitis, ulceration, strictures, tracheal fistulas (especially in presence of endotracheal tube), and exacerbation of variceal bleed. These events can be minimized by the use of fine bore tubes. Tube feeding may also be associated with higher rates of restraints and pressure sores.²⁻⁵ Furthermore we must focus on the training of health care givers to follow the standardized procedure safely. As well as proper hygiene and lubrication for oral cavity and nostrils must be taken seriously.

Feeding tubes can commonly become blocked, especially if they are not flushed with at least 30-60 mL of water every feeding or medication administration. Bolus feeding, hypertonic, high-fiber formulas, crushed tablets, potassium, iron supplements, and sucralfate are particularly likely to cause blockage.²⁻⁷ This result was documented by the current study's results as blocked tube was noticed among (70%) from the studied subjects. Whenever possible, and elixir forms of medications should be used. The tube should be flushed every 4-6 hours during continuous feeds and after every medication dose and bolus feeding.²⁻⁷ A tube may be unblocked by flushing with warm water or cranberry juice. The use of solutions with pancreatic enzymes or meat tenderizer should be done with caution, as this may harm the gastric mucosa or the tube. Carbonated drinks, pineapple juice, and sodium bicarbonate solution may cause tube degradation. Furthermore the high protein contents may be one of the causes for tube blockage.⁷ Tube blockage may be also due to kinking of it or mal-position of the patient. Failure to recognize this event may result in serious iatrogenic events, including bacteriologic events which usually cause economical burden events for patient or health care setting or final death of patient.^{15, 16} Thus the intake of swab for bacteriologic studies is highly recommended.

While the EF feeds are an ideal culture medium and can become contaminated with bacteria during handling, poor storage of the formula and its temperature or the rate of administration, poor oral hygiene or presence of periodontal disease as well as hypo-salivation and poor tube care.²⁻⁵ Therefore, careful hand hygiene can minimize the contamination, the feeding bags and tubing should be changed daily. Opened through should be refrigerated. In addition to gastrointestinal events, sepsis can occur.

Aspiration is one of the most important and controversial events in patients receiving E F, as well as the leading causes of death among those patients

due to aspiration pneumonia.⁷⁻¹⁰ However, differentiation of aspiration from oropharyngeal or gastric contents is difficult to assess.¹¹ The rate of aspiration pneumonia in TF patients ranges from approximately 5% to 58%.⁷⁻⁹ Aspiration often occurs without obvious evidence of vomiting or regurgitation and is recognized by the development of clinical signs of respiratory compromise or pneumonia.^{9,10}

This lined with the results of this study as observed in form of elevated body temperature among 70% from the studied subject. Additionally to altered respiratory pattern with the presence of offensive greenish sticky sputum among 50 % from the studied subject.

Whatever a lot of studies noticed that NGTs are used by some to prevent aspiration, although evidence is lacking to support this belief.⁹ Additional risk factors for the development of aspiration pneumonia include advanced age, the presence of esophagitis on endoscopy, gastro-esophageal reflux, prior history of aspiration or pneumonia, impaired level of consciousness, neurologic deficits, poor oral hygiene, and sedative medications.¹⁰ By the way the management of this event includes stopping the feed, attempts at aspirating the feed from the lungs, and antibiotics if signs of infection are evident. Feeding beyond the duodenum likely lowers the incidence of aspiration, although no conclusive evidence supports this premise.^{9, 10} Furthermore the use of preventive measures to decrease the incidence of aspiration and its development into pneumonia by targeting modifiable risk factors. To minimize the risk of aspiration the Patients should be fed sitting up or at a 30- to 45-degree semi recumbent body position.^{8,11} They should remain in the position at least one hour after feeding is completed. Iso-osmotic feeds may be preferred since high-osmolality feeds can delay gastric emptying. Intermittent feeding (200-400 mL every 4 hr) is preferred for gastric feedings due to reservoir of stomach; in contrast, continuous feeding (20-40 mL/hr) is standard for jejunal feeding. However, the effect of feeding type on risk of aspiration is inconsistent.^{8,11} Since there may be an increased risk of aspiration if gastric contents accumulate, the gastric residual volume (RV) should be checked. There is no standard definition as to what constitutes a safe RV. While the general practice is to hold feeding for RV of > 200 mL, recently experts recommend that increasing the amount of constitutes a significant RV to 400-500 mL.^{5,9} If the RV is set too low, patients often do not reach their nutritional goal because of feeds being held.^{8, 9} In spite of the acid suppression may help in case of reflux symptoms, it does not prevent aspirating pneumonia. Proton pump inhibitors may reduce the risk of aspiration in patients at this event risk. Another modifiable risk factor is periodontal care. However

one study looking for oral care in nursing interventions as demonstrated that aggressive oral care minimized the risk of pneumonia among TF subjects.¹¹

As evidence by many studies the most common reported complication of tube feeding is diarrhea, defined as stool weight > 200 mL per 24 hours.²⁻⁵ This is lined with results of this study as events of diarrhea was shown among 70% from total subject. However, while enteral feeds are often blamed for the diarrhea, it has yet to be causality linked to the development of diarrhea. When a patient develops diarrhea, the HCGs should begin by checking for changes in infusion rate or change in formula.²⁻⁵ Furthermore, there are others common causes as medications, oral cavity infections, bacterial contamination, and impaction.³⁻⁵ Otherwise it could be patients are on standing doses of laxatives, which need to be held. Many liquid medications contain sorbitol which induce diarrhea by increasing the osmotic load to the intestines. Other common offenders' factors are medications containing magnesium, non-steroidal anti-inflammatory drugs, H2 blockers, proton pump inhibitors, and antibiotics. The reduced gastric acid caused by H2 blockers and proton pump inhibitors may lead to small intestinal bacterial overgrowth. Antibiotics seem to induce diarrhea more frequently in E fed patients than normally fed ones.²⁻⁵ More over, diarrhea often coincides with the initiation of enteral feeding since many of the medications that were previously given by intravenous routes are now converted to E route at the same time of feeding initiation¹⁰

Management of diarrhea is directed at the underlying cause; however, several therapeutic strategies are available in the absence of an obvious etiology. Decreasing the feeding flow rate may alleviate diarrhea by allowing time for intestinal mucosal adaptation to occur when the gastrointestinal tract has not been used for extended periods of time. The flow rate is then increased gradually over the next several days. Supplementation of formulas with fiber or switching to a fiber-enriched feed has not resulted in consistent results but may be attempted.¹² Stool samples should be tested for *Clostridium difficile* (*C. difficile*) toxin.^{13,14} *C. difficile* is found in 20-50% of patients with antibiotic-related diarrhea. If lactose intolerance is suspected, switch to a lactose-free formula. Consider obtaining a fecal fat test for astrimal-absorption if diarrhea persists.

However, the concept that diarrhea relates to mal-absorption is not well supported due to the efficiency of the gastrointestinal tract. A change to an elemental or predigested feeding formula is rarely needed unless significant impairment in gastrointestinal function and absorption is well

documented. Moreover, isotonic formulas are well tolerated when started at full strength. However, hypertonic formulas such as calorically dense 2 calories per mL and elemental formulas are best initiated at half strength and changed to full strength 24 hours later. Importantly, patients should be also examined for fecal impaction and maintain fluid and electrolytes balance. Furthermore, the recent studies mentioned that the HCGs must be monitoring the re-feeding syndrome events for minimize or overcoming this life threatening events.¹⁵

As regards nausea, vomiting, or abdominal bloating and cramps the review of literature mentioned that these events usually noticed among EFpatients. As regard the abdominal bloating and cramps are often be due to excess feed administration rates, delayed gastric emptying, or decreased bowel motility that often present and also associated with aging process.²⁻⁵ Mobilization of the patient does not invariably improve bowel function so importantly, clinical evidence of abdominal distention is a contraindication to E feeding. It is usually associated with more reflux this approved with the events of the current study finding as well as literature review. However, it may be also resulting in re-feeding syndrome. Furthermore hyperglycemia is also very common (10-30%) in patients being fed enterally as well as the high calorie intake may unmask glucose intolerance or diabetes. On the other hands acute illness, overfeeding, in addition to inappropriately low insulin or medication supplementation can account for hyperglycemia.^{13, 14} Additionally, to stressful situations as well as sleep disturbance and peridontitis usually lead to hyperglycemia due to insulin resistance or alter the C reactive proteins as well as enhancing the inflammatory process. Other wise the electrolyte imbalances are also common events associated with T feedings.¹³ Specific imbalances are related to either high or low serum levels of sodium, potassium, phosphorus, magnesium, zinc, copper, vitamins, trace elements, and water.¹⁵

However these events were documented by the current study in form of skin events, as dryness, edema, poor skin turgor, and dry mucous membrane as well as alter of the urinary out put. Thus fluid management must be carefully monitored in patients receiving EF to avoid electrolyte imbalances and fluid balance iatrogenic events. Excess free-water leading to over hydration and hyponatremia may occur in up to 25% of EF patients.^{13,14} As evidence in the literature may results when a patient receiving IV fluids or high volumes of free-water boluses, so that slowing the infusion rate or substitution of a 1.5 to 2 kcal/mL formula may be needed. Further more hypernatremic event usually seen among at least 10% of cases secondary to iatrogenic causes as free-water restriction

for medical reasons as renal or cardiac condition, free-water loss, feeding of calorie-dense formulas and excessive use of normal saline by intravenous infusion concomitant.

By the fact the HCGs must be focused on the assessment of abdominal distention and fecal impaction. If a patient is receiving intermittent feeds, then, the feedings can be changed to a slower rate of continuous feeds. Switching to a more calorie-dense product may be helpful to decrease the total volume and rate infused. By the way those patients are at risk for inadequate protein intake,¹⁵ and ingest less than, the recommended dietary allowance for protein (0.8 g/kg per day) for healthy adults.²² whatever, the T fed patients fail to intake the highest acceptable macronutrient distribution for protein 5% of their energy intake. On average, those patient may consume fewer calories and protein than do healthy adults, and although the exact cause of the decreased intake is unclear, one hypothesis is that lower muscle mass results in lower physiological nutrient needs.²³

This is translated the nutritional events as noticed in the current study among high percentage in form of loss of body WT, presence of edema, muscle weakness, pressure sores and poor general condition. Additionally to ingestion of protein-deficient formula fails to stimulate protein synthesis because the availability of blood amino acids is not sufficient⁴⁶ this review of the related issues may be matching with the events occurrence among studied subjects. It is may result from suboptimal hormone levels (primarily estrogen and testosterone),¹⁸ protein and vitamin D deficiency, decreases in physical activity,^{19, 20} chronic inflammation,^{21, 22} and insulin resistance.²³

The decline in skeletal muscle mass is the final events among those patients. However it is greater in men than women and is attributed to hormonal factors including growth and testosterone hormone.²⁴ While, estrogen and testosterone can impede production of catabolic cytokines, interleukin 1 and interleukin 6, implying that, the loss of these hormones with age or other factors like protein malnutrition. By the fact both indirect and direct catabolic events of muscle take place.²⁵ However it can results due to inadequate total energy intake among TF subjects because of anorexia, poor appetite and hyper metabolism. Protein energy malnutrition may be indicated by muscle wasting, abdominal distention, edema, and/or weakness in the extremities, and factors such as flaky dermatitis or pigmentation changes in the skin. Further more the oral examination may reveal these issues with the presence of sore mouth, lesions, inflamed or swollen gums, or other factors. Vitamin C or riboflavin deficiency may be indicated by bleeding gums. Skin examinations help to assess for the presence of ulcers,

lesions, skin tears, rashes, bruises, turgor, dryness, or flakiness.²⁶

We can summarized that all of the last mentioned events are rationalized the results of the current study regarding the all iatrogenic events of this study regardless the setting but the time of fed via the NGT documented that by significance correlations. Other wise the sarcopenia expert panel recommended a protein intake of 1.0 to 1.5 g/kg per day with equal amounts of protein consumed at all daily meals.²¹

Sarcopenic individuals with wounds or ulcers should be consuming a balanced amount of protein at each meal. The recommended protein intake for individuals with skin ulcers of 1.25 to 1.5 g/kg per body weight meets the intervention recommendation for sarcopenia.²² Based on the estimated energy and protein needs of frail T fed adults; it may be beneficial to offer nutritional supplements between meals, especially when they are exercising. The prime responsibility of essential amino acids is the regulation of protein synthesis,²⁰ and leucine appears to be a beneficial amino acid.¹⁹ Leucine is a precursor for protein synthesis and stimulates specific intracellular pathways associated with muscle protein synthesis. β -Hydroxy- β -methylbutyrate (HMB), a metabolite of the essential amino acid leucine, is thought to increase the rate of protein synthesis and slow protein catabolism.¹⁸

Thus the health care team must be design collaborative strategy for overcoming these iatrogenic events among the T fed subjects for controlling the life threatening events.

This is can be achieved through identification of 2 or more of the following 6 characteristics is recommended for diagnosis of adult malnutrition, insufficient energy intake, weight loss, loss of muscle mass, loss of subcutaneous fat and localized or generalized fluid accumulation that may some times mask weight loss or diminished functional status as measured by hand grip strength²³

With highly recommendation members of the inter professional healthcare team are must be encouraged to develop and implementation strategy for assessing the recommended characteristics. The goal is validating and establishing those characteristics that are the most or least reliable in identifying the nutritional iatrogenic events. The recommended characteristics to diagnose iatrogenic events are an important and dynamic work in progression.

Conclusion & Recommendations.

ETF is usually a relatively straight forward method of nutritional support and should be facilitated by a multi professional team. However, the attending healthcare professionals need to be aware of the iatrogenic events serious and non serious that can arise and how they predict it as well as deal with them.

Poor outcomes are associated with iatrogenic events of NGTF as under nutrition/ malnutrition including the risk of morbidity and mortality, hence the need to quickly identify and implement nutrition treatment strategies. Treating and reversing under nutrition among the T fed are challenging because of the physical changes and conditions that occur, such as sarcopenia, diarrhea, constipation, fecal impaction and dehydration. Nutritional interventions implemented to prevent and the resultant iatrogenic events as weight loss, anorexia, and under nutrition. Screen nutritional status of individuals at risk for PrUs (pressure ulcer) PrU using a validated nutrition screening tool is urgent.

Additionally to provide adequate protein, energy and fluid following sarcopenia events as (PrU) guidelines. Distribute protein evenly at each meal to ensure adequate protein synthesis and provide enriched supplements between meals when oral intake at meals is inadequate to meet the patient's needs. Consider the risk and benefit of E nutrition when oral intake cannot achieve positive outcomes. As well as assess dining environment and implement techniques that support independent feeding. Plus evaluate current data collection forms and establish a peer review chart audit system.

Evaluation of Safety Practices

For each practice, we must instruct to review the literature for information on:

- 1-.Prevalence of the problem targeted by the practice
- 2-.Severity of the problem targeted by the practice the current utilization of the practice
- 3-.Evidence on efficacy and/or effectiveness of the practice
- 4-.The practice's potential for harm
- 5-.Data on cost if available
- 6-.Implementation issues

-These elements were incorporated into a template in an effort to create as much uniformity across issue as possible, especially given the widely disparate subject matter and quality of evidence. The protocol outlined the elements for another studies, and guidance on reporting information from each setting about EF events.

-HCGs were asked to review the guide lines to identify the safe practices, and retain those for designs plan of care for those patients.

-The HCGs were asked to use their judgment in deciding whether the evidence was sufficient at a given level of care for E fed patients or needed to be reviewed next for adequate to justify each event.

-Thus inclusion the adequate clinical trials were necessary in order to investigate the expected of events among E fed patients.

- Communication is a magic key between members of the inter professional team, to ensure that everyone understands the importance intervention in the prevention and treatment of any iatrogenic events which may be raised

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