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عمادة البحث العلمي والدراسات العليا
كليـــــــــــــة التمـــــــريض
ماجســتيـر تمريض الرعاية الحثيثة

Knowledge, attitudes and practices about Endotracheal Intubation Guidelines among nurses working in Pediatric Intensive Care Units at Governmental Hospitals in Gaza Strip.

المعرفة، التوجهات والممارسات حول إرشادات التنبيب الرغامي لدى الممرضين العاملين في وحدات العناية المركزة للأطفال في المستشفيات الحكومية في قطاع غزة.

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فَتَبَسَّمَ ضَاحِكًا مِنْ قَوْلِهَا وَقَالَ رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَىٰ وَالِدَيَّ وَأَنْ أَعْمَلَ صَالِحًا تَرْضَاهُ وَأَدْخِلْنِي بِرَحْمَتِكَ فِي عِبَادِكَ الصَّالِحِينَ

[النمل: 19]

إقـــــرار

أنا الموقع أدناه مقدم الرسالة التي تحمل العنوان:

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Dedication

I dedicate my dissertation work to my dear parents, my dear wife and my dear children, who have stood by me throughout the past period and supported me through this study with love.

I also extend my thanks to my beloved brothers and sisters who have always lifted my spirits.

I also dedicate this work to my friends who have supported me throughout the process.

I also extend my thanks and gratitude to all the nurses who cooperated with me in making this letter a success.

With respect and love

بسم الله الرحمن الرحيم

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The Islamic University of Gaza
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نتيجة الحكم على أطروحة ماجستير

بناء على موافقة عمادة البحث العلمي والدراسات العليا بالجامعة الإسلامية بغزة على تشكيل لجنة الحكم على أطروحة الباحث/ **فادي محمد شحدة الحو** لنيل درجة الماجستير في كلية **التمريض**/ قسم **تمريض العناية الحثيثة** وموضوعها:

المعرفة ،التوجهات، والممارسات حول إرشادات التنبيب الرغامي لدى الممرضين العاملين في وحدات العناية المركزة للأطفال في المستشفيات الحكومية في قطاع غزة.

Knowledge, attitudes and practices about Endotracheal Intubation Guidelines among nurses working in Pediatric Intensive Care Units at Governmental Hospitals in Gaza Strip

وبعد المناقشة العلنية التي تمت اليوم **الثلاثاء 6 صفر 1443هـ** الموافق **2021/09/14م** الساعة **الواحدة مساء**، في **قاعة مؤتمرات مبنى طيبة** اجتمعت لجنة الحكم على الأطروحة والمكونة من:

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وبعد المداولة أوصت اللجنة بمنح الباحث درجة الماجستير في **كلية التمريض/قسم تمريض العناية الحثيثة**.

واللجنة إذ تمنحه هذه الدرجة فإنها توصيه بتقوى الله تعالى ولزوم طاعته وأن يسخر علمه في خدمة دينه ووطنه.

والله ولي التوفيق،،،

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Abstract

Introduction: Endotracheal Intubation (ETI) in Intensive Care Unit (ICU) is a high-risk procedure, resulting in significant morbidity and mortality.

Aim: The main aim of this study is to determine the knowledge, attitudes and practice of the pediatric intensive care unit nurses regarding Endotracheal Intubation Guidelines at Pediatric Governmental Hospitals in Gaza Strip.

Methodology: A quantitative descriptive, analytical cross-sectional design was used. The researcher used a self-constructed, self-administered questionnaire and observational checklist. The study sample included all nurses (census sample) who are working in pediatric intensive care units at governmental hospitals in Gaza Strip, in total: 72 nurses have completed the questionnaire with a response rate of 100%. Content and criterion related validity was done. Reliability testing was done by using Cronbach's Alpha coefficient which was very good (0.884).

Results: the results showed that the percentage mean scores for the participants' knowledge, attitude, and practice about ETI procedure. The overall percentage mean score are 72.3%, 65.7%, and 79.9% for knowledge, attitude, and practice respectively, and the overall percentage mean scores for the practice pre procedure 73%, during the procedure 86%, and post procedure 80.8%.

Conclusion: the study concluded that nurses who are working in PICU should be selected carefully, should receive adequate training, and should be monitored and evaluated periodically to maintain high quality of care and good knowledge about endotracheal intubation.

Abstract in Arabic

ملخص الدراسة باللغة العربية

مقدمة: إن التنبيب الرغامي في وحدة العناية المركزة هو إجراء عالي الخطورة ، مما يؤدي إلى حدوث نسبة مراضة ووفيات كبيرة .

الهدف: الهدف الرئيسي من هذه الدراسة هو تحديد معرفة واتجاهات وممارسات ممرضي وحدة العناية المركزة للأطفال فيما يتعلق بإرشادات التنبيب الرغامي في مستشفيات الأطفال الحكومية في قطاع غزة.

المنهجية: تم استخدام المنهج الوصفي التحليلي. استخدم الباحث استبانة ذاتية الإنشاء وقائمة مراجعة قائمة على الملاحظة. وقد اشتملت عينة الدراسة على جميع الممرضين العاملين في وحدات العناية المركزة للأطفال في المستشفيات الحكومية في قطاع غزة ، وقد أكمل الاستبيان 72 ممرضًا بنسبة استجابة 100٪. تم إجراء الصلاحية المتعلقة بالمحتوى والمعيار. تم إجراء اختبار الموثوقية باستخدام معامل ألفا كرونباخ والذي كان جيدًا جدًا 0.884

النتائج: أظهرت النتائج أن النسبة المئوية لمتوسط الدرجات لمعرفة المشاركين واتجاهاتهم وممارستهم حول إجراءالتنبيب الرغامي بلغ متوسط النسبة المئوية الإجمالية 72.3٪ و 65.7٪ و 79.9٪ للمعرفة والمواقف والممارسة على التوالي، والنسبة المئوية الإجمالية للدرجات العملية قبل العملي 73٪ ، أثناء الإجراء 86٪ ، وبعد الإجراء 80.8٪.

الخلاصة: خلصت الدراسة إلى أنه يجب اختيار الممرضين الذين يعملون في وحدة العناية المركزة للأطفال بعناية ، ويجب أن يتلقوا تدريبًا مناسبًا ، ويجب مراقبتهم وتقييمهم بشكل دوري للحفاظ على جودة الرعاية العالية ومعرفة جيدة حول التنبيب الرغامي.

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List of Abbreviations

AHA	American Heart Association
BIPAP	Biphasic Positive Airway Pressure
BVM	A bag-Valve Mask
CO2	Carbon Dioxide
CPAP	Continuous Positive Airway Pressure
CPR	Cardiopulmonary Resuscitation
DL	Direct Laryngoscopy
ECG	Electrocardiogram
EGH	European Gaza Hospital
ENT	Ear-Nose-Throat
ETI	Endotracheal Intubation
ETS	Endotracheal Suctioning
ETT	Endotracheal Tube
FiO2	High fraction of inspired oxygen
GDP	Gross Domestic Product
GS	Gaza Strip
ICU	Intensive Care Unit
IV	Intravenous
LMA	Laryngeal Mask Airway
MOH	Ministry of Health
MV	Mechanical Ventilation
NAP	National Audit Projects
NGOs	None Governmental Organizations
NIV	Non-Invasive Ventilation
OT	Operation Theater
PCBS	Palestinian Central Bureau of Statistics
PICUs	Pediatric Intensive Care Units
PMOH	Palestinian Ministry of Health
PPE	Personal Protective Equipment
RCT	Randomized Control Trial

RSI	Rapid Sequence Intubation
RTI	Respiratory Tract Infection
SpO2	Saturation of Peripheral Oxygen
SPSS	Statistical Package for Social Sciences
sq.km	Square kilometers
TI	Tracheal Intubation
TT	Tracheal Tubes
UNRWA	United Nation Relief and Work agency
VL	Videolaryngoscopes
VST	Viva Sight Tube (camera at its tip)
VAP	Ventilator Associated Pneumonia
WB	West Bank

Chapter 1

Introduction

Chapter 1: Introduction

1.1 Background

Every child who enters the pediatric intensive care units (PICUs) is exposed to endotracheal intubation(ETI), so in order to prevent complications from this procedure, it is necessary to improve keeping the airway open, so ETI is a very important criterion for securing the airway in cases where the health service provider is unable to ventilate the patient Appropriately in other ways, especially since the anatomy of the airway in children is different from that of adults, it is possible that the experience of medical staff in direct stimulation of children is limited. **(Smereka, 2019).** ETI is a procedure in which a tube is inserted through the mouth or nose into the trachea, and through the mouth is more common and used **(Broken, 2018).** The endotracheal tube (ETT) is made of plastic and is placed from inside the mouth into the trachea to help patients breathe, and then put them on a ventilator, which supplies the lungs with oxygen. **(Eldridge, 2020).** Doctors perform intubation in emergency situations to give medicine or help the patient breathe, by inserting this tube into the airway **(Fletcher, 2018).** The tube may be inserted either nasally or orally and may be un-cuffed or cuffed **(Katrina, 2019).**

One of the most high risk medical procedures in the intensive care unit (ICU) is ETI, which results in many complications and high rates of morbidity and mortality. These complications may occur in up to 40%, the most important of which are severe hypotension occurring in 10-25%, severe hypoxemia in 25%, and cardiac arrest in 2%. **(Lapinsky, 2015).** Non-invasive ventilation (NIV) its use has increased in PICUs in order to limit the complications resulting from endotracheal intubation, however failure NIV is likely, and the delay in initiating invasive ventilation may be associated with adverse outcomes **(Crulli, 2016).** It is important and necessary for clinicians dealing with critically ill patients to be familiar with airway management know the rapid sequence intubation (RSI) procedure which is mandatory in in a critically ill child with severe trauma or any other situation that threatens his or her life, so they must also be familiar with and practice the equipment and techniques for difficult airway management, and look for receiving a formal training in ETI **(Sarlat, et al., 2018)**.

The study aimed to assess of knowledge, attitudes and practice about ETI guidelines among nurses working in PICUs at governmental hospitals in Gaza strip (GS).

1.2 Significance of the study

I am talking about a new study for the assist process of ETI in pediatric intensive care units (PICU), to the best of my knowledge there is no previous studies about this subject in pediatric intensive care units before my current study in the Gaza Strip, this study can contribute to increasing learning and training to improve the skills of nurses team in intensive care for children, it is certain that our current study will help decision makers in contributing to the development of the guidelines for this.

1.3 General objective of the study

To assess Knowledge, Attitudes and Practices about Endotracheal Intubation Guidelines among Nurses Working in Pediatric Intensive Care Units at Governmental Hospitals in Gaza Strip.

Specific Objectives

- To determine the knowledge, attitudes and practice of the pediatric intensive care unit nurses regarding Endotracheal Intubation Guidelines at Pediatric Governmental Hospitals in Gaza Strip.
- To assess the level of knowledge and attitudes among nurses working in pediatric intensive care units
- To explore the association between the knowledge, attitudes, practice and sociodemographic characteristics.
- To develop recommendation about Endotracheal Intubation Guidelines.

1.4 Research questions

Q1. Is there a relationship between adherence to ETI guidelines and knowledge, attitudes and practice among nurses working in PICUs?

Q2. Is there a relationship between knowledge, attitudes and practice of the PICU nurses regarding ETI Guidelines and socio demographic variables?

Q3. Do PICU nurses follows ETI guidelines?

Q4. Is there a relationship between knowledge, attitudes and practice of the PICU nurses regarding ETI Guidelines according to hospital?

1.5 Geographical and demographical context

The area of historical Palestine is 27,000 km2, expanding from Ras al-Nakoura in the north to Rafah in the south. The Israeli occupation divided Palestine in to three areas separated geographically, the West Bank (WB) 5,655 km2, Gaza Strip (GS) 365 km2 and East Jerusalem. The total population of Palestinians in the GS and the WB is 5,227,193 million (3,120,448 in WB and 2,106,745 in GS) **(Palestinian Central Bureau of Statistics - PCBS, 2021).**

The GS is bounded of the south by Egypt, GS is bordered on the west by the Mediterranean Sea, and on the east and north by the occupied territories in 1948. The length of the Gaza Strip is 46 kilometers and its width is 12.5 kilometers, with a total area of 365 km2. It is divided into five governorates: North, Gaza, Mid-zone, Khan Yunis and Rafah. It consists fourteen villages and eight refugees' camps. GS has a population of 2,106,745 people. Population density is 5.771 inhabitants per sq. km2. Gaza Strip has an extremely high population growth rate of over 2.8 %, and as a result some 41% of the population is under the age of 15 (Palestinian central bureau of statistics **(PCBS), 2021).**

1.5.1 Health care system

The Palestinian health system compose of different sectors. The major groups of health providers are the MOH, Non-governmental organizations (NGOs), United Nations Relief and Works Agency for Palestinian Refugees in the Near East (UNRWA), Military Health Services, and the private sector. The total number of hospitals in Palestine is 81 hospitals, 51 of them in WB including east Jerusalem. The number of hospitals in MOH is 27 hospitals, of these hospital, there are 14 hospitals in WB and 13 hospitals in GS. The number of beds allocated to admit children is 19.3% of the total number of beds in MOH hospitals (260 beds in WB and 381 beds in GS) **(MOH, 2017).**

1.5.2 The status of children in Palestine

The Palestinian community is considered a young community, where the percentage of the population aged between 15-29 years accounted for 29.7 %**(PCBS, 2017).** And the percentage of children under the age of fourteen is also 38.9%, where the number of children under the age of eighteen 18 is 2,115,370 children in Palestine, which represents is 45.3% of the population **(PCBS, 2018).**

1.6 Area of the study

The study will be conducting at five pediatric intensive care units at governmental hospitals in Gaza Strip, as follows:

El Dora pediatric hospital

According to Palestine MOH**,** Eldora pediatric hospital is relatively a newly established pediatric hospital by the year 2000, located at the north-eastern of Gaza city in Al-Toffah district and it contains 110 beds in four internal departments (two medical pediatric departments, intensive care unit, emergency department, pharmacy, laboratory, outpatient clinics, X-ray and ultrasonic department, and others of logistic departments), it serves about 500,000 peoples, serve as internal medicine for children aged from one month until twelve years old, there are 64 nurses and 40 doctors, and 5 physiotherapists **(PMOH, 2019).**

Dr. Abdel Aziz Al-Rantisi pediatric specialist hospital

Dr. Hospital Abdel Aziz Al-Rantisi Children's Specialist Hospital is a children's hospital in Gaza City. The hospital was established in 2003, and it became ready as a building in 2006. On 04/23/2008, with a capacity of 45 beds and full capacity 100 beds when fully operational, the hospital provides medical services as a transformative hospital from all areas of the GS so that it covers the segment of children with a number of 600 thousand **(PMOH, 2019).**

The martyr Kamal Edwan Hospital

The martyr Kamal Edwan Hospital is a public government hospital located in the Beit Lahiya project within the borders of the Northern Gaza Governorate, and it was opened in 2002 to serve 350 thousand people. The space is narrow **(PMOH, 2019).**

European Hospital Gaza (EGH)

Is located in a governorate Khan Yunis on a 65-donum area, the total area of the hospital buildings is 20 thousand square meters. Where the EGH is a distinguished center provides Medical services at the second and third level for the region. The hospital serves a segment of the population of 500,000 people, following international standards for medical care. The EGH is a model for administrative operations, especially in the established use. From the family who was serving 350 thousand citizens in 1967. The uprising erupted in the late 1980s required that critical states be converted into or into the Green Line **(PMOH, 2019).**

Al Nassr pediatric hospital

Is the oldest and largest children's hospital in the Gaza Strip, with a capacity of (132) beds. It is located in Al-Nasr neighborhood and serves a large area of Gaza City and some of its services extend to the central and northern region, so the improvement of its service is reflected in the level of pediatric services in the GS. Note that Al-Nasr Hospital for Children was established in 1962 with an area of 4400 m. **(PMOH, 2019).**

1.7 Operational definitions:

Knowledge: A state of awareness or understanding with conscious mind. In this study "knowledge" refers to awareness about endotracheal intubation and its complication measured as the score obtained in the validated knowledge test**.**

Attitudes: It is about the feeling and opinions of the nurses working in the PICUs in the Gaza Strip regarding the ETI.

Practice: practice referred to the psychomotor abilities necessary for a nurse to work efficiently and provide high-quality care to the patients, practical, applied and professional way with regard to nurses during the process of ETI in the PICUs.

Nurses: all nurses working in the PICUs in governmental hospitals in the Gaza Strip, and they have been working PICU a minimum of six months.

Endotracheal intubation: It is a medical procedure where a tube is inserted from the nose until the lungs reach, in very urgent cases, in order to help the sick child breathe, and the patient is then insert on a mechanical ventilator and follow-up after the case through health care provider working in intensive care.

Pediatric intensive care units: It is an important department in children's hospitals, because it contains advanced equipment, especially mechanical ventilators, where very critical cases from one month to twelve years old are treated and dealt.

Intensive care nurse: registered nurse who working at PICU.

Chapter 2:
Conceptual Framework and Literature Review

2.1 Conceptual framework

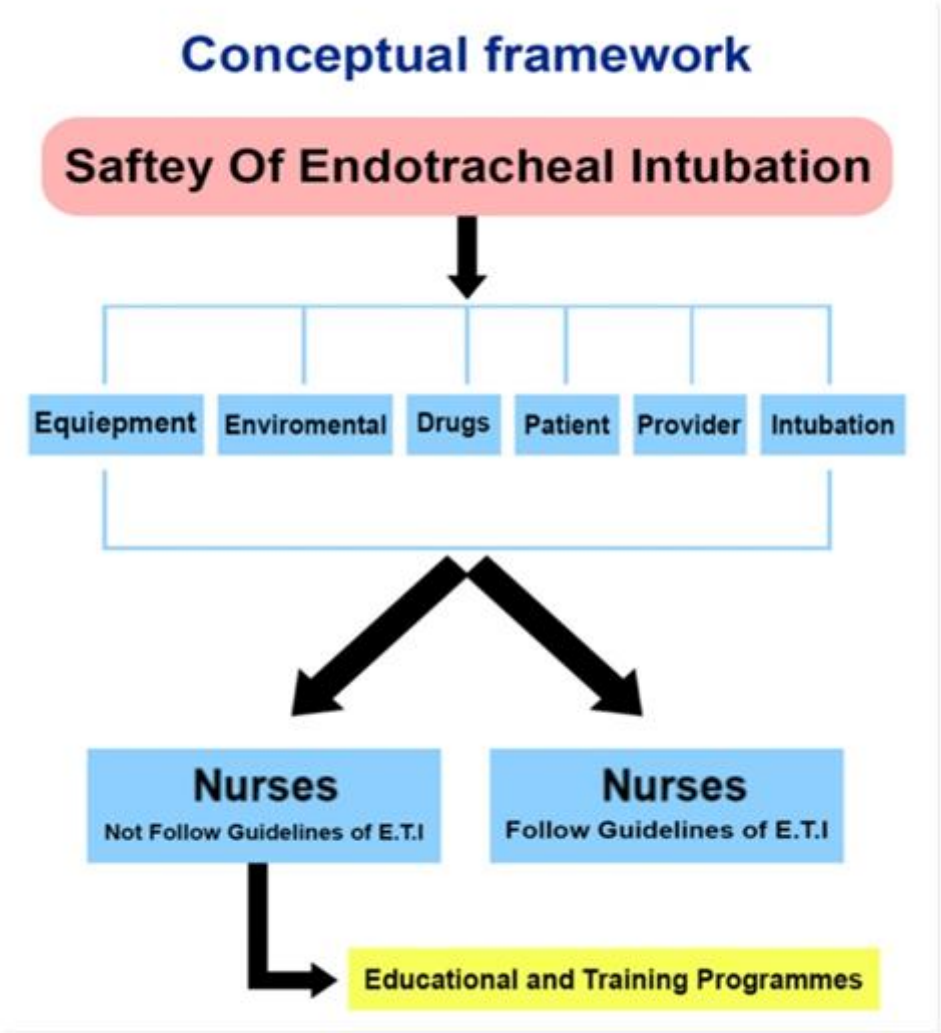

Figure (2.1): Conceptual framework

The conceptual framework explain the relationship between the nurses adherence to ETI guidelines and the knowledge, attitudes and practices among nurses working in PICUs in government hospitals in the GS, which appear from the framework that nurses adherence with ETI guidelines lead to safety practice of ETI, while those who are not adherence with ETI guidelines may be lead to high risk to patient.

2.2 Literature review

2.2.1 Introduction

The literature review is an important and major aspect of the research process, as it helps in laying sound foundations for the study, in addition to helping to choose the methodology, improve the tool, and analyze the data.

Abuadwan (2018): conducted a study aimed to determine the nursing knowledge and practices for prevention of ventilator associated pneumonia in PICUs in governmental hospitals in Gaza Strip. The sample of this study consisted of 55 nurses who are working in PICUs in four governmental hospitals (European Gaza hospital, Al Rantesy hospital, Al Dora hospital, and Al Nasser hospital).The results of this study showed that 81.8% were male nurses, 60% live in a city, 89.1% have bachelor degree, 40% have 6 – 10 years of experience and 21.8% have 11 years and more experience in PICU, 27.3% were from EGH, 25.5% from Al Rantesy hospital, 20% from Al Dora hospital, and 27.3% from Al Nasser hospital, and 25.5% received training or education about PICU. The results also indicated that the overall average knowledge about measures to prevent VAP in PICU was above moderate (75.17%), and 63.6% of nurses have moderate level of knowledge, 30.9% have high knowledge, and 5.5% had low knowledge. Observation of practice reflected that 50.9% of nurses showed high level of practice, 43.6% showed moderate level of practice, and 5.5% showed low level of practice, and the overall average of practices was 77.11%, which revealed above moderate level of practices to prevent VAP. The results also showed that there were statistically no significant differences in levels of knowledge related to age, qualification, years of experience, hospital, while significant differences existed in relation to gender, place of residency, and training. Furthermore, there were statistically no significant differences in levels of practice related to age, gender, place of residency, years of experience, while significant differences existed in relation to qualification, and hospital. The study concluded that nurses who are working in PICU should be selected carefully.

Bahar, et al., (2015): conducted a study aimed to determine the complications caused by ETI in ICU, because the maintenance of the airway is limited and unstable, and the time for endotracheal intubation is also limited. Generally, the rate of these complications is approximately 39%-41% .the complication rate is about 39-41% in this study. ETI is a frequent procedure in the ICU and has extremely serious complications, this study was conducted on 36 patients and the complications were as follows. Shock is the most common reason for admission to ICU with 50%, followed by respiratory failure by 36%, 27% of these patients were intubated an emergency, 8% almost semi-urgently, and electively 65%. Where at least one complication appeared in 13 cases, according to the study, midazolam is considered one of the most widely used drugs for anesthesia, with 76%, followed by propofol with 16.7%. This study concluded that ETI in ICU causes major complications, and training on the success of ETI reduces and limits these serious complications.

Sobeih, et al, (2018): conducted study aimed to assess nurses' perception regarding ventilator associated pneumonia (VAP) bundle. Design: A descriptive exploratory design was utilized. Setting: The study was carried out in critical care units at El Fayoum Universities Hospitals. Study subjects: convenience sample of 40 nurses were included in the study. Data collection tools: Data were obtained through five main tools; demographic data tool, nurses' knowledge questionnaire, nurses' observational checklist, nurses' perception questionnaire and factors affecting nurses' perception questionnaire. Results: Three quarter of the study nurses had unsatisfactory knowledge and more than three quarters of them had incompetent level of practice regarding VAP bundle. About two thirds of the studied nurses had negative perception regarding VAP bundle. There were many factors affecting nurses' perception regarding VAP bundle as; nurses' related factors, health setting related factors and patients' related factors. There was statistically significant difference between the nurses' perception, level of knowledge and practice regarding VAP bundle. As well there was statistically significant difference between the nurses' perception regarding VAP bundle and their level of knowledge and practice. Recommendations: Designing in-service training and educational program to improve nurses' knowledge and practice regarding VAP bundle.

Shiima, et al., (2016): conducted study aimed to determine the incidence and epidemiological characteristics of cardiac arrest at ETI in PICUs. A group study was used for data collected from Twenty-five PICUs are diverse by collecting endotracheal quality improvement data for all primary ETI in 25 PICUs from July 2010 to March 2014 The cardiac arrest associated with ETI was defined as chest pressures more than 1 minute occurs during endotracheal intubation or within 20 minutes after endotracheal intubation. After evaluating a total of 5232 ETI. The results yielded that cardiac arrest associated with tracheal intubation was reported in 87 (1.7%). Cardiac arrests associated with ETI occurred within 1.7% of PICU endotracheal intubation.

Lee, et al., (2016): conducted study aimed to know the relationship between the number of tracheal intubation (TI) attempts and clinical outcomes in critically ill children in the PICU. The majority of children with acute respiratory failure require TI and mechanical ventilation (MV), few studies indicate a correlation between the risks of intubation resulting from the number of attempts, so this study came to assess the number of intubation attempts and their risks to patients, 19 intensive care units were selected around the worldwide, The database includes information related to satisfaction, such as age, gender, and intubation indications, was collected and medical records were verified. This study also included ETI methods and the drugs used, and the results showed that ETI succeeded from the first attempts by 60%, from the second attempt by 24%, and through three or more intubation attempts 15%, in addition to these results it became clear that 18% of patients They had indications for endotracheal intubation, and it was also found that a part of the patients had a history of difficult airway.

Yaseen, et al., (2015): conducted study aimed to estimate Saudi critical care nurses' knowledge regarding VAP prevention guidelines and to explore the barriers that may restrict adherence to these guidelines. Design: Descriptive, cross sectional survey. Method: A survey to evaluate nurses' knowledge of VAP prevention using a multiple choice questionnaire was distributed to intensive care nurses (n=93) in two large hospitals in Makkah, Saudi Arabia. Results: The mean of the total knowledge score was 7.13 (±1.36). More experienced nurses performed significantly better than their less experienced colleagues ($p<0.05$), and mean of total knowledge score for diploma nurses was significantly lower than for Bachelor and Graduate degree nurses. The main

barriers to adherence to VAP guidelines were lack of VAP courses and nursing shortages. Conclusion: There is a need for ongoing improvements in the Nursing schools' curriculum and hospital education. Although knowledge is an important component of behavior changes, strict protocols must be considered to increase nurses' compliance toward VAP guidelines.

Liyew, et al., (2020): conducted study aimed to assess knowledge, attitude, and associated factors towards physical assessment on critically ill patients among nurses working in the ICU at Amhara regional state referral hospitals. Methods. Institution-based cross-sectional study was conducted among 299 nurses from March to September 2019. A convenience sampling method was used. Result and conclusion: the knowledge 55.9% .Attitude 52.8%. Conclusion. Based on the result of this study, the knowledge and attitude towards physical assessment regarding critically ill patients among nurses working in intensive care units were good.

Mwakanyanga, et al., (2018): conducted study aimed to assess the knowledge and practice of ICU nurses about endotracheal suction for intubated patients. Due to their small population, all were targeted to respond to the questionnaire and be assessed for endotracheal tube suctioning practices. The remaining 103 (84.4%) signed the informed consent. Self-administered questionnaire and observational checklist were used to collect data. One hundred three (103) ICU nurses participated in the study, response rate 96% of potential study participants. In addition, it became clear from the results that 60.2% have a diploma in nursing, more than half of them, 57.3%, have received training in ICU. It was found from the study that those who worked in intensive care between 1-5 years averaged 43.7%, and the majority of those working in intensive care were females, with a rate of 72.7%, and the results showed a good percentage of nurses' knowledge regarding tracheal suctioning, with an average of 69.9%. In addition, it is worth mentioning that 7.77% of nurses know the signs and sudden changes in which the patient needs tracheal suction, and the paradox in these results is that 86.4% of nurses working in intensive care did not know how to choose the appropriate catheter size for the patient and 88.3% of them do not know the appropriate method for the process of tracheal suction, and this study concluded that the ICU nurses do not have desirable knowledge and skills of tracheal suction.

2.2.2 History of ETI

The year 1879 saw the first elective oral ETI, performed by William Macewen, and with the increasing number of patients requiring ETI, A couple of years later American physician Joseph O'Dwyer developed metal tubes that could be blindly passed in order to relieve airway obstruction in children suffocating from the pseudomembrane formed in diphtheria infections. ETI became a routine medical practice in the second half of the 20th century. Thereafter, progress was made in modern anesthesia and thoracic surgery. As the number of intubated patients increased, the need for a more effective placement of the tube also increased. An important issue with the O'Dwyer intubation system and its variants was the necessity to perform a blind placement. Another significant advancement in airway management was the development of direct laryngoscopy, which allowed for the visualization of glottic structures **(Goksu, et al., 2015).**

In 1913, Chevalier Jackson designed a laryngoscope and was the first to perform intubation with it. Laryngoscope was later modified by Magill, Miller and Macintosh. The traditional and most commonly used method of intubation is oral intubation using direct laryngoscopy. Nasal intubation in ICU is better tolerated than oral tube, requires less sedation and leaves the oral cavity clear to maintain oral hygiene. The disadvantages of nasal intubation are it is more difficult than oral intubation and may result in bleeding due to the rich blood supply to the nasal mucosa. If kept for a long time, nasal tube may be associated with infection of the paranasal air sinuses. Other methods of intubation include blind nasal intubation, intubation using video laryngoscope, intubating LMA and fiberoptic techniques **(Gurjar, 2016).**

Caution should be used when tracheal intubation with positive pressure ventilation is used to bypass an airway obstruction because of the risk of intrathoracic airway collapse. Therefore, TI is contraindicated for patients with airway collapse from a mediastinal mass. The timing of intubation is also important. As TI is most commonly performed for respiratory failure or general anesthesia, failure to intubate in a timely manner may rapidly lead to patient injury or death. Backup systems should always be in place to care for patients with unanticipated difficult intubation **(Volsko, et al., 2020)**.

2.2.3 Anatomy and Function of the Respiratory System

A person can live several weeks without food because the body can use nutrients it has stored. Although the body does not store as much water, it is possible to live several days without fluid intake. However, Death or serious irreversible damage may be caused by lack of oxygen for a few minutes. The most sensitive cells in the human body are located in the brain. Brain cells begin to die if the lack of necessary oxygen and nutrients continues for 4-6 minutes, and if the brain dies, the death of the entire body follows completely. Since brain cells in the event of their death and destruction, they cannot be replaced, so it is important and necessary to understand the anatomy and function of the respiratory system, as they have an important role in saving and supporting life by providing it to the cells of the body with sufficient oxygen in addition to removing carbon dioxide from red blood cells by Through gas exchange in the lungs, and through the anatomy of the respiratory system, it becomes clear to us that the parts of the body used in the breathing process are: the mouth (oropharynx),), the nose (nasopharynx), the throat (pharynx), the trachea (windpipe), the lungs, the diaphragm (the muscle between the chest and the abdomen), and numerous chest muscles (including the intercostal muscles) **(Pollak, 2018)**.

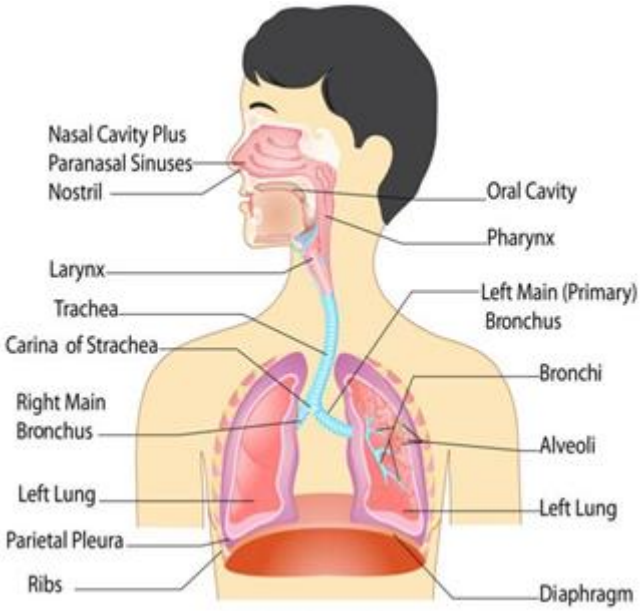

Figure (2.2): Anatomy of the Respiratory System

Pediatric airway can be divided into supraglottic, glottic, and subglottic structures. Dividing the airway in this way allows us to consider the impact of pediatric airway development in a way that aligns with interventions and management. The supraglottic structures include the elements of the upper airway: the tongue, palate, posterior pharyngeal space, and epiglottis. Supraglottic sensation is mediated by the superior laryngeal nerve. The glottis is made up of the cartilages and muscular structures of the larynx. The larynx consists of nine cartilages, including the thyroid, cricoid, and epiglottis, and the corniculate, cuneiform, and arytenoid cartilages. These cartilages are covered by folds of mucosa, connective tissue, and muscle; laryngeal tissue folds define the glottis. The superior, inferior, and recurrent laryngeal nerves innervate the larynx. The recurrent laryngeal nerve provides most laryngeal motor innervation. Only the cricothyroid muscle is innervated by the superior laryngeal nerve (**David, et.al 2015)**.

Because of the desaturation, the ETI procedure is a very emergency procedure, so the nurses may be required to assist with intubation, so the health staff must follow a safety checklist, because forgetting anything that puts patients' lives at serious risk and lack of hypoxia **(Woodrow, 2019)**.

2.2.4 Indications and uses of ETI

The main purpose of intubation is to secure the airway and ensure adequate ventilation and oxygenation. Intubation is considered an advanced technique for life support, especially in children, due to the small size of the patient and the differences in anatomy, and relatively high oxygen demand in pediatric patients **(Choudhury, et al., 2015).**

Tracheal intubation is most commonly indicated to provide positive pressure ventilation to treat respiratory failure. An ETT is sometimes placed to bypass an obstruction between the mouth or nose and the mid-trachea. Other indications include facilitating airway suctioning when a cough and less invasive suctioning are ineffective or for airway protection. A child who does not have protective airway reflexes, most commonly from anesthetics or poisoning, and who is also at risk for emesis is at increased risk of aspiration pneumonitis. Rarely, TI is used to isolate one lung—for example, during thoracic surgery. Specialized ETTs and bronchial blockers

are used in these situations. Many times, TI is indicated for surgery under general anesthesia. General anesthesia can be administered without an ETT, but intubation is most commonly used for major surgical procedures and for laparoscopic and thoracoscopic procedures where spontaneous ventilation is compromised. Endotracheal intubation is frequently indicated for airway surgery, and in children the most common airway procedures are adenoidectomy and tonsillectomy **(Volsko, et al., 2020)**.

Although ETI has serious complications and is associated with undesirable consequences for both adult and pediatric patients, nevertheless, ETI is very important in saving the lives of many patients suffering from acute respiratory failure and insufficiency, and it is necessary to know that the clinical condition of children in the ICU is very complex and very difficult due to the difference in the anatomy of the respiratory system in children (**Nishisaki, et al., 2012)**.

Eldridge L. (2020).conducted study shows that there is a need for ETI in many health interventions and pathological conditions, for example:

- When we need general anesthesia for the body in general surgeries where the entire muscles of the body, including the diaphragm, are completely paralyzed.
- When any foreign body obstructs the airway, we need to put a tube to help in the process of suctioning this foreign body.
- Stroke and acute gastrointestinal bleeding require ETI.
- Any defect in the trachea or a health problem in the larynx or bronchi, and intervention is required to treat it, so we need an ETT.
- In case of pneumothorax, respiratory failure, heart failure, or loss of consciousness due to drug overdose, it is important to keep the airway open through endotracheal intubation.
- Major surgeries, such as the need for surgery to remove lung cancer, we may need to put the patient on MV, which necessarily needs an ETT to connect to it.
- When used strong sedatives in a patient very ill, ETT may be needed to assist breathing.

- In respiratory distress in premature babies often requires placement of an ETT and MV.
- The need for a high concentration of oxygen to reach the patient is higher than the oxygen in the room air. He needs MV, which in turn needs an ETI **(Eldridge, 2020).**

Since the time in the intensive care unit is very limited, it is necessary to keep the airway open, because the pathology of intensive care patients is unstable. **(Bahar, et al., 2015).**

2.2.5 Types of Intubation

ETI is a short-term measure that may be needed in an emergency, used to stabilize the airway if a child is losing the ability to keep the airway open due to swelling or exhaustion that leads to a deteriorating level of consciousness. The ETT can be inserted orally or nasally. The ETT prevents vocal cord vibration, when the child is intubated, he's unable to cry or talk. If long-term intubation is required, a tracheostomy may be necessary (**Meadows, 2015)**.

Monique, D., (2018), conducted study shows that orotracheal intubation and nasotracheal intubation are both safe if performed correctly, but the preferred method to keep the airway open and the most common and widely used is oral intubation, as it has a low incidence of complications in the ICU **(Monique, 2018)**.

Traditionally intubation could be:

1- Oral
2- Nasal
3- Tracheostomy

1-**Orotracheal Intubation**

The most important procedure for the doctor is to secure the airway, all support methods can be applied once the endotracheal intubation is applied, without a safe airway nothing helps the patient survive. There is no doubt that the most used method for intubation is orotracheal intubation, and this is controlled by physician preference ,skills

and experience, according to his preference, in addition to the patient's condition and the available equipment procedure and make it not difficult **(Reichman, 2019).**

2-**Nasotracheal intubation**.

Nasotracheal intubation is rarely performed as a primary intubation technique in the emergently ill or injured child. It is more commonly performed electively after primary oral.

As an intensivist, orotracheal intubation is mostly commonly performed for critically ill patients. Occasionally when difficult airway is encountered in an awake patient, nasal intubation can be performed by an experienced Intensivist. Use a small size ETT, lubricate well and insert the tube through the nose and listen for air flow at the end of the tube. If oral airway is obstructed nasal intubation can be successful for an emergent airway.

3-Tracheostomy.

A tracheostomy is an opening in the front wall of the trachea so that air can enter, allowing the patient to breathe. This procedure is considered one of the ancient surgical procedures, as it is used in cases of acute airway obstruction, such as foreign body aspiration, inflammatory conditions and trauma **(Pires, 2018)**.

Fiberoptic intubation

Recent years have seen a rapid expansion in optical devices used to aid in ETI. The devices that use fiberoptics begin near the distal end and transmit an image to be viewed at the proximal end. Some of these devices are variations on the "optical stylet" concept. They consist of an eyepiece or other viewing mechanism attached to stylet of varying degrees of flexibility. A standard ET tube can be jacketed onto each device. The stylet can then be used as an adjunct to standard ETI or as a stand-alone device. Most fiberoptic stylets and their variations are falling out of favor and are less often used today **(Reichman, 2019)**.

Difficult intubation might be encountered in ICU patients due to various reasons. Most importantly ICU patients are never optimized compared to operation theater (OT) patients and reversing patient and postponing intubation is not an option. So anticipation is the key. Every intensivist should be aware of indication/contraindications and comfortable with procedure of fiberoptic bronchoscopic (FOB) intubation. FOB gives easy access to upper and lower airway without need of general anesthesia. Hence, use of FOB has been extended to confirm ETT as well as double lumen tube placement, visualization of trachea in preoperative or post extubation stridor, and to diagnose ET blockage by secretions, kinking of tube or cuff herniation. It is a combination of art and science with approach tailored to particular patient and situation **(Gurjar, 2016)**.

Figure (2.3): Fiberoptic intubation

2.2.6 Equipment of ETI

Video laryngoscopy has been a way to improve the safety of the ETI procedure due to the high rate of complications of intubation and airway related complications, as some data indicated that the success rate of ETI using a tube equipped with a video camera is higher than the tube used in a direct laryngoscope (DL). The two groups did not differ in terms of intubation conditions. The first-attempt success rate was Virtual Studio Technology (VST) 96% vs. DL 93%. The performance of the VST in patients with an expected difficult airway should be evaluated separately. Airways soiled with secretions may reduce the usability of the VST due to lens contamination. **(Grensemann, et al., 2018).**

One of the studies indicated that the rate of leakage using cuffed endotracheal tubes is lower than uncuffed tubes in a comparison targeting children from (0-16) years, and no major complications resulting from the two types of endotracheal tubes were recorded, although uncuffed tubes were its complications. Relatively less than cuffed tubes. Tidal volumes were higher in the cuffed group and increased over time, but in the uncuffed group were lower and decreased over time **(Chambers, et al., 2018).**

Figure (2.4): Intubation equipment

Laryngoscopes

The purpose of the laryngoscope is to retract the mandible and soft tissues of the anterior oropharynx upward, allowing visualization of the glottis. In cross section, the blade of the laryngoscope typically consists of a flat portion (spatula) and a vertical portion (flange), along with a light source. These components are arrayed in a large variety of shapes and configurations to meet the challenge of elevating soft tissues during retraction and keeping them out of the line of sight of the laryngoscopist, while at the same time permitting the necessary manipulations to insert an ETT. By the middle of the 20th century, laryngoscopes incorporated with these innovations had been developed. More modern laryngoscopes contain a light source in the handle with fiberoptic bundles in the blades. The older-style laryngoscopes remain in use by ear-

nose-throat (ENT) surgeons today for diagnostic and therapeutic procedures involving the airway. Many different types of retraction blades for direct laryngoscopy are available today. Although many variations of the straight and curved blade exist, the Miller and Macintosh blades, introduced in the 1940s, remain the most commonly used blades in clinical practice. The choice of laryngoscope blade is largely based on the personal preference of the operator, with both Macintosh and Miller blades being a reasonable choice for a "normal" airway. In general, the advantages of the Macintosh blade include more room for passage of the ETT, whereas the Miller blade may provide better visualization in patients with a small mandibular space, large incisor teeth, or a large epiglottis**.** Straight Blades Miller Straight blade with curved tip Normal airway, long epiglottis, "deep" glottis, prominent upper incisors Phillips and Wisconsin Straight blade with higher vertical profiles than Miller More room for ETT placement than Miller. Curved Blades Macintosh Curved blade Normal airway, Macintosh When face mask ventilation is inadequate to provide necessary airway support, or when long-term positive pressure ventilation is required, an ETT should be placed (**Orebaugh, et al., 2015).**

In order to facilitate lifting of the epiglottis and exposing the glottic opening in children and infants, it is recommended and preferred to use a Miller blade, while the Macintosh blade is usually used with older children, with attention to avoid resting on the blade to not put pressure on the gums and teeth (**Choudhury, et al., 2015).**

Figure (2.5): Laryngoscopes

When preparing for ETI in the PICU, the Miller and Macintosh blades must be prepared. It is preferable to use the Miller blade in young children. As for the use of endotracheal tubes, the art of using the oral intubation method with cuffed endotracheal tubes is better to avoid reintubations than another as a result of leakage. Resulting from uncuffed endotracheal tubes, in order to reduce intubation failure in children in the intensive care unit, it is recommended to use video laryngoscopes (VL) **(Quintard, et al., 2019).**

Since the larynx is quite anterior and the glottis may not be seen unless the epiglottis is lifted with difficulty seeing the glottis, the use of straight-blade laryngoscopes becomes preferable, with attention that the Attempts at ET intubation should not exceed 30 seconds, with monitoring of vital signs and oxygen during intubation **(McInerny, et al., 2017)**.

Laryngoscopes

Airway management is no longer a difficult process, thanks to the rapid and remarkable development of laryngoscopy, where video laryngoscopy has made a major qualitative leap, as we no longer have only two options (Miller and Macintosh), but this does not excuse health service providers from being fully aware of all The available devices, There are four primary types of laryngoscopy techniques that can be employed depending on the device: direct laryngoscopy (DL), direct video laryngoscopy (DVL), indirect video laryngoscopy (IVL), and channeled video laryngoscopy (CVL) **(Merelman, 2017)**.

Direct laryngoscopy

Direct laryngoscopy (DL) was introduced in 1895 by Alfred Kirstein. Physicians have since developed instruments to improve visualization of the larynx while limiting tissue trauma. .

The Macintosh and Miller laryngoscope blades were developed in the 1940s and have been the primary tool for ETI. They have been effectively used for most ET intubations. There are limitations to their ability to allow direct visualization of the glottis and surrounding structures. Numerous adjuncts have been developed to assist in ET intubation. The development of VL or the video laryngoscope (both referred to as VL) marks a new era in airway management. Traditional DL requires alignment of the oral, pharyngeal, and laryngeal axes to visualize the glottis. It is not always possible to align these three axes with mechanical manipulation. The major advantage of VL is that it does not require the Emergency Physician to align the three airway axes, reducing the need for manipulation and potential traumatic forces on the airway.VL provides a superior view of the glottis when compared to traditional DL. The eye of the VL camera is within centimeters of the glottis and provides a wider angle of vision than the 15° of traditional DL. The video monitor magnifies the view of the airway, making structures easier to visualize **(Reichman, 2019).**

DL is not dispensed with as it is an important and essential skill and I have it available to RSI before arriving at the hospital, preferably for children under two years of age to use a Miller blade and for adults to use a Macintosh blade **(Choudhury, et.al. 2015).**

Table (2.1): How to choose the right sizes of instruments for endotracheal intubation

Body weight/age	Tube size (mm)	Depth of insertion (cm)	Laryngoscope blade (Miller)	Laryngoscope blade (Macintosh)
1500–3000 gm	3.0	7–9	0	-
Neonate to 6 months	3.5	10	0	-
6–18 months	4.0	11	1	-
2 years	4.5	12	1	2
>2 years	Age (years)/	Age (years)/	2–6 years = 1	2
(8-10years)	4+4	2+ 12	6–10 years= 2	2–3
			>11 years =2-3	3–4

Video Laryngoscope (VL)

The anatomy of the larynx does not permit direct visualization. It is often essential for the clinician to view the larynx at the bedside or in the examination room. The VL essentially brings the 'eye' of the clinician right above the larynx. The equipment, a fiber-optic or digital scope, can be inserted via the nasal or the oral route. The image is generally a magnified view of the larynx and the adjoining structures as seen on a monitor, permitting a detailed examination. The procedure can also be recorded. The use of this equipment will enable the ICU physician to further the care of critically ill patients at the bedside. The images so obtained can also be useful in training medical and paramedical staff employed in patient care. Their proper use will also reduce expensive diagnostics and procedures requiring exposure of the patient to radiation (fluoroscopy and X-rays) and avoid transport of critically ill patients to the radiology suite. Despite the initial cost of procurement such equipment will prove economically viable **(Gurjar, 2016)**.

Figure (2.6): Video Laryngoscope

Endotracheal Tubes

There are different sizes of Endotracheal tubes (ETT), as they have various internal diameters to suit the different ages of patients, their internal diameters range between 2-10 mm, and their length may reach 30 cm. The tube allows a chest X-ray imaging of the tube as it enters the trachea, and there are types of tubes available with and without a far cuff, the built-in wire coil helps to insert the tubes into the anaerobic trachea by strengthening these tubes, ETT may be reinforced with a wire coil embedded within the plastic for the entire length of the tube to prevent kinking and occlusion. The wire coils can however be irreversibly compressed by a strong bite that occludes the airway **(Doug, et al., 2012)**.

The ETT is designed in a curved way to facilitate its entry into the trachea, flexible and painless, as it is designed to slide easily so as not to cause trauma, and it is imprinted with a shadow line visible during radiography and has a heavier called Murphy's eye, in addition to that an inflatable balloon is positioned proximal to the Murphy eye, Where it is inflated to fix the endotracheal tube and not leak, Intracuff pressure is transmitted to the delicate tracheal mucosa where it can cause pressure necrosis and ischemia. A pilot balloon with an inflation port to inflate the cuff hangs from the proximal third of the ETT **(Reichman, 2019)**.

It is important that the ETT is appropriate for the age of the patient. Cuffed ETTs can be used at all ages, taking into account young children. As for the depth of the ETT, it is determined by multiplying the size of the tube by 3 and the presence of this number at the teeth / gums. As well as determining the appropriate size of the uncuffed tube for patients by its internal diameter according to the age group, in newborns the tube is used 3 cm, at the age of 6 months 3.5 cm, and at the age of one year 4 cm, and between 1 year - 12 years[(age in years _ 4) _ 4] mm. As for determining the size of the cuffed tube: up to 3 cm from one year, from one to two years, 3.5 mm, and after two years [(age in years _ 4) _ 3.5] mm. Cuffed ETTs may be used in children younger than 8 to 10 years who are in a hospital setting, because they have been shown to be as effective and safe as uncuffed ETT. **(McInerny, et al., 2017).**

When noninvasive techniques such as nasal cannulas, facemasks, Continuous positive airway pressure (CPAP), and/or biphasic positive airway pressure (BiPAP) fail to improve a patient's condition or the initial assessment warrants, intubation is performed via the nasal or oral route. The oral route is preferred, unless contraindicated, because of reduced risk of bleeding and sinusitis, along with easier insertion. Intubation allows for maintenance of a patent airway, deep suctioning and improved secretion removal, and lower aspiration risk **(Landrum, 2012).**

Although there are concerns about cuffed ETT, as they lead to complications, perhaps the most important of which is damage to mucosal damage and subglottic stenosis, due to differences between adult and pediatric subglottic anatomy between adults and children, it has been shown during the past years and through indications that cuffed endotracheal tubes have more advantages of uncuffed ETT and their results are almost the same in children **(Chambers, et al., 2018).**

Recent Cochrane review showed two trials comparing cuffed versus uncuffed ETTs, which found no difference between the groups for post-extubation stridor. However, both trials demonstrated a statistically significant lower rate of ETT exchange in the cuffed ETT group. Cochrane concluded that large randomized control trial (RCT) of high methodological quality should be conducted to help clarify the risks and benefits of cuffed ETTs for children14 **(Anand, 2019).**

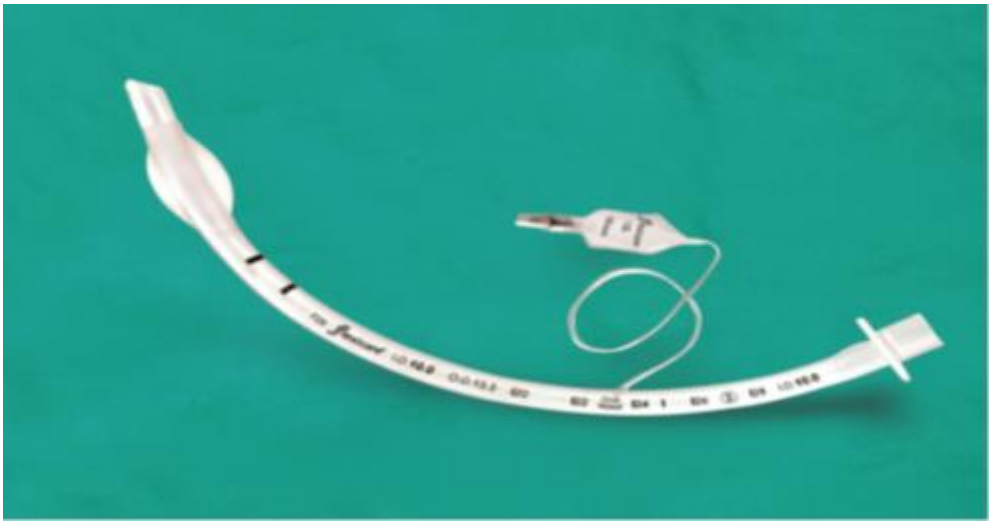

Figure (2.7): Endotracheal Tube

Magill Forceps

Most health institutions use McGill forceps, through which ETTs are inserted into the trachea from the hypopharynx under direct visualization, and this forceps are equipped with double blades to hold with serrated ends. It is curved at an oblique angle between the handles and the blades to prevent the view of the patient's airway from being obscured. The ends of the blades are rounded to minimize trauma **(Reichman, 2019)**.

Figure (2.8): Magill Forceps

Introducer / Stylet

Stylets are a great benefit in the ETI procedure, as they allow the ETTs to be guided to enter the appropriate place with high accuracy, but they contain significant risks such as trauma to the airway because it is made of flexible rods that allow the ETTs to be formed at an angle of 30° to 40°. Introducers are rigid or semi-rigid rods inserted into the airway, and then an ETT is passed over them. Introducers have an angled tip and can be bent to some degree, and an ETT can be passed over them with ease **(Reichman, 2019).**

The intubating introducer is a semi-rigid, long stylet (typically > 60 cm) with a bent, so t tip designed for use with anterior airways or the situation when direct visualization o the glottic structures is not possible. In the past, the term "bougie" was used to such introducers because a bougie dilator was used as one of the first introducers. The Frova is a particular intubating introducer that also has an enestrated tip to allow oxygenation when used with an adapter and bag valve aperture. The introducer is best used on patients in whom a glottis view is not possible **(Farcy, et.al.2017).**

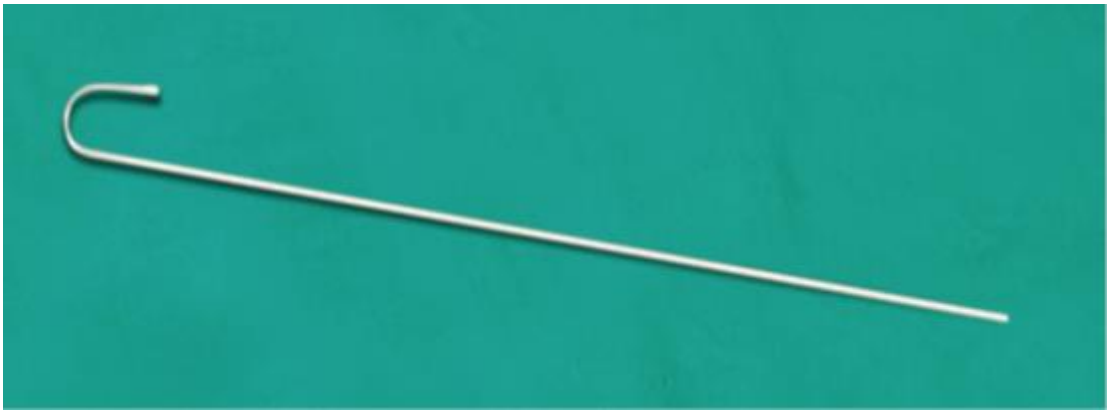

Figure (2.9): Introducer / Stylet

Bougie

The Eschmann endotracheal tube introducer (frequently referred to as a "bougie") is a reusable, 60 cm long introducer. The Eschmann flexed tip permits obstacle avoidance and lifting of the epiglottis and provides tactile feedback in the form of "clicking" as it passes over the tracheal rings to confirm its proper location. It has a high success rate

and low complication rate. The Frova intubating introducer is a single-use alternative of similar design. The Frova is improved by the presence of a hollow lumen that permits ventilation and Carbon dioxide (CO2) detection while having a similar success rate to that of the Eschmann introducer **(Reichman, 2019).**

Figure (2.10): Bougie

Nasopharyngeal airway.

A nasopharyngeal airway is a soft rubber or plastic tube that provides an airway and channel for suctioning between the nares and the pharynx (**David, et.al 2015).**

This device is inserted into the patient's nose. You can use nasal airways in both unconscious and conscious patients who are unable to maintain an open airway. Usually a patient will tolerate a nasal airway better than an oral airway. It is not as likely to cause vomiting. One disadvantage of a nasal airway is that you cannot suction through it because the inside diameter of the airway is too small for the standard whistle-tip catheter suction tip **(Schottke, 2018).**

Steps to insert a nasopharyngeal airway:

* To find out the length of the tube and its correct measurement, we measure from the tip of the nose to the earlobe.

* To relieve discomfort, lubricate the tube with lidocaine jelly or water.

* The tube is inserted into the airway through the nostril and to the end of the nasal trumpet.

* To ensure the correct position of the tube, have the patient cover his mouth, where you feel the air can be felt exiting from the tube opening.

* Open the patient's mouth, depress the tongue, and look for the tube's tip just behind the uvula **(Patricia, et al., 2018).**

Figure (2.11): Nasopharyngeal airway.

Oropharyngeal airway

An oral airway, also called an oropharyngeal airway, has two primary purposes: It maintains the patient's airway after you have manually opened the airway, and it functions as a pathway through which you can suction the patient. You can use oral airways for unconscious patients who are breathing or who are in respiratory arrest (sudden stoppage of breathing). You can use an oral airway in any unconscious patient

who does not have a gag reflex. You cannot use oral airways in conscious patients because they have a gag reflex. These airways can be used with mechanical breathing devices such as the pocket mask or a bag-valve mask (BVM**) (Schottke, 2018)**.

The oropharyngeal airway consists of a flange, a short bite block segment, and a curved plastic body that provides an airway and suction channel through the mouth to the pharynx. It is designed to relieve airway obstruction by fitting over the tongue to hold it and the soft hypopharyngeal structures away from the posterior wall of the pharynx (**David, et al., 2015)**.

Figure (2.12): Oropharyngeal airway

Laryngeal Mask Airway (LMA)

The LMA is used by anesthesiologists in the controlled setting on the operating room or elective cases, but it is not ideal or emergent settings because it does not protect the airway from secretions, aspiration, blood, or mass lesions such as expanding hematomas. Furthermore, the LMA is ineffective in situations in which there is an obstruction (e.g., epiglottitis, angioedema, tracheal trauma) and should not even be attempted in such cases. The LMA works by creating a seal over the larynx with a so t mask that allows or oxygen to be blown into the lungs, in a sense moving the bag mask apparatus from the level of the mouth to the larynx. The LMA is inserted “backwards” into the posterior pharynx and then advanced while being rotated forward, seating the LMA in the hypopharynx. Once this is done, the cu is in lated and bag ventilation can be performed. Even I adequate oxygenation and ventilation can be provided with an

LMA, the clinician must remember that this is not a de initive airway because the patient's airway is not protected from secretions, aspiration, blood, or mass lesions such as expanding hematomas The LMA should only be used emergently to provide oxygen while preparing to establish a definitive airway **(Farcy, et al., 2017)**.

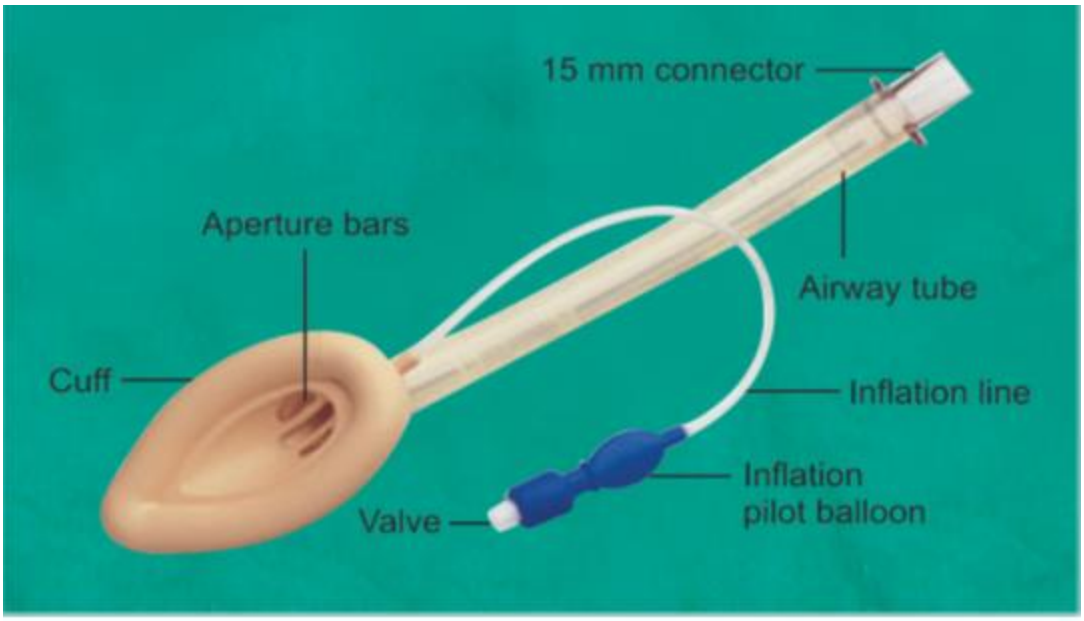

Figure (2.13): Laryngeal Mask Airway

Bag-Mask Ventilation.

Bag-mask ventilation is an essential skill that requires adequate training and frequent use or periodic retraining. The ability to provide effective bag-mask ventilation is the single difference between the "can't intubate, but can ventilate" patient challenge and the "can't intubate and can't ventilate" life-threatening event. It is the single most important aspect of airway management; unfortunately, it is infrequently practiced (**David, et al., 2015).**

The self-inflating bag refills with air when you release the pressure on it. The BVM delivers 21% oxygen (the percentage of oxygen in room air) without supplemental oxygen attached. However, supplemental oxygen is usually added to the BVM. A BVM can deliver up to 90% oxygen to a patient if 10 to 15 liters per minute (L/min) of

oxygen is supplied into the reservoir bag. Many BVMs are designed to be discarded after a single use **(Schottke, 2018)**.

Contraindication: Bag-mask ventilation is contraindicated only in a selected group of patients like complete upper airway obstruction or severe facial trauma (due to inadequate mask seal and risk of aspiration due to bleeding). Before initiating bag and mask ventilation, any visible foreign body in oral cavity should be removed. The technique of bag-mask ventilation requires caution in patients with suspected cervical spine instability and should be avoided in patients with full stomach as well as those planned for RSI **(Gurjar, 2016).**

Figure (2.14): Bag-Mask Ventilation

2.2.7 Medication for Intubation

No perfect combination of drugs exists for RSI of all patients, so providers must select drugs based on the patient's condition and the provider's expertise. Not every patient needs general anesthesia for intubation, but appropriate sedation will facilitate intubation, minimize physiologic response, and reduce awareness of paralysis and intubation (**David, et al., 2015)**.

Medications are used in most airway management situations, and as such, familiarity with the common drugs and dosages used is crucially important. The basic premise of medication use in airway management is to create optimal conditions for the requisite airway intervention while maintaining the patient's safety. Different airway situations require different medications and optimization can have various forms, which always include: Maintaining oxygenation, maintaining hemodynamic stability, and blunting the sympathetic response to the airway intervention. Other goals include keeping the patient as comfortable as possible and relaxing skeletal muscle when appropriate. Pharmacologic intervention prior to airway management should be tailored to the specific needs and current clinical conditions of each patient. Inappropriate use of many of the medications mentioned in this chapter can actually cause the patient harm. In controlled, elective airway management situations for example, placement of endotracheal tube for elective surgery the first medication administered is often an anxiolytic and/or analgesic .This helps decrease the anxiety and fear commonly reported before surgical procedures. Oxygen is then provided to help maintain necessary blood oxygen content for homeostasis during the expected period of apnea that occurs after administration of intravenous (IV) general anesthetic agents and muscle relaxants , which are provided to render a patient unconscious and paralyzed, respectively, for the planned airway intervention. Note that the anesthetic must be administered before the muscle relaxant so as to avoid the patient experiencing total paralysis while awake.

The combination of anesthesia and paralysis serves an important role in optimization of conditions for intubation movement is decreased, the patient is amnestic to the event, the vocal cords are relaxed and open, and the cough and gag reflexes are diminished **(Orebaugh, et al., 2015).**

The clinical situation and medical history of the patient in the PICU plays an important role in determining the type of hypnotic agent, as the use of Succinylcholine is the first factor used in RSI in patients whose vital sign is distress, it is also imperative to use (Etomidate, Ketamine, Propofol) in In the PICU, it is also possible to use Rocuronium when the use of Succinylcholine is contraindicated. Atropine should probably be administered before intubation during induction in PICU for children aged of more than 28 days to 8 years **(Quintard, et al., 2019).**

In many cases, there is no possibility of adequate preparation for the intubation process due to severe oxygen deficiency or poisoning or other cases, and perhaps the use of simultaneous administration of the induction and paralysis agent is the most used to facilitate the procedure of tracheal intubation, and it is preferable to use ketamine for uncooperative patients to facilitate the process of primary oxygenation **(Merelman, et al., 2019).**

Sedatives and Anesthetics

Etomidate. Is commonly used due to its little hemodynamic instability, although the possibility of an effect on adrenal suppression is considered even in a single dose and the ongoing question of the clinical importance of this depression have placed the use of etomidate in the spotlight **(Mechlin, et al., 2014).**

Etomidate is considered an effective and excellent drug for anesthetizing a child who needs ETI, due to its minimal complications on the circulatory system, but it is worth noting that it should not be used if the patient has sepsis, resulting in hypotension and hypocortisolism for up to two days **(McInerny, et al., 2017)**.

Midazolam. It is frequently used in endoscopy and radiology suites due to its speed of performance, especially in preparation for procedural sedation, especially since it does not lower the patient's pressure as propofol does and does not damage the adrenal gland as it does etomidate.

Propofol. One of the advantages of propofol is that it provides good intubating conditions quickly to patients undergoing mechanical ventilation, as it is given by infusion continuously.Hypotension with administration of propofol is its major disadvantage, making it of variable utility for emergency intubation,

Other Agents. one of the most important other drugs commonly used in RSI is Ketamine and dexmedetomidine, where studies have shown that ketamine is very effective in rapid sequential intubation as efficacious as etomidate, and its complications are very lack of deleterious effect on hemodynamics.

Neuromuscular Blocking Agents

It has been passed down as a truism in bedside teaching, Succinylcholine versus Rocuronium. Succinylcholine is the neuromuscular blocking agent of choice for RSI because of its rapid onset and short duration of action. There are circumstances in which the use of succinylcholine may be ill advised however, such as in patients who are hyperkalemic.

Rocuronium is an attractive alternative in such cases. Rocuronium has a similar onset of action as succinylcholine when given in larger doses. However, its duration of action is significantly longer that of succinylcholine **(Mechlin, et al., 2014).**

2.2.8 Nursing checklist of intubation equipment:

- Stethoscope.
- Multiple sizes of endotracheal tubes.
- Cardiac monitor with pulse oximeter.
- Laryngoscope with its different blades with batteries ready for use.
- Face mask.
- Valve mask bag.
- A 10 cm syringe to inflate the cuff of the cuffed tube.
- Pharyngeal airways.
- Continuous source of oxygen.
- Suction machine ready to use, suction tip and connection tubes ready.
- Standby mechanical ventilator machine

2.2.9 Nursing roles during insertion of the endotracheal tube

The nurses play a major role in the endotracheal intubation process, although this procedure is mainly the responsibility of the doctor, and here is the nurse's course in case of an emergency need to perform endotracheal intubation

1. If the patient is in respiratory distress, oxygenate the patient using a bag valve mask. Attach the patient to a pulse oximeter for monitoring. Make sure to ask for reinforcement of nurses to help you in this procedure. Delegate tasks immediately (E.g. medication nurse, nurse who will assist the physician and

prepare the laryngoscope, nurse who will assess the condition of the patient and checks vital signs). One nurse cannot perform all the tasks simultaneously written below.

2. Ensure that the emergency cart is accessible to the room or the area of the patient.
3. If the patient has no intravenous access, immediately insert a line (or ask another nurse or intravenous therapist) for premedication purposes.
4. Position the patient and the height of the bed comfortable to the physician who will insert the tube. Align the patient's head in a neutral position. Hyperextended the head to a comfortable degree.
5. Consider premedication, optional for most patients-usually given 2-3 minutes prior to induction. Prepare and administer the sedative medication as ordered by the physician.
6. Prepare the laryngoscope and blades. Ensure that the batteries and bulbs are working. Ask the physician what size or type of blade he/she preferred to use.
7. Assist the physician during insertion. When the tube is already in place, inflate the cuff to the desired cuff pressure using a syringe. Check the tube position and the level in the lip line (e.g. 20 cm, 21 cm, 22 cm, and 23 cm).
8. Fix the tube in place partially using tape or tie, to ensure that the tube is steady. Assessment should be done first if the tube is in the correct place.
9. Continue to oxygenate the patient using bag-valve or manual resuscitator.
10. Verify the tube position immediately. Auscultate both lung fields. Assess if both chests are rising equally.
11. Check also the pulse oximeter to assess a patient's oxygenation.
12. If the endotracheal tube is correctly placed, secure tube in position using either a Leukoplast, an ET holder, or ET ties. Suction patient's secretions as needed.
13. Attach the patient to a mechanical ventilator. Check the physician's orders for the mechanical ventilator settings.
14. The physician would request a standard chest x-ray to confirm ET placement. Correspondingly, the physician would order an ABG test one hour after attaching the patient to the mechanical ventilator.

15. When ABG results are out, the physician would typically adjust the mechanical ventilator settings according to the patient's response.
16. Observe the 5 moments of hand hygiene and ensure that the health care team is in their proper and complete PPEs adequate **(RNspeak, 2020).**

2.2.10 Pre Procedure

There is no doubt that this phase is very important from the phases of ETI. At this phase, preparations are made for the intubation process. If all the staff needed for safe intubation are present and functioning **(Kliegman, et al., 2020).**

Advanced airways should be placed within a healthcare system that has established processes for continuous quality improvement, including protocols, verification of healthcare provider training and experience, monitoring of complication rates, and a system for remedial training (**David, et al., 2015)**. Insertion of endotracheal airways is within the scope of practice of certain specially trained nurses. As a nurse in general practice, you will assist with insertion by gathering equipment and preparing the patient. On most units, you will find intubation equipment in the resuscitation cart. Intubation must often be done quickly, in response to a temporary decline in the patient's respiratory function during a procedure **(Treas, et al., 2014)**.

Most texts place heavy emphasis on the prediction of anatomical difficulties. Additionally, considerable focus is provided on the steps of physically placing an endotracheal tube **(Farcy, et al., 2017).**

Therefore, there must be trained health staff to carry out this procedure, the nurse explains the rationale for the procedure to the patient and family. The patient is positioned on his or her back with a small blanket under the shoulder blades to hyperextend the neck and open the airway. Air (10 mL) is injected into the endotracheal cuff before insertion to ensure an intact cuff, and then the cuff is deflated **(Patricia, et al., 2018)**.

While intubating a patient, there are certain basic essentials that must be present to ensure a safe intubation. They can be remembered by the mnemonic **SALT**.

Suction: It is possible that the patient has secretions in the pharynx that make it difficult to see the vocal cords and airway, so **s**uction is a very important step for the success of intubation.

Airway: To maintain good oxygen saturation, a conductive oxygen source must be available and ready, with a bag and mask provided through the open airway, medication and monitoring equipment should be ready.

Laryngoscope: with different blades and full batteries is required for tracheal intubation ready to use.

Tube: It is necessary to provide ETTs of appropriate sizes **(Choudhury, et al., 2015).**

Assessment of the airway should be quick. Thick short neck, crowded oral airway, micrognathia and anatomical anomalies of the chin may cause difficult airways.

LEMON rule is described in evaluation of difficult airway.

L- Look externally for an obvious signs of difficult airway

E- Evaluate 3:3:2 rule

 Do 3 fingers fit between incisors when mouth is wide open? – If yes, then temporomandibular joint mobility is good.

 is the distance between the mentum and hyoid bone 3 fingers? – If yes, then it is good length of mandible. More or less can make bag mask ventilation or intubation difficult.

 is the distance between the hyoid bone and thyroid 2 fingers? – If yes, then length of the neck is good.

M- Mallampati score

O- Obstruction or obesity,

N- Neck mobility **(Munira, et al., 2015)**.

In preparation for intubation, the child should be preoxygenated with 100% oxygen using an appropriately sized bag and mask. Historically, uncuffed ET tubes were used in children younger than 8 years old, but there is evidence that the use of these tubes in small children does not produce a higher incidence of complications; newer cuff designs are reported to decrease complications, such as stridor and tracheal mucosal injury. Air or gas delivered directly to the trachea must be humidified. During intubation, the cardiac rhythm, heart rate, and oxygen saturation should be monitored continuously with audible tones **(Hockenberry, et al., 2017).**

Careful preparation is essential prior to RSI. A history of current medications, allergies and time of the last meal should be sought and the airway examined looking for anatomical features that may predict difficult intubation. Pre-oxygenation The administration of a fastacting muscle relaxant is a critical component of RSI allowing prompt laryngoscopy and passage of a cuffed ETT. Apnea is a necessary part of this process and desaturation will occur without efforts to prevent it. Effective pre-oxygenation may allow several minutes of apnea without desaturation and should be utilized in the management of any patient who requires intubation. The administration of drugs for RSI should not occur until the airway team indicates to the team leader that they are ready to undertake the RSI, having optimized the patient, and completed the airway checklist **(Cameron, et al., 2020).**

This position is re erred to as “the sniffing position” or “ear to sternal notch.” While positioning the patient, make sure to check all your equipment:

1. Do you have the right sized ace mask?

2. Is the respiratory bag connected to oxygen?

3. Is suction set up and ready?

4. Is the laryngoscope in proper working order?

5. Are extra handles and blades (including various sizes and types) available? **(Gurjar, 2016).**

Prepare Equipment

This phase is important for ETI, in which the equipment and personnel required for safe intubation are prepared by using a method: An easy pneumonic for this is **SOAP MM:**
* Suction through a catheter connected to the Yankauer suction catheter attached to wall suction**.**

* Oxygen is connected to a mask to provide the patient with oxygen.

* Airway is opened through an endotracheal tube suitable for the patient.

* Persons required for intubation are present.

* Monitoring vital signs, heart rate and blood pressure is important.

* Medications for intubation must be ready to use to facilitate intubation **(Kliegman, et al., 2020).**

Monitoring: Electrocardiogram (ECG) (pulse tone on) Saturation of Peripheral Oxygen (Spo2) BP (cycle every 2 min if no arterial line) Capnography/Color capnometer. Airway items: T-piece with mask Suction on with Yankauer Guide/LMA Laryngoscope ET tubes (correct size & 1 size below and test the cuff) Note ETT insertion length ETT ready Stylet/Bougie Magill forceps if nasal intubation . Drugs: Induction agents & muscle relaxant dose confirmed (decrease dose if hypotension likely) Emergency drugs required? (Fluid bolus, Adrenaline) **(Bordoni, et al., 2018)**.

Prepare Patient

In preparation for intubation, the child should be preoxygenated with 100% oxygen using an appropriately sized bag and mask. Historically, uncuffed ET tubes were used in children younger than 8 years old, but there is evidence that the use of these tubes in small children does not produce a higher incidence of complications; newer cuff designs are reported to decrease complications, such as stridor and tracheal mucosal injury (**Hockenberry, et al., 2017)**.

It is known that ETI is inherently an uncomfortable procedure for the patient, but it is easy during the process of assessing the patient before intubation to know whether there is difficulty in intubation or not, so a quick assessment of the airway is necessary even in emergency situations, it is true that there are factors that may hinder ETI such as thick neck, narrow mouth openings, large tongues and the anatomic barriers of the tongue and epiglottis, but it is possible to successfully intubate and overcome these barriers, even patients with low mental states may cough and resist intubation, so it is necessary to optimize and deliberate use of drugs to facilitate the process of intubation and avoid side effects For these drugs, such as low heart rate, low blood pressure, and intracranial pressure, so if the drugs are used appropriately, these expected damages will be mitigated. Judicious use of appropriate medications can blunt the potential adverse physiologic effects while providing analgesia, sedation, and amnesia. Decisions regarding use of specific agents are based on knowledge of their advantages and disadvantages relative to the patient's clinical status and comorbidities **(Kollef, et al., 2018).**

Prepare Team

In view of the possible and expected result of the negative events and complications resulting from ETI, and in order to avoid such damages, and to facilitate the intubation process, it is necessary to follow some organizational, collective and individual matters, including factors related to the characteristics of the patient and the experience of the health staff. As a large PICU we have junior medical staff with varied experience and have experienced a high turnover of nursing staff **(Bordoni, et al., 2018).**

Assign roles

*Team leader *1st Intubator *2nd Intubator *Intubator's assistant *Drug administrator

*Nasogastric tube aspiration *Cricoid pressure

*Are we in best location? *Nurse in-charge aware?

*Consultant aware? Prepare for failure *Failure to intubate

*Any specialist team required? Confirm plan, Plan A: 2 attempts by1st intubator Plan B: Next attempt by senior Plan C: Bag Mask Ventilation Plan D: Call Anesthetist/ENT **(Anand, 2019).**

ETT Placement

Once the glottic view is revealed, and found to be adequate, the ETT is placed between the vocal cords with the right hand. Attempts at laryngoscopy may become quite involving, and the laryngoscopist may easily lose track of the duration of patient apnea. Laryngoscopy attempts should generally be limited to 30 seconds, or the occurrence of oxygen desaturation, whichever comes first. Note that SpO2 technology results in at least 30 seconds delay in readout. Particularly in critically ill patients, rapid desaturation may occur due to inadequate time for preoxygenation, atelectasis with shunting, or cardiopulmonary pathology. Thus it is imperative to use bag mask ventilation to achieve the highest possible oxygenation between every attempt at laryngoscopy. Emergent intubations should be carried out with a stylet in place in the ETT. Once the tip of the tube has passed the vocal cords, the stylet may contribute to tracheal damage. At this point, the laryngoscopist should hold the ETT firmly and keep the laryngoscope in place, observing that the tube is not dislodged, as an assistant removes the stylet **(Gurjar, 2016).**

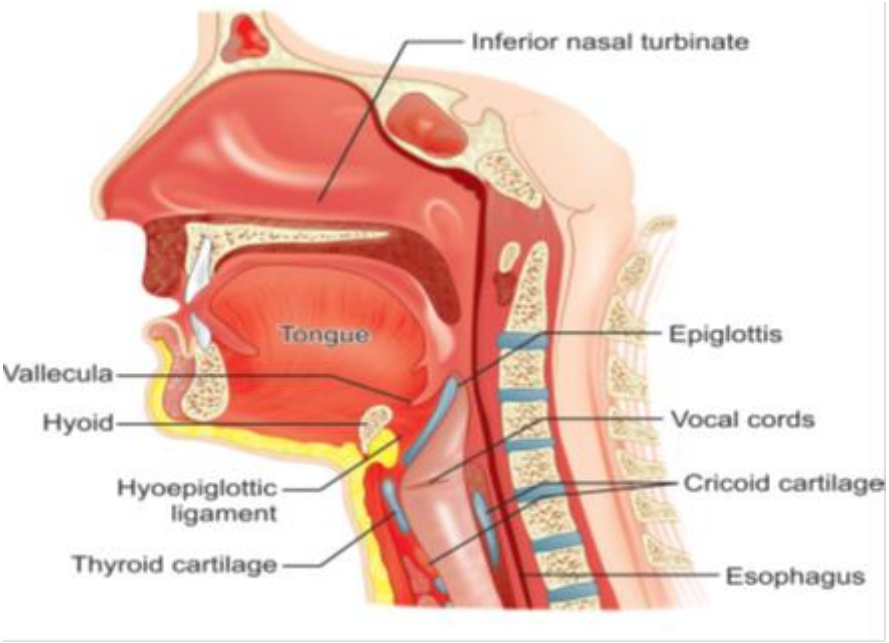

Figure (2.15): Upper airway anatomy

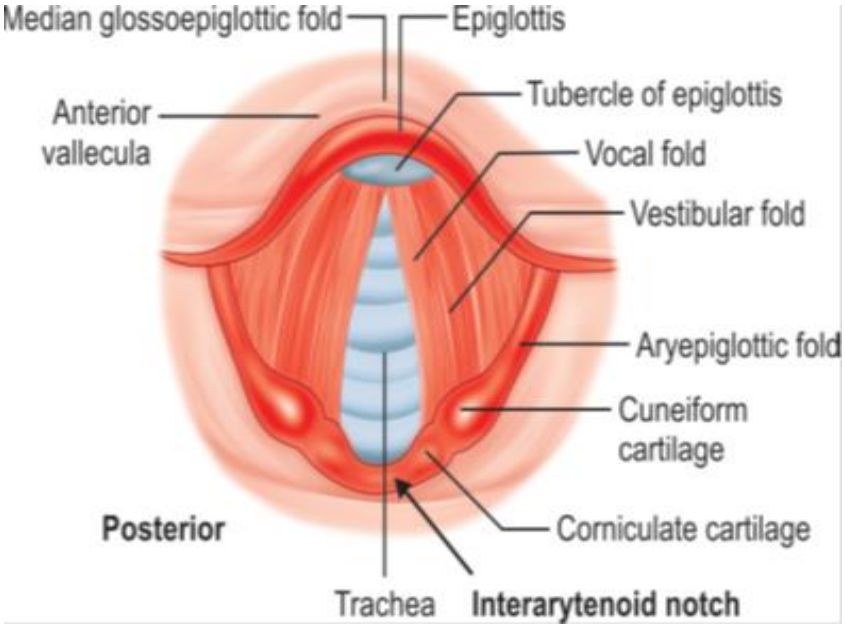

Figure (2.16): Laryngoscopic view of glottis

Positioning

1. Child above 2 years: A folded towel to be placed under the occiput to align the pharyngeal and tracheal axis.

2. Child below 2 years: A folded sheet to be placed under shoulder to align airway.

The "sniffing" position, achieved by flexing the neck approximately 30 degrees and extending the head at the atlanto-occipital joint to 20 degrees, helps align the oral, laryngeal, and pharyngeal axes . Placement of towels under the occiput supports maintenance of this position. Pre-oxygenation is achieved using a high-flow oxygen system for at least 3 minutes prior to induction. An oropharyngeal airway, nasopharyngeal airway, or jaw thrust is frequently required after induction to maintain upper airway patency. Apneic oxygenation via a nasal cannula is typically continued during laryngoscopy to decrease the risk of desaturation. Choice of specific equipment should be left to the individual practitioner. In general, straight blades allow visualization of a larger portion of the vocal cords as the epiglottis is removed from the field of view. It may be difficult to control a large tongue with a Miller blade, which is relatively narrow. Similar to direct laryngoscopy, several shapes and sizes of video laryngoscope blades are available. With the patient in the "sniffing" position, the laryngoscope is held in the left hand and the blade is inserted into the right side of the mouth to the base of the tongue. The blade is then moved to the midline sweeping the tongue to the left. The laryngoscope handle and blade should align with the nasal septum. The tip of straight blades is advanced to the epiglottis, while the tip of curved blades is placed in the vallecula **(Kollef, et al., 2018)**.

Positioning can facilitate both blade insertion and glottic exposure. The sniffing position, is atlanto-occipital extension, and elevation of the head to achieve "lower neck flexion 35˚," which in normal volunteers required head support of 31 to 71 mm. Further head elevation may facilitate DL and may be essential for intubation in difficult cases. Clinical and geometric observations show flexing the thoracic spine to elevate the head may facilitate DL more than flexion of the cervical spine **(Farcy, et al., 2017).**

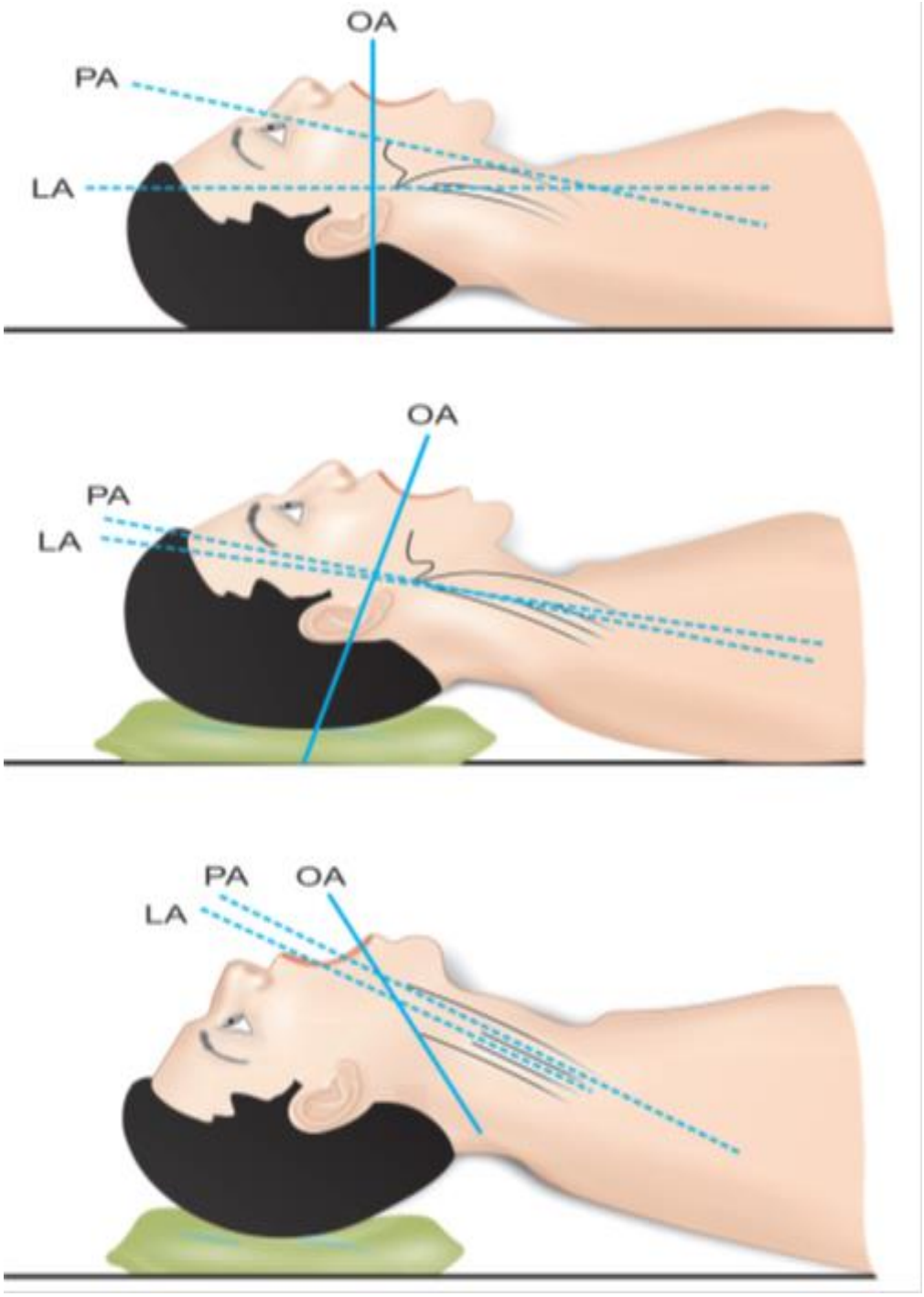

Figure (2.17): Positioning, Alignment of three axes (LA, Laryngeal axis; PA, Pharyngeal axis; OA, Oral axis) for intubation

Avoid: Hyperextending or rotating the neck and flexing the head towards the chin.

- Maintenance of oxygenation is a priority during the procedure

- Procedure should be limited to maximum of 20 seconds.

- Ensure suction available to hand at infant / child's shoulder.

- The nurse to apply cricoid pressure.

- Cricoid cartilage is just below the thyroid cartilage (Adam's apple).

- It is the nurse's duty to follow up the patient's vital signs and blood saturation and to notify the doctor of any changes.

- The procedure should be stopped if the infant / child deteriorates i.e. bradycardia and/ or desaturates. The nurse will hand ventilate with 100% oxygen until the infant's cardiovascular and respiratory status stabilizes.

2.2.11 Procedure

Although ET intubation is critically important in a child who is in respiratory failure, it is less urgent in a child who can be easily oxygenated and ventilated either on his own with supplemental oxygen, by bag-mask ventilation, or by NIV. Particularly in a child who is in cardiac arrest, persistent and uninterrupted (no more than 10 seconds) cardiac compressions are more important than ETI as long as ventilation and oxygenation remain adequate. In addition, although resuscitation medications (lidocaine, epinephrine, atropine) can be given through the ET tube if no other route is available, resuscitation medications by intravascular or IO routes are preferable. Medications given down the ET tube are variably absorbed. However, if a child cannot be oxygenated adequately despite high concentrations of oxygen, ETI should be considered early. ETI should be accomplished by the available person with the most intubation expertise. The procedure should be preceded by oxygenation with 100% FiO2. If the patient is awake, sedation and muscle relaxants should be administered by persons properly qualified to perform this task to enable safe and efficient intubation **(McInerny, et al., 2017)**.

Airway Assessment

In many emergency situations, we do not have enough time to assess the difficulty of the airway, because there are many and many factors that must be considered, for example obesity, small mouth opening, poor neck movement and small chin, so attention must be paid to these factors and take them into account when performing ETI.

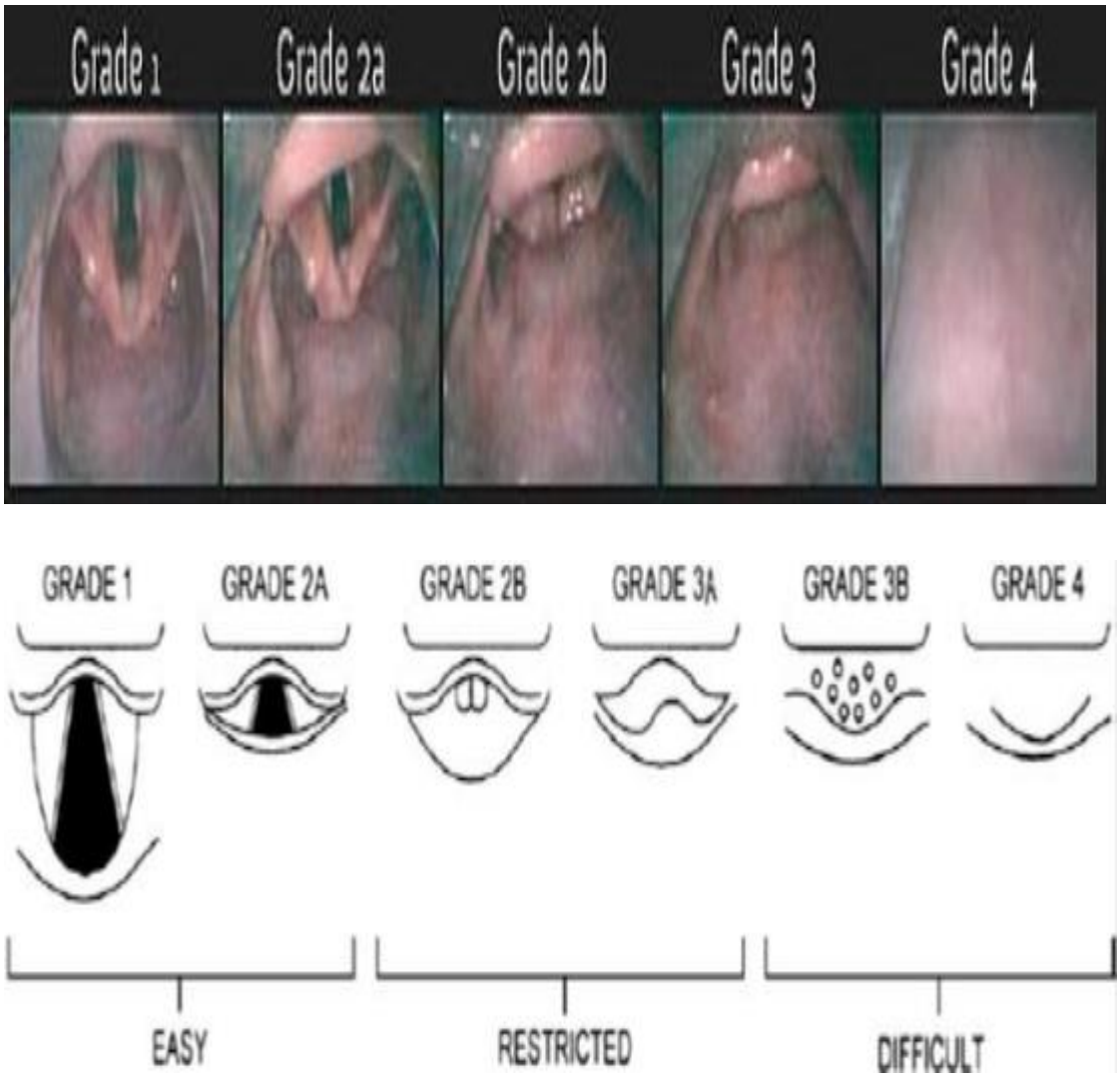

Figure (2.18): The Mallampati system for predicting airway difficulty

During Intubation

After completing the phase of preparing the necessary instruments for intubation and preparing the patient for that, we must continue the intubation procedure by completing the remaining steps of the intubation process, by placing the patient in an ideal position, where the head is at the level of the larynx and close to the person performing the endotracheal intubation, and it should be noted here That the person performing the intubation should not place his face too close to the patient's mouth, and do not forget in these crucial moments to follow up and observe the patient for any vital signs such as distress or wakefulness and watching the monitor, the ETI procedure should not take a long time, and when preparing to try intubation again The patient must be provided with adequate oxygen and well ventilated **(Merelman, 2017).**

After adequate patient positioning and preparation, pre oxygenate with 100 % oxygen for 2 to 3 minutes. Administer IV induction agents like propofol or etomidate, along with iv fentanyl and or iv midazolam. Key for intubation is adequate ventilation and maintaining the saturation above 90% all the time to avoid any hypoxia. Everyone should be able to maintain adequate saturation 100% of the time. If the patient is not ventilated well, cyanosis or bradycardia can occur and eventually patient can have cardiac arrest **(Rajaram, 2015).**

2.2.12 Intubation Steps

1. Maneuvers which can be used to keep the airway patent while under anesthesia.

a. Head-tilt chin-lift maneuver lifts the tongue from the back of the throat and maintains an open, patent airway. But this maneuver can only be used if there is no concern for cervical spine injury.

b. Jaw thrust maneuver: if cervical spine injury is a concern – the jaw thrust maneuver is a good technique to maintain a patent airway. In supine position, the mandible is displaced forward by physically pushing the angle of the mandible upwards using both thumbs. This helps lift the tongue forward and does not let it obstruct the airway.

2. Then administer the paralytic agent with sedatives if using RSI. Muscle relaxation keeps the vocal cords open and abducted and easy to pass the ETT. If not paralyzing

wait until the vocal cords to abduct during exhalation and pass the ETT through the cords.

3. Scissors Maneuver: Open the mouth using the scissor motion of the fingers of the right hand.

4. Hold the laryngoscope handle with your left hand and insert the blade from the right angle of the mouth of the patient. Slide the laryngoscope blade in the mouth of the patient from the right angle of mouth to the center, sweeping the tongue towards the left. Keep the tongue always under the laryngoscope blade.

5. Once in the center, insert the blade slightly deeper into the pharynx towards the vallecula.

6. Identify the epiglottis and lift it up and adjust the tip of the laryngoscope blade in the vallecula. This is done by lifting the laryngoscope upwards towards the handle.

7. If cords are too anterior, bimanual laryngoscopy needs to be done. After the mouth is open and the laryngoscope blade is inserted properly as mentioned above, the right hand is then placed on the thyroid cartilage and it is externally manipulated either pressing downward or sideways to get the glottis into view. Once vocal cords are seen well ask an assistant to keep it steady in that spot.

8. Then use the right hand to hold the endotracheal tube such that the concave curve of the endotracheal tube faces away from you. Insert the ET into the mouth, tip first, lateral to the laryngoscope blade and follow the curve of the palate.

9. Advance the ET in enough so that the tip and the bevel pass beyond the vocal cords.

10. Ask an assistant to retract the stylet and remove it. This prevents any trauma to the soft tissues and blockage of the tube.

11. While the assistant is removing the stylet, the physician should hold the ET steady in place and always maintain the view of the vocal cords and ET through it.

12. Once the stylet is out, advance the ETT so that the cuff lies below the vocal cords and ETI rests at approximately 21 cm at the front incisors.

13. Inflate the cuff with about 5 to 8 ml of air.

14. Remove the laryngoscope blade out

15. Attach the end tidal- Carbon dioxide (CO_2) monitor and auscultate to confirm placement of the endotracheal tube **(Gurjar, 2016)**.

Cricoid Pressure

To avoid vomiting and to prevent aspiration of gastric contents during intubation, cricoid pressure is performed, through pressure on the closed tracheal ring of the cricoid cartilage located below the protrusion, by placing the thumb finger on one side of the patient's trachea, and the middle finger is also placed on the other side of the trachea, and the index finger is placed directly on the cricoid.

2.2.13 Post Procedure

It is very important to provide the patient with sedation and anesthesia after the ETI procedure, for the patient's comfort respiratory compliance with artificial ventilation.

Confirmation of Endotracheal Tube Placement

ETTs are used to establish and maintain an airway. They may be inserted nasally or orally by trained and experienced clinicians. Immediately after intubation, placement of the ETT in the airway can be confirmed by the presence of CO2 using capnography. All chest fields are auscultated to make sure that there are bilateral breath sounds. Physical examination should never substitute for CO2 detection. Chest X-ray is important to ensure whether the tip of the ETT is about 1 in. (2–3 cm) above the carina. Frequency of chest X-ray is indicated post intubation and with worsening in condition. Reassessment of ETT placement is mandatory. ETT position can change with coughing, patient movement, and suctioning. Continuous monitoring with end-tidal CO2 can detect a loss of airway early **(Johnson, et al., 2018).**

There are many ways to know and determine the correct position of the endotracheal tube, and these methods include visualization the ETT between the vocal cords, the expansion of the chest when ventilating the patient, auscultation over the epigastrium and lung fields during ventilation and auscultation over the epigastrium and lung fields during ventilation. A chest radiograph also documenting whether the endotracheal tube is in the correct place or not. Upon confirmation of placement, the endotracheal tube is secured firmly in place with either tape or a commercial device **(Kollef, et al., 2018).**

This is not always feasible. Rates for incorrect ET tube placement have been noted to be up to 25%.The verification of correct ETT placement is important as or more important than the intubation procedure. Lack of proper confirmation of ETT placement has the potential for serious patient harm and catastrophic outcomes if unrecognized and uncorrected. For over 20 years, there has been ongoing research and development to improve upon the basic techniques of physical examination confirmation of ETI. Physical examination with auscultation has been found to be inadequately sensitive (94%) and specific (83%) as an independent method for confirmation of correct ET tube placement. use of physical examination findings, esophageal detection devices (e.g., syringe and bulb), carbon dioxide (CO2) detection devices (i.e., qualitative detector and continuous quantitative monitor), and imaging techniques (i.e., radiography and ultrasound). Each method is described for a patient with normal anatomy and the absence of any pathology (e.g., chest or neck trauma). Certain patient conditions or pathology may affect the accuracy of some methods. No single method is universally or completely reliable. The confirmation of ETI requires a multiple method approach **(Reichman, 2019)**.

A misplaced ETT can result in severe morbidity and mortality. As soon as an ETT is inserted, its presence in the trachea must be confirmed. A quick method to confirm ETT placement is to directly visualize the ETT as it passes through the vocal cords. Video laryngoscopes have improved the approach of visualizing the airway, however, a view of the glottis may often be obscured despite the technique of visualization used. As no single test exists that definitely establishes correct placement of the ETT, confirmation should best be carried out with a combination of physical examination maneuvers and CO2 detection. Detection of exhaled CO2 is widely accepted as the most reliable, readily available technique of confirming ETT placement. This is accomplished either with capnography (continuous monitoring of end-tidal CO2, which is displayed graphically on a dedicated monitor) in operating rooms or with a small, portable end-tidal CO2 detector (a purple-to-yellow color change indicates presence of >4% CO2 in exhaled gases) outside of operating rooms. Although CO2 detection reliably localizes the ETT in the airway, it does not distinguish between tracheal and endobronchial intubations **(Gurjar, 2016)**.

Physical examination

The use of physical examination methods has been the mainstay for the initial evaluation of proper ETT placement. The first and best way to confirm the placement of the ETT is to see the tube insertion through the vocal cords and into the trachea **(Reichman, 2019)**.

Capnography

This method is considered one of the ways to ensure that the ETT is in place, a continuous waveform capnography trace should be seen during ventilation of a patient's lungs even if they have suffered a cardiac arrest, although that trace may well be attenuated: the absence of such a capnography trace suggests that the TT is either in the wrong place is blocked or kinked or that the patient has been in cardiac arrest for several hours **(Foy, et al., 2018).**

Radiography

The main utility for radiographic confirmation of ETI lies in its ability to detect whether the ETT is placed too deeply into the trachea .Locating the end of the ET tube approximately 4 cm above the carina may prevent some of the complications associated with a right mainstem intubation. The post intubation chest radiograph can assist in identifying any complications that may have resulted during the intubation (e.g., aspiration, a pneumomediastinum, a pneumothorax, or tracheal injuries).

Ultrasonography

The use of ultrasound (US) in the Emergency Department has gained significant popularity in the diagnosis of various diseases and pathology. US is readily available, can be used at the bedside, and uses no ionizing radiation. US can identify conditions before and after intubation (e.g., pneumothorax or tracheal injury). It can be used during intubation to see the ET passing the vocal cords. US is used after intubation to confirm the presence of the ET tube in the trachea and its lack of residing in the right mainstem bronchus **(Reichman, 2019)**.

Securing the Tube

The ETT is fixed through three pieces of Elastoplast, Cut 2 pieces 10 – 15 cms long into "trouser legs" as clinically indicated. Also a third piece with 'eye-hole' in the middle and it is important that the tube is securely attached in both directions from the face, and these tapes are changed in case the tube is not in its correct position or the tapes become wet and loose.

Following Securing of Endotracheal Tube.

The suction process is important for the patient after the ETT is placed and fixed, and then obtain blood gas post intubation to check the blood gases. When the patient's condition is stable, the tube can be shortened if necessary. It is also important for the nurse to document the procedure and write any nursing notes in this regard from where the size and depth of the tube and the medications used to facilitate the endotracheal intubation procedure, and this is after removing personal protective equipment and washing the hands **(Rachel, et al., 2016).**

Gastric Tube

To reduce gastric distension resulting from the ventilation process before and during ETI, an orogastric or nasogastric tube must be inserted for intubated patients, in addition to its benefits in improving the work and function of the respiratory system by reducing intra-abdominal pressure.

Patient Positioning

The intubated patient is usually placed in an upright position with the bed raised from the patient's head at an angle of 30°, because this position allows the lungs to expand more easily and completely, this position also contributes to decreases intracranial pressure. Patient who are strongly suspected to have cervical spine injury should remain supine if it does not cause respiratory or airway compromise.

Reassessment

It is necessary and important to continuously and regularly assess tube placement and hemodynamics in addition to oxygenation, especially when transferring the patient from one place to another. Reassessment of the patient must be systematic and frequently, often we need for additional analgesia or sedation **(Merelman, 2017).**

Nursing considerations

If there's time, explain the procedure before intubation. If the tube is inserted as an emergency measure, explain each step as it's taken. In addition, follow these steps:

• Suction the ETT as needed to maintain patency.

• Securely retape the tube to the child's face as needed to prevent dislodgment.

• Monitor skin integrity around the tube, such as around the nares if nasotracheally intubated or on the lips and gums if orotracheally intubated.

• Frequently monitor breath sounds to assess lungs and for positioning of the tube; breath sounds should be equal bilaterally.

• Observe for signs of tube dislodgment, such as audible crying or talking, oxygen desaturations on pulse oximetry, and decreased breath sounds.

• Monitor the child's facial expressions. Although you may not hear him cry, his face will still make the grimaces of crying.

Provide support, calming and comforting techniques, and pain medication as necessary.

• Because the tube passes through the child's vocal cords, facilitate communication with the child by providing alternatives, such as using sign language, allowing the child to write information, or using a communication board **(Oliver, et al., 2015)**.

2.2.14 Complication of ETI

Complications of ETI can be divided into immediate complications (associated with the placement of the artificial airway) and later complications. Later complications include those that occur while the artificial airway is in place and those that develop during and following extubation (**David, et al., 2015).**

In the PICU, there are complications associated with ETI, so every patient admitted in PICUs is at risk of complicated intubation, so these patients are likely to face respiratory complications and hemodynamic complications, so careful preparation for intubation are among the factors to avoid these complications resulting from intubation **(Quintard, et al., 2019).**

TI procedure in PICU settings is more complex compared to that done in the OT. In the OT, intubation is associated with a low rate of complication as it is done by a trained anesthesiologist, generally in a stable patient with good physiological reserve. Conversely, high incidence of failure and complications are associated with intubation in the ICU, where airway tools may not be readily available. In ICU settings, intubation is done often by a junior doctor with little or no training of intubation, as an emergency, in a critically ill patient with precarious hemodynamic and respiratory status. There is under evaluation of the airways and suboptimal response to preoxygenation. In addition, many drugs used during intubation are associated with adverse hemodynamic effects **(Gurjar, 2016).**

The percentage of adverse events in the PICU from 19-41% of the complications of ETI, which is a significant percentage. Medical interventions based on guidelines, evidence and careful preparation, the ETI procedure becomes easier and less dangerous **(Hatch, et al., 2016)**. The longer the ETI process is delayed, and the greater the number of failed intubation attempts, this will lead to serious complications, including cardiac arrest. Intubation failure from the first attempt is estimated at 30% of intubation procedures in the ICU, if this percentage is compared to what is in the operating rooms. It is a relatively high, severe hypoxemia during ICU intubation is reported in up to 25% of patients **(Higgs, et al., 2018).**

There is no doubt that the ETI procedure may be accompanied by adverse events. There are some dependencies that can be easily treated, including what is related to the patient and experience. In some previous studies, it was shown that confidence exists among respondents at a high rate, and this percentage decreases when dealing with a patient who has difficulty managing the airway. The development and preparation of a checklist for intubation ensured a significant improvement in the understanding and perception of the role of each person from the medical staff, and studies have proven that the training process for health staff working in ICU has a significant role in improving the handling of the difficult airway, We identified that more training would be beneficial and are developing multidisciplinary simulation training for the difficult airway **(Bordoni, et al., 2018)**.

TI associated cardiac arrests occurred during 1.7% of PICU tracheal intubations. TI associated cardiac arrests were much more common with TI when the child had acute hemodynamic instability or oxygen failure and when the child had a history of difficult airway or cardiac disease. This study aims to determine the incidence and epidemiological characteristics of cardiac arrest between respiratory tract infections in PICUs. A group study was used retrospectively for data collected in the future from Twenty-five PICUs are diverse by collecting future endotracheal quality improvement data for all primary ETI in 25 PICUs from July 2010 to March. The cardiac arrest associated with ETI was defined as chest pressures more than 1 minute occurs during ETI or within 20 minutes after ETI. After evaluating a total of 5232 ETI. The results yielded that cardiac arrest associated with TI was reported in 87 (1.7%). Cardiac arrests associated with RTI occurred within 1.7% of PICU ETI. Cardiac arrests associated with tracheal intubation were more common with ETI when the child had severe blood circulation or oxygen failure and when the child had a history of airway difficulty or heart disease. In the ICU, maintaining the patency of the airway is important .The physiological reserves of ICU patients are limited and unstable. In addition to these, the intubation time is also limited, the intubation procedure is performed by basic equipment. Drugs used during ETI lead to hypotension. Life-threatening complications develop during this procedure **(Bahar, et al., 2015).**

Cardiac arrests associated with tracheal intubation were more common with endotracheal intubation when the child had severe blood circulation or oxygen failure and when the child had a history of airway difficulty or heart disease **(Shiima, et al., 2016)**.

Immediate complications:

1. Hypoxia. 2. Loss of airway: unable to oxygenate and unable to ventilate.

3. Hemodynamic instability. 4. Hypotension 5. Hypertension. 6. Tachycardia.

7. Arrhythmias. 8. Bronchospasm. 9. Laryngospasm. 10. Esophageal intubation.

11. Aspiration of loose teeth, oral contents, oral or tracheal secretions, gastric contents.

12. Trauma to structures: teeth, tongue, lips, eyes, corneal abrasion, in the soft tissues of oropharynx, larynx, vocal cords and trachea.

Long-term complications:

1. Tracheomalacia

2. Laryngomalacia

3. Tracheal stenosis

4. Injury to vocal cord **(Munira, et al., 2015).**

Post-procedure care

Once the position of the ETT is confirmed, it should be reassessed periodically because the ETT can migrate over time as a consequence of coughing, suctioning and movement. The clinical examination to confirm the correct ETT placement like chest auscultation for breath sounds, symmetrical chest expansion and palpable tube cuff in the suprasternal notch may be inaccurate in the ICU settings. Hence, daily chest X-rays are done at many centers to verify tube position. However, studies suggest a more

restrictive approach to decreases the number of chest radiographs without worsening clinical outcomes. Routine change of ETT every 1–2 weeks, to decrease the incidence of complications is not recommended as the process itself may lead to silent aspirations and nosocomial pneumonia **(Gurjar, 2016)**.

2.2.15 Nursing Interventions for Clients with Endotracheal Tubes

- Hand hygiene and washing are one of the most important factors in fighting infection and a must when dealing with any patient secretions. As for dealing with the patient's respiratory secretions and others, it is necessary to wear gloves.
- Noting vital signs, oxygen saturation and lung sound is an urgent necessity to follow up on the patient, and it must be at least every two hours, periodically and regularly.
- Provide full morning care from assessment and care of the mouth and nose and reporting any abnormal results.
- It is necessary to check from time to time the tightness of ETT and ensure its continuous and regular placement.
- Raise the head of the bed 30° to 45°.
- Suction of the ETT is a sterile nursing procedure to remove any secretions inside this tube, Wear goggles when performing suctioning.
- Closely monitor cuff pressure, maintaining a pressure of 20 to 25 mmHg to minimize the risk of tracheal tissue necrosis.
- Provide oral hygiene and nasal care every 2 to 4 hours. Use an oropharyngeal airway to prevent the client from biting down on an oral ETT.
- Provide humidified air or oxygen because the ETT bypasses the upper airways, which normally moisten the air.
- If the client is on MV, ensure that all alarms are enabled at all times because the client cannot call for help should an emergency occur.
- Communicate frequently with the client, providing a note pad or picture board for the client to use in communicating.
- Inform the client and family that an ETT is usually used as a short-term artificial airway **(Audrey, et al., 2016).**

Summary

According literature review of the previous studies

Many of researchers as Shibasaki, et al. (2019), Shiima, et al. (2016) and Lee, et al. (2016) have used a systematic review of the previous. While, the researcher used across sectional descriptive analytical design and developed a self-report structured questionnaire and observational checklist for data collection from all nurses working in the PICUs at government hospitals in the GS to assess KAP about ETI Guidelines among Nurses Working in PICUs at Governmental Hospitals in GS.

In addition, many of researchers as Veder, et al. (2020), Mwakanyanga, et al. (2018) and Foy, et al., (2018) conducted study aimed to assess the knowledge and practice, conducted their studies in adult ICUs. While, the researcher conducted the study in PICUs.

Nurses have an essential role in the ETI procedure in PICU, which positively affects the success of this procedure.

Most of previous studies have shown significant relationships between nurse's demographic characteristics (gender), qualifications, years of experience and KAP

However, some studies have shown there is no significant relationship between nurse's age, educational qualification and KAP.

Chapter 3

Research Methodology

Chapter 3: Research Methodology

Through this chapter, the issues related to the methodology that was used in this research are described, from the study design, study population, study setting, and period of the study, sample size, and sampling.

3.1 Study design

Cross sectional descriptive analytic design was used, aims to assess knowledge, attitudes and practices about ETI Guidelines among nurses working in PICUs at governmental hospitals in Gaza strip during the period of April 2021 May 2021.

3.2 Study population

In this research, the study population consists of all nurses (census sample) working in the five PICUs in government hospitals in the Gaza Strip, and their number when collecting data is 72 nurses.

Table (3.1): Distribution of study sample by hospital

Hospital name	**Number of nurses**
Kamal Edwan hospital	14
Al Dora pediatric hospital	15
Al Nasser pediatric hospital	16
Al Rantisi pediatric hospital	13
European Gaza Hospital	14
Total	**72**

3.3 Eligibility criteria

Inclusion criteria:

- All nurses working in PICUs in government hospitals, and they have been working for at least three months.
- They work full time schedule.

Exclusion criteria:

- Any nurse who is volunteer.

- Any student nurses.

- In long vacation or maternity leave.

3.4 Study setting

The study consisting of all the nurses in PICUs of the governmental hospitals in GS, Eldora pediatric hospital - The martyr Kamal Edwan Hospital- European Hospital Gaza - Dr. Abdel Aziz Al-Rantisi pediatric specialist hospital - Al-Nasr pediatric Hospital.

3.5 Data collection and study instrument

Data were collected by using two tools**:**

Tool (1): Nurses' self-structure questionnaire (Annex 1): It was used to assess nurses' knowledge and attitudes regarding ETI. This tool was developed by the researcher after reviewing the related literature, the questionnaire is clear with no complex terms, and no leading questions to collect the necessary data.

The questionnaire was distributed to all nurses working in the pediatric intensive care, where 72 questionnaires were distributed, and the response rate was 100%, as all these questionnaires were filled out and received. The questionnaire was sent to a specialists in nursing, and to specialist in English language. A questionnaire was provided with a covering letter explaining the purpose of the study, the way of responding, the aim of the research and the security of the information in order to encourage a high response.

Contents of the questionnaire:

Part 1: Personal and professional information, It includes demographic data such as (age, gender, qualification, work place and years of experience.

Part 2: Nurses' knowledge about ETI in PICU consisted of 15 items.

Part 3: Nurses' attitudes about ETI in PICU consisted of 15 items.

Tool (2): An observational checklist is developed by the researcher to observe the actual nurses' performance regarding ETI. Two nurses in each PICU were trained (the head of the department, who works in the morning continuously, and another nurse who works on shifts) were trained on how to handle the checklist. It included all procedures needed for application of ETI. The checklist consisted of 50 items (annex 4) distributed on three main domains:

1- Pre Procedure consisted of 26 items.

2- During Intubation consisted of 14 items.

3- Post procedure consisted of 10 items.

3.6 Pilot study

Before the actual start of data collection and in order to test reliability of the questionnaire and identify the clarity or ambiguity of the questionnaire statements, a pilot study was conducted that included 10 nurses, and after collecting this sample and with the absence of any observations or modifications from the nurses on the questionnaire and limited number of available subjects in the study, the ten questionnaires that were used in the questionnaire were included, the pilot study were reused in the actual study sample.

3.7 Study period

The questionnaires and checklists were collected during the period between 20/4/2021 till 31/5/2021, during which seventy-two questionnaires and twenty-five checklists were collected (five checklist from each PICU), questionnaires were distributed by the researcher by going directly to the intensive care departments. As for the checklist, two nurses were trained to fill it out.

3.8 Validity

In order to ensure the high validity of the components of questionnaire and checklist, they were presented to experts in the field of nursing and public health holding high scientific degrees and specialists in the field of ICU (Annex 7), and their observations and modifications were taken into account.

3.9 Reliability

The following steps were done to assure instruments reliability:

- Data collection by questionnaire were done by researcher himself.
- Then, the data entry in the same day of data collection would allow possible interventions to check the data quality.
- Knowledge, attitude data were examined for the internal consistency of its statements. The researcher used Cronbach's alpha coefficient to check the reliability ,table (3-2)

Table (3.2): Cronbach's alpha coefficient for KAP statements

Item	Value of Cronbach's alpha	Number of statements
Knowledge	0.827	**15**
Attitude	0.884	**15**

Data entry and analysis

The data was entered and analyzed in several stages. The first stage was data entry through constructing the entry base and coding of variables. In the second stage, the actual data entry process. In the third stage, data was entered at the time of data collection. In the fourth stage, the analysis and conducting data cleaning and data management for variables of interest were performed, and the researcher entered the data and analyzed it using version 25 of the Statistical Package for Social Sciences (SPSS) program, and descriptive analysis was also used, including figures, frequency tables were used to describe the main features of the data.

The number of knowledge and attitude statements were 15 for each, which were presented as 5- points Likert scale from one point for the strongly disagree statements to five for strongly agree ones. Thus, knowledge and attitude scores were the summation of the score of the fifteen statements multiplied by 100 and divided over 75 (15 multiplied by 5).

Practice score was calculated by giving one point for the applied step and zero for the not applied step. All the points were summed and multiplied by 100 over the number of practice statements in the three parts (pre, during, and post procedure).

Inferential analysis including; t- test, and one way analysis of variance (ANOVA) test were used to examine the relationship between knowledge, attitude, and practice and the demographic characteristics. In addition, Person correlation coefficient was used to examine the relationship between the two outcome variables (knowledge, attitude). Confidence interval was considered at 95% and p-value ≤ 0.05 was considered statistically significant.

3.10 Ethical considerations

Before starting the study, the researcher obtained approval from Islamic University (annex 4),and approval of the Deanship of Postgraduate Studies and Research Affairs (annex 5), as well as the approval of the Palestinian Ministry of Health, Gaza, by the General Directorate of human resource was obtained (annex 3), in addition each study participant has been fully explained about the purposes of the research and confidentiality (annex 1), All ethical consideration are observed, respect for people and human rights and respect for truth, confidentiality was given and maintained.

3.11 Statistical analysis

In this research, Likert scale was used. Ordinal scale is a ranking or a rating data that normally uses integers in ascending or descending order. The numbers assigned to the important (1, 2, 3, 4, 5) do not indicate that the interval between scales are equal, nor do they indicate absolute quantities.

They are merely numerical labels. Based on Likert scale we have the following:

Item	Strongly Disagree	Disagree	Undecided	Agree	Strongly agree
Scale	1	2	3	4	5

Statistical Package of Social Science (SPSS) program for data entry and analysis was used. Data analysis was done by the researcher with support from the supervisor.

- Cross tabulation started for specific study variables.
- Advanced statistical analysis used to explore the potential relationship among the study variables.

3.12 Limitation of the study

1. Lack of financial resources.
2. Follow up of nurses during work schedules of different shifts.
3. Limited literature about the topic, since it is the first study done in GS.

Chapter 4

Results and Discussion

Chapter 4: Results and Discussion

In this chapter, the study findings are presented. These findings answer the research questions that formulated in the introductory chapter regarding the level of participants' KAP about ETI procedure. Then, we interpreted the main results and compared them with the international findings.

4.1 Descriptive analysis

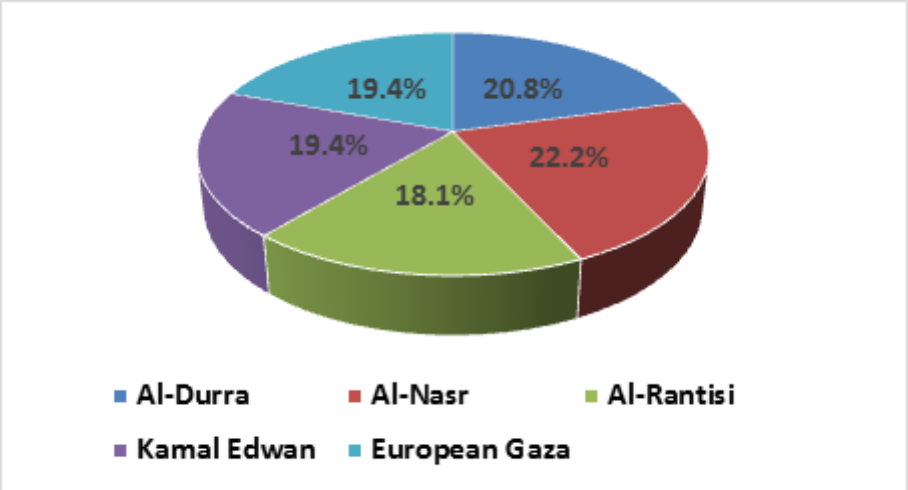

Figure (4.1): Distribution of study participants according to their hospitals

Table (4.1): Demographic characteristics of study participants

Variable	Categories	N (%)
Gender	male	56 (77.8)
	female	16 (22.2)
Marital Status	single	10 (13.9)
	married	60 (83.3)
	others	2 (2.8)
Qualifications	Diploma	7 (9.7)
	Bachelor	54 (75)
	Master	11 (15.3)
Hospital	Al-Durra	15 (20.8)

Variable	Categories	N (%)
	Al-Nasr	16 (22.2)
	Al-Rantisi	13 (18.1)
	Kamal Edwan	14 (19.4)
	European Gaza	14 (19.4)
Variable	Mean ± SD	(Min- Max)
Age	32.4 ± 6.4	(23- 55)
Experience	7.0 ± 5.8	(1- 32)

Table (4-1) shows the demographic characteristics of the study participants. Seventy-two nurses working at the PICUs of the only five pediatric hospitals located in the GS. Of them, 77.8% are males, the majority 83.3% are married and having Bachelor degree (75%). The participated nurses are working at the five hospitals as follows; Al- Durra, Al-Nasr, Al-Rantisi, Kamal Edwan, and European Gaza hospitals in the percentages 20.8%, 22.2%, 18.1%, 19.4%, and 19.4% respectively. The mean age of the participants is 32.4 years, and have 7 years of experience.

In the conducting study of Yassin and Salama (2015), where the sample of the study consisted of 93 nurses, the results showed that a large percentage of nurses are females with a percentage of 69.9%, holders of a bachelor's degree in nursing 48.4%, and a diploma holders of 37.6%,but in our current study showed that 77.8% are males, the majority 83.3% was married, and having Bachelor degree (75%), these results of Yassin and Salama study are inconsistent with our current study, which shows that the number of male nurses is greater than female nurses, and it reflects the negative view that prevailed previously towards the nursing profession in the GS, and part of this view was the presence of foreign females nurses who have an open culture different from the culture of our people in the GS, as for the increase in the percentage of holders of bachelor's and master's degrees in the GS, due to the presence of well-established national nursing colleges, and it reflects the orientation of the nursing profession's children to complete their higher studies.

The results of current study disagreement with Mwakanyanga et al. (2018) study that 103 ICU nurses participated in the study, response rate 96% of potential study participants. The majority (60.2%) of study participants had diploma in Nursing, 43.7% had worked in ICU between 1 and 5 years and 72.7% were females.

It is certain that the percentage of male nurses working in the PMOH is greater than that of female nurses, which is consistent with the results of our current study, which showed that the percentage of the staffing of research males is higher than females. The percentage of who hold a bachelor's degree in nursing outweigh the percentage of those who hold a diploma., which indicates the appointment of highly educated nurses in the PICU with high qualifications and skills, and this, of course, is positively reflected on the health care provided to patients in the PICUs in the GS.

Table (4.2): Participants' Knowledge about ETI procedure

Statements	SD	D	N	A	SA	Mean	% Mean
Multiple emergency drugs to be ready during ETI procedure.	2(2.8)	2(2.8)	2(2.8)	28(38.9)	38(52.8)	4.4	88
Years of experience have played a role in the success of the ETI procedure in PICU.	4(5.6)	1(1.4)	4(5.6)	27(37.5)	36(50)	4.3	86
I have the scientific knowledge to assist in the ETI procedure.	2(2.8)	5(6.9)	2(2.8)	31(43.1)	32(44.4)	4.2	84
Different sizes of laryngoscopes blades are on standby when doing ETI.	5(6.9)	1(1.4)	1(1.4)	31(43.1)	34(47.2)	4.2	84

Statements	SD	D	N	A	SA	Mean	% Mean
I know all supplies that are used in the ETI procedure.	3(4.2)	3(4.2)	2(2.8)	30(41.7)	34(47.2)	4.2	84
The training courses assist in increasing the nurse's competence with the help of ETI.	3(4.2)	3(4.2)	5(6.9)	36(50)	25(34.7)	4.1	82
In your PICU, the instruments used in ETI are easy to reach during its procedure.	4(5.6)	4(5.6)	3(4.2)	35(48.6)	26(36.1)	4.0	80
The most frequent method to stabilize the ETT is the adhesive tape method.	2(2.8)	5(6.9)	7(9.7)	37(51.4)	21(29.2)	4.0	80
I know to assess the risk factors for failure of ETI.	4(5.6)	4(5.6)	5(6.9)	40(55.6)	19(26.4)	3.9	78
It is preferable to use the uncuffed tube in ETI for children under 8years.	4(5.6)	4(5.6)	10(13.9)	36(50)	18(25)	3.8	76
Guidelines for ETI are available in your PICU.	16(22.2)	18(25)	4(5.6)	25(34.7)	9(12.5)	2.9	58

Statements	SD	D	N	A	SA	Mean	% Mean
There is a shortage of tools that are used in ETI.	12(16.7)	20(27.8)	14(19.4)	21(29.2)	5(6.9)	2.8	56
It is appropriate that one size of ETT should be available when doing ETI.	22(30.6)	18(25)	7(9.7)	18(25)	7(9.7)	2.6	52
It is appropriate one size of the suction catheter should be available when doing ETI.	21(29.2)	18(25)	10(13.9)	15(20.8)	8(11.1)	2.6	52
The first action for respiratory support in PICU is ETI.	25(34.7)	24(33.3)	7(9.7)	13(18.1)	3(4.2)	2.2	44
Overall						**3.6**	**72.3**

Table (4-2) demonstrates participants' responses about knowledge statements, mean, standard deviation, and the percentage mean score and the overall percentage mean score. The overall percentage mean score for the knowledge statements is 72.3%. The highest percentage mean scores were for the statements "Multiple emergency drugs to be ready during ETI procedure" and "Years of experience have played a role in the success of the ETI procedure in PICU" 88%, and 86% respectively. Three statements have a good percentage mean score 84% "I have the scientific knowledge to assist in the ETI procedure.", "Different sizes of laryngoscopes blades are on standby when doing ETI", and "I know all supplies that are used in the ETI procedure". In contrast, the participants responded with low mean scores for the statements "Guidelines for ETI are available in your PICU" 58%, "There is a shortage of tools that are used in ETI" 56%, "It is appropriate that one size of ETT should be available when doing ETI" 52%,

“It is appropriate one size of the suction catheter should be available when doing ETI” 52%, and “The first action for respiratory support in PICU is ETI” 44%.

Our current study indicates that a significant percentage admit that there are no instructions in the intensive care department, especially for ETI.

In current study 75% from nurses preferable to use the uncuffed tube in ETI for children under 8years. On the other hand, a study of Chambers et al., (2018) shows many advantages of cuffed tube, If uncuffed ETTs are compared with cuffed ETTs, and through many studies, it will be clear to us that cuffed ETTs provide better ventilation and require less requirements for ETI, and the rate of complications and associated adverse events in children is lower.

Current study results about knowledge were also consistent with the study of Abuadwan, (2018): The results also indicated that the overall average knowledge about measures to prevent VAP in PICU was (75.17%), this, in my opinion, is the result of the presence of nurses who hold advanced degrees in nursing and are highly qualified in PICU in the GS.

Nevertheless, up to the researcher's knowledge there is no direct research sources on the knowledge of pediatric intensive care nurses about endotracheal intubation guidelines, we did find some convergent studies in this regard, and this indicates the lack of interest in this aspect in studies and research on pediatric intensive care.

Table (4.3): Participants' attitude about ETI procedure

Statements	SD	D	N	A	SA	Mean	% Mean
Taken safety and protection measures can protect yourself while applying the ETI procedure.	2(2.8)	5(6.9)	3(4.2)	25(34.7)	37(51.4)	4.3	86
I believed that Pre-oxygenation before ETI can prevent hypoxemia.	2(2.8)	6(8.3)	4(5.6)	27(37.5)	33(45.8)	4.2	84
The training courses assist in increasing the nurse's competence with the help of ETI.	2(2.8)	7(9.7)	2(2.8)	38(52.8)	23(31.9)	4.0	80
I believe that ETI is important to prevent serious complications in the patient.	4(5.6)	3(4.2)	5(6.9)	43(59.7)	17(23.6)	3.9	78
I think that the lighting condition in the PICU affects the procedure of ETI.	4(5.6)	5(6.9)	7(9.7)	33(45.8)	23(31.9)	3.9	78

Statements	SD	D	N	A	SA	Mean	% Mean
I believe that using an uncuffed tube is better than using a cuffed tube in children under 8 years.	3(4.2)	4(5.6)	8(11.1)	40(55.6)	17(23.6)	3.9	78
Suspected obstruction of the endotracheal tube by secretions.	4(5.6)	5(6.9)	5(6.9)	41(56.9)	17(23.6)	3.9	78
Switch off the electricity for more than two minutes on the PICU affected on the ETI.	3(4.2)	13(18.1)	15(20.8)	25(34.7)	16(22.2)	3.5	70
Long working hours can be a reason for the failure of ETI.	5(6.9)	10(13.9)	9(12.5)	43(59.7)	5(6.9)	3.5	70
Matching names (the same name) between the staff members can lead to confusion when applying ETI.	7(9.7)	14(19.4)	21(29.2)	23(31.9)	7(9.7)	3.1	62

Statements	SD	D	N	A	SA	Mean	% Mean
I think that the lack of staff members under 6 health providers lead to the failure of the ETI.	7(9.7)	34(47.2)	16(22.2)	8(11.1)	7(9.7)	2.6	52
I think that one of the emergency drugs to be drawn up is enough to be available when doing ETI.	19(26.4)	22(30.6)	8(11.1)	18(25)	5(6.9)	2.6	52
I believe that one size of suction catheter is enough to be available when doing ETI.	23(31.9)	30(41.7)	8(11.1)	10(13.9)	1(1.4)	2.1	42
I believe that one size of laryngoscope blades is enough to be available when doing ETI.	24(33.3)	36(50)	6(8.3)	5(6.9)	1(1.4)	1.9	38
I believe that one size of ETT is enough to be available when doing ETI.	31(43.1)	28(38.9)	3(4.2)	8(11.1)	2(2.8)	1.9	38
Overall						**3.3**	**65.7**

Table (4-3) illustrates the participants' responses about attitude statements, mean, standard deviation, the percentage mean score and the overall percentage mean score. The overall percentage mean score for the attitude statements is 65.7%. The highest percentage mean scores of their attitude were for the statements "Taken safety and protection measures can protect yourself while applying the ETI procedure" 86%, "I believed that Pre-oxygenation before ETI can prevent hypoxemia" 84%, and "The training courses assist in increasing the nurse's competence with the help of ETI, 80%.

In contrast, the participants responded with low mean scores for the attitude statements "I think that the lack of staff members under 6 health providers lead to the failure of the ETI" and "I think that one of the emergency drugs to be drawn up is enough to be available when doing ETI" 52% for each, "I believe that one size of suction catheter is enough to be available when doing ETI" 42%, I believe that one size of laryngoscope blades is enough to be available when doing ETI and "I believe that one size of ETT is enough to be available when doing ETI" 38% for each.

In the conducting study Liyew, et al., (2020): that aimed to assess knowledge, attitude, and associated factors towards physical assessment on critically ill patients among nurses working in the intensive care unit at Amhara regional state referral hospitals, disagreement with current study, this study showed that Attitude proportions of nurse's attitudes percentage 52.8% put in my result study it is 65.7%

From my point of view, the weakness in the nurses' attitudes towards ETI is due to the lack of clear guidelines showing the role of nursing in this procedure within the pediatric intensive care departments, which is what our current study indicated.

Table (4.4): Demographic characteristics of patients performed the ETI

Variable	**Categories**	**N (%)**
Gender	male	12 (48)
	female	13 (52)
Variable	**Mean ± SD (months)**	**Min- Max**
Patients' age	9.2 ± 16.3	1- 84

The researcher observed the nurse practice during twenty- five ETI procedures in the five PICUs hospitals, five practice chick list in each of them. Table (4-4) demonstrates the patients' demographic characteristics. More than half of the patients are females (52%), the mean age is 9.2 months (the youngest patient was one months, and the oldest was 84 months (7 years)).

Table (4.5): Information about the observed ETI procedures

Variable	Categories	N (%)
Working shift	morning	12 (48)
	evening	8 (32)
	Night	5 (20)
ETI emergency	planned	5 (20)
	Urgent	20 (80)
Number of trials	once	13 (52)
	twice	10 (40)
	more than twice	2 (8)
Complication during Procedure	difficult intubation	1 (4)
	desaturation	2 (8)
	Hypoxia	1 (4)
	Arrested	1(4)
	No	20 (80)
Patient status after intubation	Alive	24 (96)
	Dead	1 (4)

Table (4-5) demonstrates data about the performed ETI procedures. About half of the procedures (48%) performed at morning shift, the majority (80%) were argent and (52%) performed successfully in one trial, only four cases had complications during the procedure; two patients had desaturation, and only one patient had difficult intubation, and another had hypoxia, and one of them was died.

The results of the current study showed that 80% of intubation was performed as an urgent procedure, there is disagreement with the conducted study Bahar et al., (2015) showed that 65% of ETI procedures for patients occur electively, 27% of ETI procedures are performed emergency, and 8% of these patients undergo intubation performed semi-urgently.

Comparing these results with other studies reflected that the percentage of complications of cardiac arrest in current study 4% is agreement with conducted study Shiima et al. (2016) showed that total of 5,232 ETI were evaluated, TI associated cardiac arrest was reported in 1.7%.

Lapinsky, (2015): conducted a study of ETI in the ICU show that 40% of patients suffer from significant complications resulting from ETI, 10-25% have severe hypotension, 25% have severe hypoxemia, and 2% may have cardiac arrest.

The results of the study showed that 52% of patients in current study was intubated from the first attempt, second attempt 40% and more than three attempts 8%, this percentages agreement and close with Lee et al., (2016): conducted study show that first attempt success was achieved in 60 %, second attempt in 24 %, and ≥3 attempts in 15 %, With a slight difference in the number of tracheal intubation attempts more than three trials.

Bahar et al., (2015) conducted study showed that the success rate of intubation was 61% in the first attempt. It is also consistent with the results of our current study.

Graciano et al., (2014) conducted study in this finding is consistent with our findings that percentage of endotracheal intubation after three or more attempts, this study show that difficult TIs in PICUs requiring three or more attempts by advanced providers were reported in 8.8 % of all TIs.

About difficult intubation there is a difference with the conducted study Bahar et al., (2015) showed that the common complication was difficult intubation 21%, but in current study it is 8%, In addition, there is a difference in the rate of complications resulting from ETI, where the percentage in our current study was 20% compared with

the conducted study Bahar et al., (2015) showed that the rate of complications resulting from ETI is 36%, while the rate of life-threatening complications was 11%. The most important of these life-threatening complications is severe hypoxemia which represents 8%, in addition to cardiac arrest, which represents 2%, the low rate of complications resulting from ETI in our current study compared to previous studies is a good indication of the efficiency of health staff working in pediatric intensive care in the GS.

Table (4.6): Participants' practice about ETI pre procedure

Statements	Applied	Not applied	Mean	% Mean
Suction tools were prepared.	25(100)	0 (0)	1.00	100
A good IV access with running lines was fixed.	25(100)	0 (0)	1.00	100
Stethoscope checked and ready to use.	25(100)	0 (0)	1.00	100
An emergency drugs to be drawn up (labeled & double checked).	25(100)	0 (0)	1.00	100
Monitoring for (BP, ECG, Spo2, and RR) was ready.	25(100)	0 (0)	1.00	100
The first intubator is known.	25(100)	0 (0)	1.00	100
Drug administrator ready.	25(100)	0 (0)	1.00	100
The Bag valve mask (BVM) with positive end-expiratory pressure (PEEP), (Ambu bag) was attached to O2.	24(96)	1(4)	0.96	96
Multiple sizes of endotracheal tubes ready.	24(96)	1(4)	0.96	96
Laryngoscopes, handles, and blades (appropriate size) were checked.	24(96)	1(4)	0.96	96
A laryngoscope is checked and ready to use.	24(96)	1(4)	0.96	96
Emergency trolley was checked and on standby.	23(92)	2(8)	0.92	92
Fixed NGT and continuously aspiration during face mask ventilation.	22(88)	3(12)	0.88	88
Different sizes of stylets were on standby.	21(84)	4(16)	0.84	84
Cricoid pressure person found and ready.	21(84)	4(16)	0.84	84
A Verbal or written consent form was obtained.	18(72)	7(28)	0.72	72

Statements	Applied	Not applied	Mean	% Mean
History for allergies/drugs was checked.	18(72)	7(28)	0.72	72
Rapid sequence intubation (RSI), (plan A), and Backup plan (plan B, C, D) if the airway is difficult.	15(60)	10(40)	0.60	60
Multiple sizes of oral airways ready.	14(56)	11(44)	0.56	56
Procedure and risk had been explained for the family.	13(52)	12(48)	0.52	52
History of difficult intubation was obtained.	13(52)	12(48)	0.52	52
The team leader is known.	13(52)	12(48)	0.52	52
The second intubator is known.	8(32)	17(68)	0.32	32
End-tidal co2 (Capnography), waveform visible the monitor.	2(8)	23(92)	0.08	8
Multiple sizes of nasal airways ready.	1(4)	24(96)	0.04	4
Surgical airway kit available.	1(4)	24(96)	0.04	4
Overall practice pre procedure			**0.73**	**73**

Table (4-6) shows the participants' responses about the pre procedure statements. The overall percentage practice score for prior the procedure is 73%. All the participants approved that "the suction tools were prepared prior the procedure", "a good IV access with running lines was fixed, stethoscope checked and ready to use", "an emergency drugs to be drawn up (labeled and double checked)", "monitoring for (BP, ECG, Spo2, and RR) was ready, the first intubator is known, and drug administrator ready".

Also, 96% of the participants responded with the application of four statements; "the BVM with positive end-expiratory pressure, (Ambu bag) was attached to O2", "multiple sizes of ETTs ready", "laryngoscopes, handles, and blades (appropriate size) were checked", and "laryngoscope is checked and ready to use".

Other good responses were given for the following statements; "fixed NGT and continuously aspiration during face mask ventilation 88%", "different sizes of stylets were on standby 88%", and "cricoid pressure person found and ready" 84%.

Other moderate responses were given for these statements; "a Verbal or written consent form was obtained" 72%, "history for allergies/drugs was checked" 72%, "rapid sequence intubation (RSI), (plan A), and Backup plan (plan B, C, D) if the airway is difficult" 60%, and 52% response score was given for the three statements "procedure and risk had been explained for the family", "history of difficult intubation was obtained", "the team leader is known".

Finally, a very weak responses was given for the statements; "the second intubator is known" 32%, "end-tidal co2 (Capnography)", "waveform visible the monitor" 8%,"multiple sizes of nasal airways ready" 4%, and "surgical airway kit available" 4%.

I believe that the lack of a second assistant in the intubation process is due to a shortage of medical staff in the PICUs in the GS. As for the lack of use of the device designated to read the carbon dioxide level (Capnography), and through my work in pediatric intensive care, it is caused by the lack of numbers of these devices, and sometimes health providers are lazy about their use.

Foy et al., (2018) conducted study shown that 80% of the responding nurses in PICUs use capnography for TI, This is very contrary to the results of our study, which proves that there is a 92% rate of not using Capnography, and I think that it may not be widely available in the intensive care for children, or that there are other, easier and faster ways to use to make sure that the endotracheal tube is in the right place.

Table (4.7): Participants' practice about ETI during procedure

Statements	Applied	Not applied	Mean	% Mean
Preoxygenation (minimum Spo2 90%).	25 (100)	0(0)	1.00	100
Optimal hemodynamics and monitoring vital signs were checked.	25 (100)	0(0)	1.00	100
The head-tilt chin-lift maneuver lifts the tongue from the back of the throat and maintains an open, patent airway.	25 (100)	0(0)	1.00	100
Jaw thrust maneuver to maintain a patent-airway.	25 (100)	0(0)	1.00	100

Statements	Applied	Not applied	Mean	% Mean
Identify the epiglottis and lift it and adjust the tip of the laryngoscope blade in the vallecula.	25(100)	0(0)	1.00	100
The patient position is optimal for endotracheal intubation (ETI).	24(96)	1(4)	0.96	96
Administer the paralytic drugs.	24(96)	1(4)	0.96	96
Bed high optimum.	23(92)	2(8)	0.92	92
The right hand was used to hold the ETT.	22(88)	3(12)	0.88	88
The assistant was asked to retract the stylet and remove it.	19(76)	6(24)	0.76	76
While the assistant is removing the stylet, the physician hold the ETT steady in place.	19(76)	6(24)	0.76	76
Confirm contraindications for ETI excluded.	16(64)	9(36)	0.64	64
Protective personal equipment (PPE) is used.	14(56)	11(44)	0.56	56
The cuff is inflated (special for cuffed ETT).	14(56)	11(44)	0.56	56
Overall practice during procedure			**0.86**	**86**

Table (4-7) shows the participants' responses about the during procedure statements. The overall percentage practice score for during the procedure is 86%. All the participants approved that "preoxygenation (minimum Spo2 90%)", "optimal hemodynamics and monitoring vital signs were checked", "the head-tilt chin-lift maneuver lifts the tongue from the back of the throat and maintains an open, patent airway", "jaw thrust maneuver to maintain a patent-airway". Also, a very good response scores were given for "the patient position is optimal for endotracheal intubation (ETI)" 96%, "administer the paralytic drugs" 96%, "bed high optimum"92%, "the right hand was used to hold the ETT" 88%. Also, 76% score was given for the statements "the assistant was asked to retract the stylet and remove it", and "while the assistant is removing the stylet, the physician hold the ETT steady in place". In contrast, low response scores were given for the statements “confirm contraindications for ETI excluded”, “protective personal equipment (PPE) is used”, and “the cuff is inflated (special for cuffed ETT)” 64%, 56%, and 56% respectively, These results indicate an

improvement in the practical performance of the two patients during endotracheal intubation.

Shibasaki et al., (2019) conducting study also agreement with current study about used cuffed tube in ETI, It also indicated the great use of cuffed ETTs, as the results showed that 55.7% of university hospital patients were intubated using cuffed ETT, and 56.9%) of children's hospitals patients. In general hospitals, cuffed ETTs were used in less than half of cases (45.0%). Although science books prefer not to use cuffed tube under the age of eight, our current study agreement with some studies, which show that the use of cuffed tube is more than uncuffed tube in children under the age of eight, I attribute this to the lack of uncuffed tube in PICU.

I attribute this to the lack uncuffed tube of presence, and a preference for use cuffed tube because there is no leakage in the air entering the patient through the M.V, in addition to the good fixation of the tube.

In Veder et al., (2020) conducting study that results showed somewhat different results from the previous one, which indicated that cuffed ETTs were not routinely used in children under 8 years, and the rate of cuffed ETT was 14%.

Table (4.8): Participants' practice about ETI post procedure

Statements	Applied	Not applied	Mean	% Mean
Vital signs are checked every one hour.	25 (100)	0 (0)	1	100
Hand over to nursing staff.	25 (100)	0 (0)	1	100
Bilateral auscultation.	24(96)	1(4)	0.96	96
The endotracheal tube is secured and cuff pressure checked.	24(96)	1(4)	0.96	96
Nasal O2 Removed.	24(96)	1(4)	0.96	96
Head of bed at 30 degrees.	20(80)	5(20)	0.8	80
Chest X-Ray done for the patient to check the depth of the tube.	19(76)	6(24)	0.76	76
ABGs are done during the first 30 minutes after ETI.	19(76)	6(24)	0.76	76
Administer drip of sedation.	18(72)	7(28)	0.72	72
End-Tidal CO2 valve with waveform.	4(16)	21(84)	0.16	16
Overall practice post procedure			**0.808**	**80.8**

Table (4-8) illustrates the participants' responses about the post procedure statements. The overall percentage practice score for post the procedure is 80.8%. All the participants approved that "vital signs are checked every one hour" and "hand over to nursing staff". Also, a high score 96% was given for three statements "bilateral auscultation", "the endotracheal tube is secured and cuff pressure checked" and "nasal O2 Removed". In addition, other scores 80% was given for the statement "Head of bed at 30 degrees", 76% for both "chest X-Ray done for the patient to check the depth of the tube" and "ABGs are done during the first 30 minutes after ETI", 72% for the statement " administer drip of sedation". On the other hand, a very low response score was given for the statement "end-Tidal CO2 valve with waveform". In contrast, a very low score 16% was given for the statement “End-Tidal CO2 valve with waveform”.

Knowledge, attitude, and practice scores

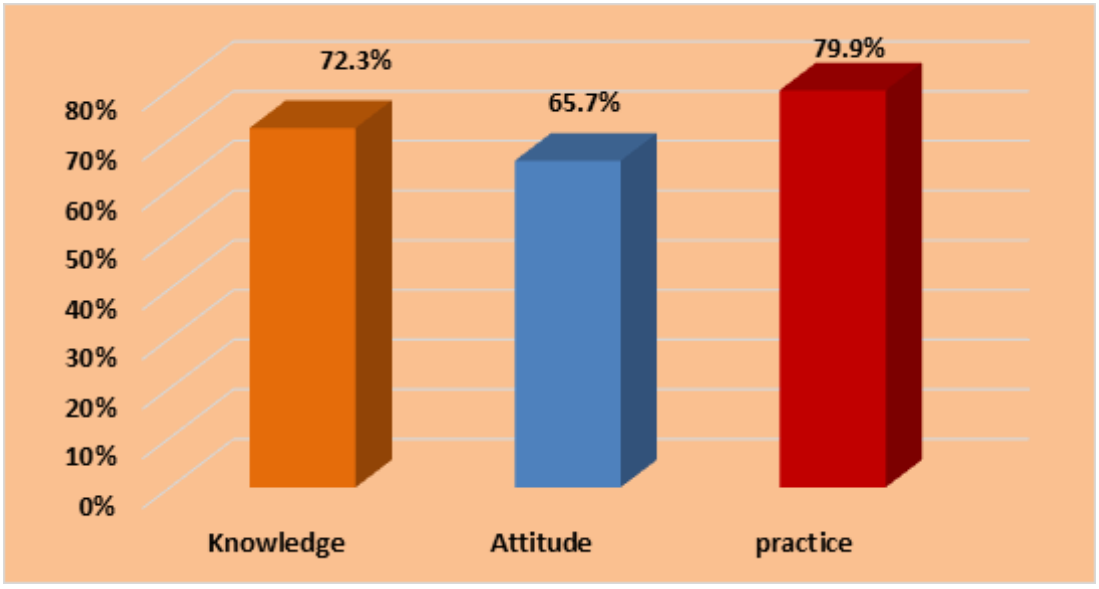

Figure (4.2): Knowledge, Attitude, and Practice scores

Figure (4-2) demonstrates the percentage mean scores for the participants' knowledge, attitude, and practice about ETI procedure. The overall percnetage mean score are 72.3%, 65.7%, and 79.9% for knowledge, attitude, and practice respectively.

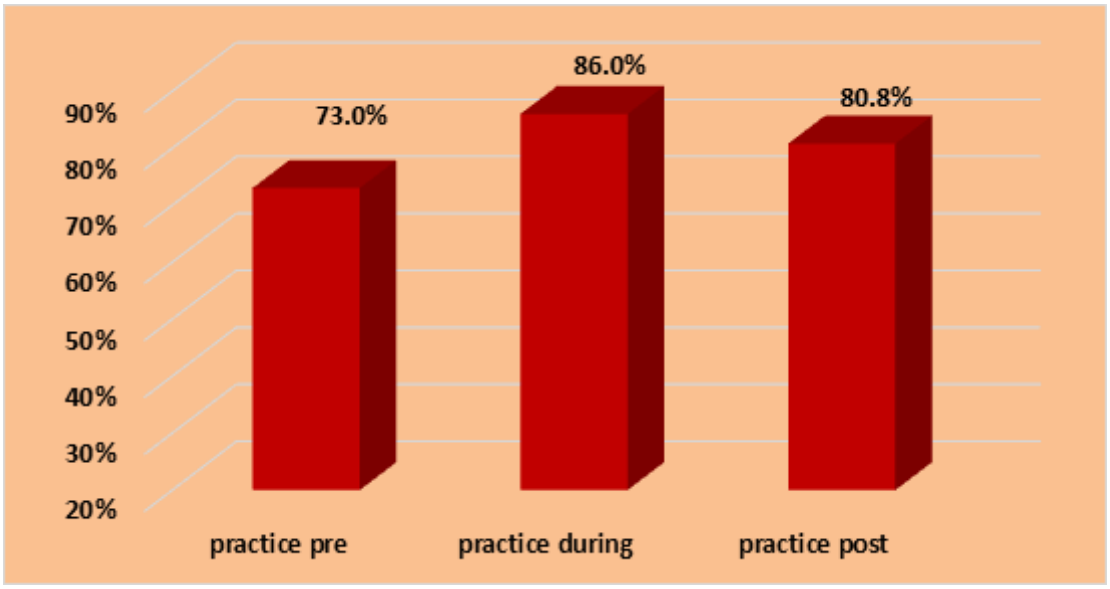

Figure (4.3): Practice scores in pre, during, and post ETI procedure

Figure (4-3) demonstrates the percentage mean scores for the practice pre procedure 73%, during the procedure 86%, and post procedure 80.8%.

Table (4.9): Practice scores in pre, during, and post ETI procedure

Variable	%Mean ± SD	Min- Max
Knowledge	72.3 ± 11.7	28- 88
Attitude	65.7 ± 9.9	21.3- 86.7
Practice	79.8 ± 5.9	69.7- 92.3

Table (4-9) shows the descriptive analysis of KAP scores. Mean score for knowledge is 72.3% (range: 28- 88), for attitude; is 65.7% (range: 21.3- 86.7), and for practice score is 79.8% (range: 69.7- 92.3).

4.2 Inferential analysis

Table (4.10): Relationship between knowledge and attitude

Variable		Knowledge	Attitude
Knowledge	Pearson coefficient value	1	0.697** 0.000
Attitude	Pearson coefficient P- value	0.697** 0.000	1

** Correlation is significant at the 0.01 level

Table (4-10) demonstrates the relationship between participants" knowledge and attitude. The Pearson correlation coefficient of the relationship between the two outcome variables is 0.697 which is statistically significant (p- value= 0.000) which is considered positive moderate correlation, there is limited literature related to knowledge and attitude towards ETI among nurses in PICUs, and it is challenging to make a comparison without consistent measuring instruments with little studies that do exist .The findings showed that nurses working in ICU had better knowledge and favorable attitudes .

Table (4.11): Differences in Knowledge scores according to demographic characteristics

Variable	N	% Mean ± SD	F/t	P-value
Gender				
Male	56	71±12.7	-2.5	0.013*
Female	16	76.8±5.9		
Age				
<= 30 Years	30	66.1±8.1	0.348	0.729
> 30 Years	42	65.4±11.1		
Experience				

Variable	N	% Mean ± SD	F/t	P-value
< 10 years	51	70.7±11.7	-1.867	0.066
>= 10 years	19	76.6±11.6		
Marital status				
Single	10	74.5±6.8	1.069	0.349
Married	60	71.6±12.4		
Others	2	82.7±7.5		
Qualifications				
Diploma	7	76±4.1	0.416	0.661
Bachelor	54	71.7±12.2		
Master	11	72.8±13.2		
Hospital				
Al-Durra	15	72.7±13.8	0.989	0.420
Al-Nasr	16	68±16.1		
Al-Rantisi	13	75.9±8.6		
Kamal Edwan	14	74.5±5.9		
European Gaza	14	71.3±10.2		

* Statistically significant

Table (4-11) demonstrates the differences in participants' knowledge scores with regards to demographic characteristics. A statistically significant difference in participants' knowledge was shown with regard to their gender (t= 2.5, p- value= 0.013) in that females show a higher knowledge score (76.8%) than males (71%). Also, there is a positive trend regarding experience difference between those < 10 years of experience show 70.7%, and those >= 10 years have knowledge score 76.6%, but the difference does not reach the statistically significant (p- value= 0.066). These results were also consistent with the study of Abuadwan, (2018): The results showed that there were statistically no significant differences in levels of Knowledge related to age of the nurse and qualification.

Abuadwan (2018), conducting study indicate that higher percentage of male nurses have moderate level of knowledge and higher percentage of female nurses have high level of knowledge about prevention of VAP in PICU it is agreement with current study results show that male nurses have moderate level of knowledge and female nurses have high level of knowledge about ETI.

Others examined demographic characteristics (age, marital status, qualifications, and hospital) show no differences between their categories as all p- values > 0.05.

This study compatible with the study of Sherpa et al. (2014) that reported that there was no significant association between knowledge score and educational qualification in ICU.

Ahmed and Abosamra (2015) conducting study indicated that there is a strong correlation between years of experiences, previous training and knowledge in PICU, and by comparing the results with other studies, it was found that there were a range of different factors that affected the knowledge and practice of preventing VAP in the PICU that consistent with current study about a positive trend regarding experience difference between those < 10 years of experience show 70.7%, and those >= 10 years have knowledge score 76.6%.

Table (4.12): Differences in Attitudes scores according to demographic characteristics

Variable	N	% Mean ± SD	F/t	P-value
Gender				
Male	56	64.9±10.1	-1.2	0.229
Female	16	68.3±9.2		
Age				
<= 30 Years	30	66.1±8.1	0.322	0.749
> 30 Years	42	65.4±11.1		
Experience				
< 10 years	51	64.6±10.7	-	0.100

Variable	N	% Mean ± SD	F/t	P-value
>= 10 years	19	69.1±7.2	1.668	
Marital status				
Single	10	65.6±7	0.090	0.914
Married	60	65.6±10.5		
Others	2	68.7±8.5		
Qualifications				
Diploma	7	66.3±8.7	0.469	0.627
Bachelor	54	65.1±10.5		
Master	11	68.2±7.5		
Hospital				
Al-Durra	15	66.6±11.7	0.709	0.589
Al-Nasr	16	64.3±14.5		
Al-Rantisi	13	69.2±5.2		
Kamal Edwan	14	65.3±7		
European Gaza	14	63.3±7.1		

* Statistically significant

Table (4-12) demonstrates the differences in participants' attitude scores with regards to demographic characteristics. All the examined demographic characteristics (gender, age, experience, marital status, qualifications, and hospital) show no differences in attitude scores between their categories as all p- values > 0.05.

Despite the continuous research and up to the researcher knowledge there is no direct research sources have been found on the attitudes of nurses working in the PICU to the guidelines for ETI.

Table (4.13): Differences in practice scores according to patients' and work characteristics

Variable	N	% Mean ± SD	F/t	P-value
Gender				
male	12	81.3± 6.2	1.19	0.244
female	13	78.5± 5.4		
Age				
<= 6 months	15	78.3± 6.9	-2.082	0.050*
> 6 months	9	82.5± 2.9		
Hospital				
Al-Durra	5	85.1± 5	7.021	0.001*
Al-Nasr	5	78.4± 4.6		
Al-Rantisi	5	84.6± 2.9		
Kamal Edwan	5	77.1± 2.6		
European Gaza	5	73.8± 5		
ETI emergency				
planned	5	78± 3.5	-0.748	0.462
Urgent	20	80.3± 6.3		
Number of trials				
Once	13	80.6± 6.9	0.269	0.767
Twice	10	78.7± 4.5		
More than twice	2	80.3± 7.5		
Complications				
yes	9	82.2± 6	2.406	0.135
no	16	78.5± 5.6		
Working shift				
Morning	12	78.2± 6.2	0.886	0.427
Evening	8	81.5± 6		
Night	5	81± 4.8		

* Statistically significant

Table (4-13) demonstrates the differences in practice score regarding patients' demographic and work characteristics. A statistically significant difference in practice score was shown with regard to the patients' age (t= 2.08, p- value= 0.05) in that practice score with patients > 6 months is better (82.5 %) than with patients <= 6 months (78.3%).

Regarding hospitals, the study shows a statistically significant differences in practice scores between the pediatric hospitals in that Al-Durra hospital and Al-Rantisi hospital show the highest 85.1% and 84.6% respectively. The other hospitals showing lower scores; Al-Nasr hospital (78.4%), Kamal Edwan hospital (77.1%), European Gaza hospital (73.8%), see annex (6). Post- hoc test revealed statistically significant differences between Al-Durra hospital and all other hospitals except Al-Rantisi hospital, and between Al-Rantisi hospital and all other hospitals except Al-Durra There is no statistically significant difference in the practice scores regarding other patients' and work variables (gender, ETI emergency, number of trials, complications, working shift).

From my point of view as a researcher in the high percentage in the practical application and through my observation that Al-Durra Hospital contains a number of nurses who have a master's degree in health fields.

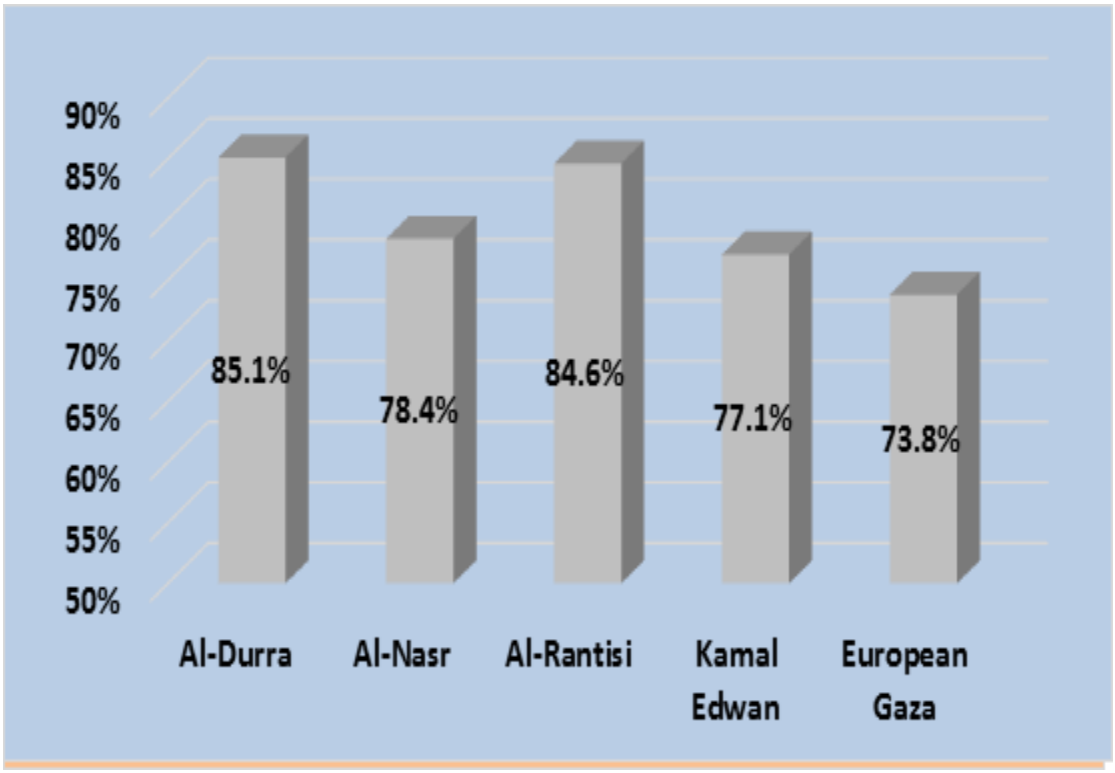

Figure (4.4): Differences between practice scores with regards to the hospitals

There is no doubt that the PICU is a special place and closed place, and in the PICU, many important procedures are performed, which are usually accompanied by major and undesired complications, and since nurses deal with pediatric patients and they are more sensitive than adults, it is from my point of view of When appointing nurses, it is necessary to take into account their potential and desire to learn and to have great competencies and high scientific qualifications, I think that the department of human resources development and department of in-service training should pay attention to the critical care units and offer appropriate learning and in-service training to qualify the nurses to work in PICU.

Chapter 5

Conclusions and Recommendations

Chapter 5: Conclusions and Recommendations

Through the results of our current study, the following recommendations and conclusions were drawn, knowing that the current study conducted to assess the Knowledge, attitudes and practices about Endotracheal Intubation Guidelines among nurses working in Pediatric Intensive Care Units at Governmental Hospitals in Gaza Strip, is the first of its kind study in the Gaza Strip in particular and Palestine in general.

5.1 Conclusions

ETI in the PICU is a high-risk procedure, resulting in significant morbidity and mortality. Therefore, there must be well-trained nurses with a high level of knowledge and training in this regard.

The purpose of the current study was to assess and determine the knowledge, attitudes and practice of the pediatric intensive care unit nurses regarding Endotracheal Intubation Guidelines at Pediatric Governmental Hospitals in Gaza Strip.

The study utilized Cross sectional descriptive analytic design, and the sample of the study consisted of 72 PICU nurses from five governmental hospitals in GS. The results of the study showed that 72.3% Of PICUs nurses have good knowledge and the overall percentage mean score for the attitude statements is 65.7% about endotracheal intubation. Also, the results showed that 79.9% of nurses practice (The overall percentage practice score for pre the procedure is 73%.- The overall percentage practice score for during the procedure is 86%.The overall percentage practice score for post the procedure is 80.8%) and generally, the results reflected good level of practice.

Several sociodemographic factors influence level of knowledge, the results indicated that a statistically significant difference in participants' knowledge was shown with regard to their gender (t= 2.5, p- value= 0.013) in that females show a higher knowledge score (76.8%) than males (71%). Also, there is a positive trend regarding experience difference but the difference does not reach the statistically significant.

In addition, nurses who have master degree, and nurses from Al-Durra and Al Rantisi hospitals exhibited higher level of practices about ETI in PICU, Others examined demographic characteristics (age, marital status, qualifications, and hospital) show no differences between their categories as all p- values > 0.05.

The study concluded that in order to maintain high level of knowledge and quality practices about ETI, nurses who are working in PICU should be selected carefully, should receive adequate training, and should be monitored and evaluated periodically to maintain high quality of care.

5.2 Recommendations

1. Working on communicating the results of the current study to decision makers in the MOH, to take these results into consideration.

2. Working on implementing educational and developmental programs for nurses working in PICU, and making attendance at these programs mandatory as much as possible.

3. Make an effort to create clear written guidelines and protocols for ETI to define the proper procedure and to ensure that everyone does it the same way.

4. Establish appropriate Palestinian guidelines on endotracheal intubation as far as possible, and provide the necessary information about it.

5. Introducing the nurses and doctors working in the intensive care unit about the health risks arising from not following the directions and instructions for the endotracheal intubation process.

5.2.1 Recommendations for further research Studies

1. Similar studies can be performed to assess the complications of endotracheal intubation in the pediatric intensive care units.
2. Further research to assess the attitudes and knowledge of nurses working in PICU regarding ETI due to the scarcity of research in this field.
3. Conducting a study to evaluate the effectiveness of the proposed educational and development program to increase knowledge and practice in PICU.

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Annexes

Annex 1: The questionnaire

Questionnaire

Dear participant

You are selected to participate in a research project entitled as: **(Knowledge, Attitudes and Practices about Endotracheal Intubation Guidelines among Nurses Working in Pediatric Intensive Care Units at Governmental Hospitals in Gaza Strip).**

This project is a part of the requirements of the master degree of critical care nursing at Islamic University – Gaza. The study aims to identify the knowledge, attitudes and practices of nurses working in pediatric intensive care units at governmental hospital in Gaza Strip regarding Endotracheal Intubation. The time needed for complete response is about 15 Minutes, All the information will be used for the purpose of project, and will be kept confidential.Please answer the questions as your opinion appropriate.

You have the right to participate or to refuse

Thank you for your kind participation

The researcher: Fadi Mohammed Al Haw

Mobil: 0599726842

Please answer the following questions

A. Personal and professional information

1.	**Age**	---------- Years
2.	**Gender**	□ Male □ Female
3.	**Years of experience in PICU**	----------Years.
4.	**Marital Status**	□ Single. □ Married. □ Divorced □ Widowed
5.	**Qualifications**	□ Diploma □ Bachelor □ Master □ Doctorate
6.	**Hospital**	□ Al-Durra □ Al-Nasr □ Al-Rantisi □ Kamal Edwan □European Gaza

Please record your agreement or disagreement level with each of the following statements by placing a check mark (✓) in the appropriate box.

(1) Strongly disagree, (2) disagree, (3) undecided, (4) agree, (5) strongly agree

B. Nurses' knowledge about Endotracheal Intubation (ETI) In Pediatric Intensive Care Unit (PICU).						
NO	**Items**	**1**	**2**	**3**	**4**	**5**
1.	A guidelines for ETI are available in your PICU.					
2.	I have the scientific knowledge to assist in the ETI procedure.					
3.	Years of experience have played a role in the success of the ETI procedure in PICU.					
4.	The training courses assist in increasing the nurse's competence with the help of ETI.					
5.	The first action for respiratory support in PICU is ETI.					
6.	In your PICU, the instruments used in ETI are easy to reach during its procedure.					
7.	It is appropriate that one size of ETT should be available when doing ETI.					
8.	It is preferable to use the uncuffed tube in ETI for children under 8years.					
9.	Multiple emergency drugs to be ready during ETI procedure.					

10.	It is appropriate one size of the suction catheter should be available when doing ETI.					
11.	Different sizes of laryngoscopes blades are on standby when doing ETI.					
12.	I know all supplies that are used in the ETI procedure.					
13.	I know to assess the risk factors for failure of ETI.					
14.	There is a shortage of tools that are used in ETI.					
15.	The most frequent method to stabilize the ETT is the adhesive tape method.					
C. Nurses' attitudes about Endotracheal Intubation in the pediatric intensive care unit.						
16.	I believe that one size of ETT is enough to be available when doing ETI.					
17.	The training courses assist in increasing the nurse's competence with the help of ETI.					
18.	I believe that using an uncuffed tube is better than using a cuffed tube in children under 8 years.					
19.	I think that one of the emergency drugs to be drawn up is enough to be available when doing ETI.					
20.	I believe that one size of suction catheter is enough to be available when doing ETI.					
21.	I believe that one size of laryngoscope blades is enough to be available when doing ETI.					
22.	I believed that Pre-oxygenation before ETI can prevent hypoxemia.					
23.	I believe that ETI is important to prevent serious complications in the patient.					
24.	Taken safety and protection measures can protect yourself while applying the ETI procedure.					
25.	I think that the lack of staff members under 6 health providers lead to the failure of the ETI.					
26.	Long working hours can be a reason for the failure of ETI.					
27.	Suspected obstruction of the endotracheal tube by secretions.					
28.	Matching names (the same name) between the staff members can lead to confusion when applying ETI.					
29.	Switch off the electricity for more than two minutes on the PICU affected on the ETI.					
30.	I think that the lighting condition in the PICU affects the procedure of ETI.					

Annex 2: Observational Checklist

Endotracheal Intubation Checklist in Pediatric Intensive Care Units

Patient Gender	□ Male □ Female		
Patient age			
Hospital name	Al Dora □	Al Naser □	Al Rantisi □
	Kamal Edwan □		European Hospital Gaza □
ETI	Planned □	Urgent □	
Number of trials	Once □	Twice □	More than twice □
Complication during Procedure	Yes □	No □	
If yes, what are the complication?			
Procedure date			
Work shift	D □	E □	N □
Patient status after intubation	Alive □	Dead □	

Please record your opinion by placing a check mark (✓) in the appropriate box.

No	Item	Applied	Not applied
Pre- Procedure			
1.	A Verbal or written consent form was obtained.		
2.	Procedure and risk had been explained for the family.		
3.	History for allergies/drugs was checked.		
4.	History of difficult intubation was obtained.		
5.	The Bag valve mask (BVM) with positive end-expiratory pressure (PEEP), (Ambu bag) was attached to O_2		
6.	Suction tools were prepared.		
7.	Multiple sizes of endotracheal tubes ready.		
8.	Emergency trolley was checked and on standby.		
9.	Multiple sizes of oral airways ready.		
10.	Multiple sizes of nasal airways ready.		
11.	A good IV access with running lines was fixed.		
12.	Laryngoscopes, handles, and blades (appropriate size) were checked.		
13.	Different sizes of stylets were on standby.		
14.	Stethoscope checked and ready to use.		
15.	End-tidal co_2 (Capnography), waveform visible the monitor.		
16.	Surgical airway kit available.		
17.	An emergency drugs to be drawn up (labeled & double checked).		
18.	Monitoring for (BP, ECG, Spo2, and RR) was ready.		
19.	The team leader is known.		
20.	The first intubator is known.		
21.	The second intubator is known.		
22.	Drug administrator ready.		
23.	Fixed NGT and continuously aspiration during face mask ventilation.		
24.	Cricoid pressure person found and ready.		
25.	Rapid sequence intubation (RSI), (plan A), and Backup plan (plan B, C, D) if the airway is difficult.		
26.	A laryngoscope is checked and ready to use.		

During Procedure			
27.	Protective personal equipment (PPE) is used.		
28.	The patient position is optimal for endotracheal intubation (ETI).		
29.	Bed high optimum.		
30.	Confirm contraindications for ETI excluded.		
31.	Preoxygenation (minimum Spo2 90%).		
32.	Optimal hemodynamics and monitoring vital signs were checked.		
33.	The head-tilt chin-lift maneuver lifts the tongue from the back of the throat and maintains an open, patent airway.		
34.	Jaw thrust maneuver to maintain a patent-airway.		
35.	Administer the paralytic drugs.		
36.	Identify the epiglottis and lift it and adjust the tip of the laryngoscope blade in the vallecula.		
37.	The right hand was used to hold the ETT.		
38.	The assistant was asked to retract the stylet and remove it.		
39.	While the assistant is removing the stylet, the physician hold the ETT steady in place.		
40.	The cuff is inflated (special for cuffed ETT).		
Post- Procedure			
41.	End-Tidal CO2 valve with waveform.		
42.	Bilateral auscultation.		
43.	Chest X-Ray done for the patient to check the depth of the tube.		
44.	The endotracheal tube is secured and cuff pressure checked.		
45.	Nasal O2 Removed.		
46.	Vital signs are checked every one hour.		
47.	Administer drip of sedation.		
48.	Head of bed at 30 degrees.		
49.	ABGs are done during the first 30 minutes after ETI.		
50.	Hand over to nursing staff.		

Annex 3: Approval of MOH

State of Palestine
Ministry of health

دولة فلسطين
وزارة الصحة

التاريخ:04/2021
رقم المراسلة 1834

السيد : رامي عبد العبادله المحترم

مدير عام بالوزارة //الإدارة العامة لتنمية القوى البشرية/وزارة الصحة

السلام عليكم ...

الموضوع/ تسهيل مهمة الباحثة// فادي الحو

التفاصيل //
بخصوص الموضوع أعلاه، يرجى تسهيل مهمة الباحث/ فادي محمد الحو
الملتحق ببرنامج ماجستير تمريض الرعاية الحثيثة – الجامعة الاسلامية بغزة في إجراء بحث بعنوان:-
Knowledge, attitudes and practices about Endotracheal Intubation Guidelines among" "nurses working in Pediatric Intensive Care Units at Governmental Hospitals in Gaza Strip
حيث الباحث بحاجة لتعبئة استبانة من عدد من الممرضين العاملين في أقسام الاطفال في المستشفيات الحكومية (مستشفى غزة الأوروبي – مستشفى النصر للأطفال – مستشفى الرنتيسي – مستشفى محمد الدرة- مستشفى كمال عدوان)، بما لا يتعارض مع مصلحة العمل وضمن أخلاقيات البحث العلمي، ودون تحمل الوزارة أي أعباء أو مسئولية.
وتفضلوا بقبول التحية والتقدير،،،
ملاحظة /
تسهيل المهمة الخاص بالدراسة أعلاه صالح لمدة 3 اشهر من تاريخه.

محمد ابراهيم السرساوي
مدير دائرة/الإدارة العامة لتنمية القوى البشرية

تحويلات:

محمد ابراهيم محمد السرساوي(مدير دائرة)	رامي عبد سليمان العبادله(مدير عام بالوزارة)	إجراءاتكم بالخصوص(06/04/2021)
رامي عبد سليمان العبادله(مدير عام بالوزارة)	عبد السلام محمد عبد صباح(مدير عام بالوزارة)	إجراءاتكم بالخصوص(06/04/2021)
عبد السلام محمد عبد صباح(مدير عام بالوزارة)	عبد عبد الظاهر عبد صباح(حكيم رئيس قسم)	إجراءاتكم بالخصوص(07/04/2021)
عبد السلام محمد عبد صباح(مدير عام بالوزارة)	مصطفى سليم عبد الكحلوت(مدير مستشفى)	إجراءاتكم بالخصوص(07/04/2021)
عبد السلام محمد عبد صباح(مدير عام بالوزارة)	محمد ابراهيم محمد ابو ندى(مدير مستشفى)	إجراءاتكم بالخصوص(07/04/2021)
عبد السلام محمد عبد صباح(مدير عام بالوزارة)	يوسف فوزي اسماعيل العقاد(مدير مستشفى)	إجراءاتكم بالخصوص(07/04/2021)
عبد السلام محمد عبد صباح(مدير عام بالوزارة)	ماجد محمد عبد الكريم حماده(مدير مستشفى)	إجراءاتكم بالخصوص(07/04/2021)

Annex 4: Approval of IUG

بسم الله الرحمن الرحيم

الجامعة الإسلامية – غزة
The Islamic University - Gaza

Faculty of Nursing
كلية التمريض

هاتف داخلي: 2700

ع س غ/2021/7
Ref.
التاريخ 03 مايو 2021
Date

الأخ الفاضل/ د. رامي العبادلة حفظه الله ،
مدير عام تنمية القوى البشرية بوزارة الصحة
السلام عليكم ورحمة الله وبركاته،،،

الموضوع/ تسهيل مهمة طالب ماجستير

تهديكم عمادة كلية التمريض بالجامعة الإسلامية أطيب التحيات، ونرجو من سيادتكم التكرم بتسهيل مهمة الباحث/ **فادي محمد شحدة الحو** تخصص ماجستير (العناية الحثيثة) في الحصول على المعلومات اللازمة لإتمام رسالة الماجستير ؛ وذلك لغرض البحث العلمي.

شاكرين لكم حسن تعاونكم،،،

عميد كلية التمريض

أ.د. أشرف يعقوب الجدي

ص.ب 108 الرمال غزة فلسطين هاتف +970 (8) 286 0700 فاكس +970 (8) 286 0800
P.O. Box 108, Rimal, Gaza, Palestine Tel. +970 (8) 286 0700 Fax +970 (8) 286 0800
www.iugaza.edu.ps public@iugaza.edu.ps

Annex 5: Ethical Research Committee (IUG)

الجامعة الإسلامية بغزة
The Islamic University of Gaza
عمادة البحث العلمي والدراسات العليا
Deanship of Research and Graduate Studies

Ext:1140

الرقم Ref ج س غ/28/
التاريخ Dat26/05/2021

The Islamic University of Gaza
Deanship of Research and Graduate Studies
Ethical Research Committee
Name: **Fadi Alhaw**

I would like to inform you that the Ethical Research Committee at the Islamic University of Gaza discussed your research application entitled

"Knowledge, attitudes and practices about Endotracheal Intubation Guidelines among nurses working in Pediatric Intensive Care Units at Governmental Hospitals in Gaza Strip"

In its meeting that was held on 25 May 2021, and decided to approve this research study

Committee Chairperson — **Prof. Dr. Adel M. Awadallah**

Dean of Research and Graduate Studies — **Prof. Dr. Bassam SAQQA**

Conditions:

1. Valid for 2 years from the date of approval.
2. It is necessary to notify the committee about any change in the admitted research study.
3. Pre-permission from the responsible authorities
4. Any treatment should be carried under the supervision of specialized physician
5. The committee appreciate receiving a copy of your final study when it is completed.

P.O. Box 108, Rimal, Gaza, Palestine Tel: + 970 (8) 264 4400 Fax: + 970 (8) 264 4800
ص.ب 108 الرمال غزة فلسطين هاتف فاكس
public@iugaza.edu.ps www.iugaza.edu.ps

Annex 6:Post- hoc multiple comparisons

Multiple Comparisons

Dependent Variable: Practice						
LSD						
(I) Hospital name	(J) Hospital name	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Al-Durra	Al-Nasr	6.71795*	2.62869	.019	1.2346	12.2013
	Al-Rantisi	.48352	2.62869	.856	-4.9998-	5.9669
	Kamal Edwan	8.00733*	2.62869	.006	2.5240	13.4907
	European Gaza	11.33333*	2.62869	.000	5.8500	16.8167
Al-Nasr	Al-Durra	-6.71795-*	2.62869	.019	-12.2013-	-1.2346-
	Al-Rantisi	-6.23443-*	2.62869	.028	-11.7178-	-.7511-
	Kamal Edwan	1.28938	2.62869	.629	-4.1940-	6.7727
	European Gaza	4.61538	2.62869	.094	-.8680-	10.0987
Al-Rantisi	Al-Durra	-.48352-	2.62869	.856	-5.9669-	4.9998
	Al-Nasr	6.23443*	2.62869	.028	.7511	11.7178
	Kamal Edwan	7.52381*	2.62869	.010	2.0405	13.0072
	European Gaza	10.84982*	2.62869	.001	5.3665	16.3332
Kamal Edwan	Al-Durra	-8.00733-*	2.62869	.006	-13.4907-	-2.5240-
	Al-Nasr	-1.28938-	2.62869	.629	-6.7727-	4.1940
	Al-Rantisi	-7.52381-*	2.62869	.010	-13.0072-	-2.0405-
	European Gaza	3.32601	2.62869	.220	-2.1573-	8.8093
European Gaza	Al-Durra	-11.33333-*	2.62869	.000	-16.8167-	-5.8500-
	Al-Nasr	-4.61538-	2.62869	.094	-10.0987-	.8680
	Al-Rantisi	-10.84982-*	2.62869	.001	-16.3332-	-5.3665-
	Kamal Edwan	-3.32601-	2.62869	.220	-8.8093-	2.1573
*. The mean difference is significant at the 0.05 level.						

Annex 7: Experts list

1-Prof. Dr. Yousef Ibrahim Aljeesh Prof. Dr. In Public Health Nursing Faculty, Islamic University of Gaza Mobile: 00970599758858	**6- Dr.Izzat Alaskary** Assistant Professor Nursing Faculty, Israa University, Gaza, Palestine. Mobile: 00970599334010
2-Dr. Khalid Jamal Khadoura BSN, RN, MSc. ADDM, PhD Assistant Professor of Epidemiology, Faculty of Medical Sciences, Israa University, Gaza Mobile: 00970599189117	**7-Samira Soliman Abo Alshiekh** Ph.D. in public health Head of mammography department, M.O.H Mobile: 00970597155586
3-Dr. Nasser Abu-El-Noor Associate Professor Nursing Faculty, Islamic University of Gaza Mobile: 00970599176260	**8-Dr. Ahmed Ali Mohammad El-shair** Assistant Professor Nursing Faculty, Islamic University of Gaza Mobile: 00970599880710
4-Dr.Mohammed Naem Mushtaha Associate Professor Nursing Faculty, Israa University, Gaza, Palestine. Mobile: 00970592712429	**9-Dr.Yousef Fathi Fahajan** PhD in Nursing Hospitals Nursing Director-MOH Mobile: 00970595906637
5-Dr.sharaf Omar ALshurafi Assistant Professor of Medical Surgical Nursing Al-Aqsa University Mobile: 00970597686038	**10-Dr. Ahmed A. Najim** Assistant Prof. of Community Health Nursing Head of Nursing Department, Al Azhar University-Gaza, Palestine Mobile: 00970599767242