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فني تخدير

# General anesthesia and its relationship to complications in the elderly patients from the perspective of the anesthetic staff

( Sana'a Public hospitals)

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## Dedication

to the intercessor and our greatest teacher....  
Our master Mohammed ,the noble prophet  
may the best prayers and peace be upon him ,  
and upon Allah and his righteous companions  
and those who followed them in goodness  
until the day of judgment . to those for whom  
we spare no effort in raising us , our southern  
mothers . to those to whom I dedicate my  
efforts in the service of our children . to all  
who exerted diligence and effort in the pursuit  
of knowledge , our professors , and to all who  
contributed to the complications of this  
research to all of these I dedicate my work

## gratitude and recognition

praise be to Allah abundant and blessed praise , glory be to you ,your will is counties you are as you have praise yourself , you soared and created , you gave and decreased , so no limit to your knowledge nor any boundaries chapter . and may Allah prayers and peace be upon the noblest of your servants and the most perfect of your creation , the seal of the prophets and the teacher of teachers , our prophet and messenger Mohammed Ibn Abdullah , the trustworthy , the best of teachers and the most excellent of advisors , He implores from hearts , them teaches us in bright shining lines the highest expressions of respect and love

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## Abstract

This study aimed to investigate the correlational relationship between general anesthesia and its subsequent postoperative complications among elderly patients (aged 65 years and older) from the unique perspective of the anesthesia team operating within public hospitals in the Sana'a Governorate, Yemen. Utilizing a descriptive analytical methodology, empirical data was gathered via a structured, closed-ended questionnaire distributed to a sample of 80 anesthesia professionals—including consultants, residents, and technicians—across four major public healthcare facilities: Al-Thawra General Hospital, the Republican Hospital, the Military Hospital, and Al-Kuwait Hospital. The collected data was statistically processed through the Statistical Package for the Social Sciences (SPSS) using frequencies, percentages, and arithmetic means. The findings revealed a substantial consensus (93%) among the anesthesia staff that geriatric patients exhibit a significantly higher vulnerability to anesthesia-related adverse outcomes compared to other age cohorts, a vulnerability primarily driven by age-associated physiological deterioration and pre-existing comorbidities. Hemodynamic instability—manifesting as intraoperative hypotension (70%) and bradycardia (91%)—along with the critical loss of airway protective reflexes (70%), were identified as the most prominent clinical challenges encountered during and after surgical procedures. Consequently, the study recommends the strict implementation of dedicated geriatric anesthesia protocols focused on highly precise, low-dose drug titration, exceptionally slow administrative injection speeds, and intensified close monitoring during the post-anesthesia recovery phase to preserve patient safety.

**Keywords:** General Anesthesia; Geriatric Patients; Anesthetic Staff; Hemodynamic Complications; Sana'a Public Hospitals; Patient Safety.

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# **CHAPTER I \ GENERAL FARMWORK AND PREVIOUS STUDIES**

## 1.1 Introduction

General anesthesia stands as a foundational cornerstone of modern surgery, facilitating the safe, effective execution of complex and highly invasive procedures. However, its application within the geriatric population presents intricate clinical challenges due to the profound progressive physiological and pharmacological alterations that characterize biological aging. These age-related deviations directly influence the uptake, distribution, metabolism, and elimination of anesthetic agents, thereby compromising the homeostatic reserve capacity of vital organ systems. In fragile and conflict-affected macro-environments, the preservation of healthcare service quality is deeply dependent on the structural implementation of Total Quality Management (TQM) frameworks, which act as primary drivers for optimizing clinical outputs and hospital performance (Al-Saleet et al., 2025; Alsalit et al., 2026). Within this national context, specialized medical academic institutions, such as 21 September University for Medical and Applied Sciences, fulfill a vital strategic imperative by reforming the health sector, upgrading clinical protocols, and generating highly qualified healthcare workforces capable of supporting the modern state (Al-Wesabi, 2020).

Elevating clinical performance within public and teaching hospitals necessitates the systemic adoption of integrated quality management structures (Al-wesabi, 2012). This includes a rigorous adherence to defensive safety benchmarks, such as infection prevention and control standards, which have been empirically proven to significantly suppress the horizontal transmission of infectious diseases and epidemiological threats within governorate hospitals (Al-Wesabi & Shamlan, 2022). Furthermore, the operational efficacy of implementing rigorous hospital accreditation standards is tightly coupled with the continuous professional development and strategic training of the available human resources for health (Al-wesabi, 2017; Alwsaby, 2017). This clinical landscape is further complicated by the high prevalence of multi-morbidity in older patients, where chronic diseases necessitate complex polypharmacy, subsequently elevating the risks of severe, clinically significant drug-drug interactions (Alyahawi et al., 2024). Therefore, compiling and evaluating real-world clinical insights from frontline anesthesia cadres becomes

crucial for establishing targeted preventive strategies that mitigate general anesthesia risks in vulnerable geriatric surgical cohorts.

## 1.2 Research problem....

- Despite continuous institutional endeavors to restructure the Yemeni healthcare matrix, public hospitals in conflict-affected zones continue to exhibit severe vulnerabilities regarding clinical governance and the sustainable maintenance of healthcare quality (Shamlan & Al-Wesabi, 2026). While the integration of patient-centered evaluation standards, such as those formulated by the Joint Commission International (JCI), alongside robust professional career development pipelines, remain essential for maximizing the field performance of nursing and technical medical staff (Qabban & Al-Wesabi, 2025; Qabban et al., 2026), a significant empirical gap persists regarding specialized risk management inside operating rooms and post-anesthesia care units (PACU), particularly concerning geriatric anesthesia.
- The crux of the problem lies in the fact that advanced age induces structural compliance reductions within the cardiovascular and respiratory systems, alongside compromised glomerular filtration rates and hepatic enzyme pathways. These pharmacokinetic and pharmacodynamic shifts, compounded by prevalent metabolic or vascular comorbidities like hypertension and diabetes, drastically increase the incidence of life-threatening intraoperative crises such as profound hypotension, severe bradycardia, hypoxemia, and prolonged postoperative neurocognitive decline. From the observed clinical practices within Sana'a public hospitals, substantial variations exist regarding the precise titration of low-dose protocols and the strict avoidance of rapid drug administration speeds, often resulting in prolonged PACU stays, elevated hospital costs, and increased mortality rates. Driven by these critical clinical realities, this study formally addresses this

operational gap by investigating the following primary research question:

**What is the relationship between the general anesthesia's complication and elderly ?**

1. What are the most common complications between the general anesthesia and elderly ?
2. What are the factors that increase the risk of complications from general anesthesia in the elderly ?
3. How can the outcomes of general anesthesia in the elderly be improved by identifying influencing factors and developing prevention and treatment strategies ?

### 1.3 Research Objective...

Research aimed are the light that leading us to known why this research is done and why should working on it , and known the mysterious to discovered the secrets to be this research familiar to everyone specifically to anesthetic staff if there is any condition that need to intervention to avoid complications and to safe a patient

Importance of the Research on complications of general anesthesia in the elderly is important for improving healthcare and reducing complications and mortality associated with general . The research can contribute to developing new strategies and protocols to improve the safety of elderly patients undergoing general anesthesia

#### 1. Main objectives

- Determining the relationship between general anesthesia and its complications in the elderly : the research aims to study the

relationship between general anesthesia and its complications in the elderly , and identify the factors that influence this relationship

- Identifying factors influencing complications of general anesthesia : the research aims to identify the factors that influence complications of general anesthesia in the elderly ,such as heart diseases , lung diseases , diabetes and smoking
- Developing strategies to reduce complications of general anesthesia : the research aims to develop strategies to reduce complications of general anesthesia in the elderly , such as developing anesthesia protocols and providing appropriate healthcare

## 2. Sub-objectives

- Studying the impact of general anesthesia on the Cardiovascular system : the research aims to study the impact of general anesthesia on the cardiovascular system in the elderly
- Studying the impact of general anesthesia on the Respiratory system : the research aims to study the impact of general anesthesia on the respiratory system in the elderly .
- Studying the impact of general anesthesia on the nervous system : the research aims to study the impact of general anesthesia on the nervous system in the elderly .

## 3. Practical Objective

- Improving healthcare for the elderly : the research aims to improve healthcare for elderly patients undergoing general anesthesia .
- Reducing complications and mortality : the research aims to reduce complications and mortality associated with general anesthesia in the elderly .
- Developing anesthesia protocols : the research aims develop anesthesia protocols that reduce complications of general anesthesia in the elderly

## 4. Specific Objectives

- Procuration the outcome and information from anesthetic cadre in the Sana'a public hospitals around general anesthesia complications to elderly : what did they do avoid these complications and to get benefits as we students in the specialty anesthesiologist

- Known complications of general anesthesia and its relationship to diseases like { blood pressure diseases , endocrine diseases } to elderly to see how these diseases impact by elderly
- Known the ways that avoided the multiplications of general anesthesia on . elderly
- Enough know by complications of general anesthesia on elderly .

## 5. Translation

Here is the translation of Objectives :

- Main objectives
  - Determine the relationship between general anesthesia and its complications in the elderly .
  - Identify factors influencing complications of general anesthesia .
- Sub-objective :
  - Study the impact of general anesthesia on the cardiovascular system .
  - Study the impact of general anesthesia on the respiratory system .
  - Study the impact of general anesthesia on the nervous system
- Practical objectives
  - Improve healthcare for elderly patients undergoing anesthesia
  - Reduce complications and mortality associated with general anesthesia
  - Develop anesthesia protocols that reduce complications

By conducting this research , we can improve the safety and outcomes of elderly patients undergoing general anesthesia

## 1.4 Importance of research .....

To addition new information about the relationship between complications of general anesthesia in the elderly because these information about this topic are mysterious and undiscoverable

there are a lot of information that should be discovered of this research ,also to raise our knowledgeable in the anesthesia special in the elderly because we saw in the hospitals that we studied inside the more patients that they stay more time in hospital no matter where the place in the nursing room or in recovery but the more importance why they stay length time and that problem itself due to may increase the risks of complications or it cost money for that patient that what we do not needed , lies in understanding how anesthesia affects this age group and how to reduce the associated risks . research in this area can help improve health outcomes for elderly individual undergoing surgery under general anesthesia , reducing the occurrence of respiratory and cardiac complications , as well as other life-threatening complications . by studying the effects of anesthesia on the elderly researchers can identify factors that increase the risk of multiplications and develop appropriate prevention and treatment strategies . this can help improve the quality of healthcare provided to the elderly and reduce healthcare costs associated with complications . additionally , research in this area can help develop specific treatment protocols for elderly individuals undergoing surgery under general anesthesia which can reduce the occurrence of complications and improve health outcomes . overall , research on general anesthesia and its relationship to reduplications in the elderly is a crucial area that can help improve healthcare outcomes for this age group and reduce the risks associated with surgery under general anesthesia also , shield light on the importance of research that we should obtain our information from hospital specially from anesthetic staff and we chose this research topic to increase information and knowledgeable by asking people and anesthetic staff and the most important reason is to procurement experience from factual work to known what we should be doing when we met the same situation when we graduate from university

with and work in hospital we should have a lot of information

### 1.5 Research hypotheses ....

Importance of hypotheses these hypotheses form the basis for scientific research and direction , and help determine the relationship between general anesthesia and its complications in the elderly , and identify the factors that influence this relationship . by testing these hypotheses , researchers can obtain valuable results that contribute to improving healthcare for elderly patients undergoing general anesthesia ,

1. Main hypothesis : there is a relationship between general anesthesia and its complications in the elderly , and this relationship is influenced by various factors such as heart diseases , lung diseases diabetes , and smoking , cancer or tumors diseases
- First sub-hypothesis : There is a relationship between general anesthesia and cardiac complications in the elderly and this relationship is influenced by factors such as heart disease , diabetes , and smoking
- Second sub-hypothesis : There is a relationship between general anesthesia and its respiratory complications in the elderly and this relationship is influenced by factors as an example lung diseases and smoking
- Third sub-hypothesis : There is a relationship between general anesthesia and its neurological complications in the elderly , and this relationship is influence by factors such as stroke and diabetes

- Hypotheses of the relationship between general anesthesia and its complications:
  - and these hypotheses aim to determine the type of relationship between general anesthesia and its complications, whether positive or negative. In this case the hypotheses suggest a positive relationship between general anesthesia and its cardiac, respiratory, and neurological complications
- **First hypothesis** : There is a positive or negative relationship between general anesthesia and its cardiac complications in the elderly and this hypothesis includes studying the relationship between general anesthesia and its cardiac complications in the elderly and the impact of factors such as heart diseases, diabetes, and smoking on this relationship
- **Second hypothesis** : There is a positive or negative relationship between general anesthesia and its respiratory complications in the elderly, this hypothesis includes studying the relationship between general anesthesia and its respiratory complications in the elderly, and the impact of factors such as, asthma, COPD, smoking on this relationship
- **Third hypothesis** : There is a positive or negative relationship between general anesthesia and its neurological complications, and this hypothesis includes studying the relationship between general anesthesia and its neurological complications in the elderly, and the impact of factors such as stroke and diabetes on this relationship
- **Fourth hypothesis** : physiological changes
  - **Hypotheses** Physiological changes and anesthesia risk: do physiological changes

associated with aging increase the risk of anesthesia complications in the elderly

- Hypotheses Chronic diseases and anesthesia risk : can chronic diseases common in the elderly , such as hypertension and diabetes , affect the risk of anesthesia complications
- fifth hypotheses type of anesthesia and risk :
  - Hypotheses type of anesthesia : can the type of anesthesia used play a role in determining the risk of anesthesia complications in the elderly
  - Dosage and duration of anesthesia : can dosage and duration of anesthesia affect the severity of complications that occur in the elderly
- Sixth hypotheses after anesthesia :
  - Nursing care and monitoring : can nursing care and close monitoring play a role in reducing the risk of anesthesia complications in the elderly
  - Nutrition and overall health : can nutrition and overall health status of the elderly affect the risk of anesthesia complications
  - Psychological and social factors : can psychological and social factors such as anxiety and depression , affect the risk of anesthesia complications in the elderly
- Application of these hypothesis  
These hypothesis can be applied in many areas, such as
  - Developing anesthesia protocols : these hypothesis can be used to develop anesthesia protocols that reduce complications of general anesthesia in the elderly
  - Risk assessment : these hypothesis can be used to assess the risks associated with general anesthesia in the elderly , and identify the factors that increase these risks
  - Improving healthcare : these hypothesis can be used to improve healthcare for elderly patients undergoing general anesthesia and provide better healthcare for them

## ○ Recommendations

- Developing training programs : develop training programs for doctors and nurses on how to deal with elderly patients undergoing general anesthesia
- Providing healthcare : provide healthcare services that cater to the needs of elderly patients undergoing general anesthesia

## 1.6\_ Search terms .....

Terms that we repeat many times in this research and the title of our research

1. ANESTHESIA : is procedure doing to relief the sensitive and kill the pain for while like revisable during doing medical procedure such as surgical or cleaning wound or removal diseases or relief anxious in the recovery and that procedure is the best procedure and helpful to avoid the pain that all people afraid from it in different types of the anesthesia
2. General anesthesia : is procedure use to loss of consciousness and sensation in all body and it should be revisable for doing medical procedure by taking time and when we do not need the patient sufferance
3. Elderly : are people which be start to be weakness their body and decrease their body functions in the time what probable they are above of 60 years and they cannot hold and risks of diseases due to decrease their immunity and healthy to face it a disease in different types of diseases
4. Complications : are risks and problems that comes after doing any medical procedure in the medicine such as side effect of medications and risks that come after doing emergence condition to help the people , and negative conditions of the people that can be heal or hold these complications

5. Anesthetic management : anesthesia management , including planning ,execution , and monitoring of anesthesia
6. Geriatric pharmacology : the study of pharmacology in older adults including the effects of medications on this population
7. Post-anesthesia recovery : recovery after anesthesia , including care provide after surgery .
8. Anesthesia-related morbidity : diseases or complications related to anesthesia , including a wide range of potential complications
9. Geriatric anesthesia guidelines : guidelines for anesthesia in older adults , including recommendations and protocols for anesthesia care .
- 10.Elderly anesthesia outcomes : outcomes related to anesthesia in older adults , including evaluation of health outcomes after surgery .
- 11.Anesthetic risk assessment : assessment of risks related to anesthesia including evaluations of factors that may impact health outcomes after surgery
- 12.Anesthesia-induced complications : complications caused by anesthesia , including a wide range of potential complications

## 1.7-Research limitations.....

The limitations of the research are the ways that leading us to doing our research and the limits are the guides that telling us from where that we start and stop and the objective that should be concentration on at and telling us what the topic that specific working

1. Thematic boundaries
  - Focus on general anesthesia : the research will focus exclusively on general anesthesia , without exploring other types of anesthesia such as local or regional anesthesia

- Complications in the elderly : the study will concentrate on complications occurring in elderly patients ( 65years and older ) without focusing on other age groups .

## 2. Spatial boundaries

- Sana'a public hospitals : the research will be conducted in Sana'a hospital ,which may limit the generalizability of the findings to other hospitals in Yemen or elsewhere .

## 3. Temporal boundaries

- Specific timeframe : the study will be conducted within a specific timeframe which may impact the results if there are changes I anesthesia practices or elderly care during the research period.

## 4. Methodological boundaries

- Descriptive or analytical approach : the research will employ a specific methodology ( analytical ) to analyze data and study the relationship between general anesthesia and complications in the elderly .
- Data collection tool : the study will use specific tools to collect data , such as questionnaires or medical records , which may affect the quality of the data and research findings ( questionnaire ) .

## 5. Population boundaries

- Elderly patients undergoing general anesthesia : the research will focus on elderly patients who have undergoing general anesthesia in Sana'a public hospitals without concentrating on other age groups or patients who have not undergoing general anesthesia .

By defining these boundaries , we can focus our research , clarify our findings and draw meaningful conclusions .

## 1.8 previous studies

Geriatric anesthesia is a specialized field in anesthesiology that focuses on the needs of elderly patients during surgical operations . the theory of geriatric anesthesia includes understanding the physiological changes that occur with aging and how they affect the body's response to anesthetic drugs .

( Alpaslan AKCAN, Agri 2020,32(2):72-78 )

### ○ Physiological changes with aging

Physiological changes that occur with aging can affect the body's response to anesthetic drug . some of these changes include :

- Decreased organ function : organ function such as liver and kidney function , can decline with age , affecting the metabolism and excretion of anesthetic drugs , for example , creatinine clearance can decrease with age affecting the excretion of drugs that rely on the kidney for metabolism
  - Changes in drug distribution : the ratio of fat to lean body mass can changes with age , affecting the distribution of anesthetic drugs in the body , for example , the proportion of fat in the body can increase with age , affecting the distribution of fat-soluble drugs .
  - Decreased cardiac function : hear rate can decrease and blood pressure can increase with age , affecting blood flow to organs . for example heart rate can decrease with age , affecting the heart's ability to pump blood effectively .
  - Changes in the respiratory system: lung function can decline with age , affecting gas exchanges in the body . for example , pulmonary ventilation can decrease with age , affecting the lung's ability to exchange gases effectively .
- ### ○ Anesthesia needs for the elderly
- Elderly patients have special needs when it comes to anesthesia . some of these needs include :

- Accurate preoperative evaluation : a thorough preoperative evaluation should be conducted for elderly patients to determine potential risks and special needs . the evaluation should be include an assessment of organ function , overall health status , and potential risks for anesthesia .
- Choosing appropriate medications : anesthetic medications should be chosen carefully for elderly patients , taking into account the physiological changes that occur with aging , factors such as decreased organ function , changes in drug distribution , and decreased cardiac function should be considered
- Close monitoring during surgery : elderly patients should be closely monitored during surgery to ensure their safety and provide appropriate care , monitoring should be include an assessment of organ function , overall health status , and potential risks
- Postoperative care : appropriate postoperative care should be provided for elderly patients , including pain and anxiety management of organ function , overall health status , and potential risks .

#### ○ Potential risks and complications

Elderly patients are more susceptible to potential risks and complications during anesthesia some of these risks include :

- Cardiac complications : complications such as , myocardia infraction or cardiac arrest , can increase with age , factors such as decreased cardiac function , hypertension ,and atherosclerosis should be considered .
- Respiratory complications : the risk of respiratory complications such as pneumonia or respiratory failure can increase with age , factors such as decreased lung function , fluid accumulation in the lungs , and sleep disorders should be considered .

In conclusion , the theory of geriatric anesthesia provides a comprehensive framework for understanding the unique challenges faced by elderly patients undergoing anesthesia . by integrating physiological ,

pharmacological , and clinical knowledge healthcare providers can deliver safe and effective anesthesia care to older adults . applying this theory requires a deep understanding of age-related physiological changes and the ability to tailor anesthesia plans to individual patient needs . through collaborative efforts and teamwork among healthcare professionals , patient outcomes can be improved , and quality of life can be enhanced for elderly patients .

## 1.8\_ Comparison with previous

- 1) Both previous studies and our research focus on elderly patients undergoing general anesthesia and confirm that aging increases the risk of cardiovascular , respiratory , and neurological complications . all emphasize careful preoperative assessment close monitoring
- 2) However , previous studies mainly examined clinical outcomes and mortality rates in developed healthcare systems , while our research focuses on the perspective of anesthetic staff in Sana'a public hospitals using a descriptive analytical questionnaire-based method
- 3) What distinguishes our study is that it provides real clinical insights from local anesthesia staff and offers practical recommendations adapted to the Yemeni healthcare

# Chapter II \ Theoretical framework

## physiological and Pharmacological changes in the elderly patients and their impact on general anesthesia

### 1. physiological changes in the elderly patients and their impact on general anesthesia

physiological changes in the elderly can affect the body's response to medications and anesthesia .As people age , their bodies undergo changes in organ function and physiological systems , which can impact overall health and response to medical treatments . these physiological changes can include decreased cardiac , pulmonary , renal and nervous , hepatic functions among other , that can affect the body's response to general anesthesia and medications ( Miller's anesthesia 2263\_2285. 2020 )

- common physiological changes in the elderly
- 1. Decreased cardiac function : can lead to decreased blood pressure and increased heart
- 2. Decreased lung function : can lead to decreased oxygen levels in the blood and decreased the function of the organ
- 3. Decreased kidney function : can lead to accumulation of toxic substance in the body
- 4. Decreased liver function : can affect drug metabolism and disturbance and toxic the body
- 5. Decreased brain function : the brain can disordered the body and affect the response to orders or medications

- Impact of physiological changes on general anesthesia
  1. Increased risk of complications : physiological changes can increase the risk of complications during general anesthesia
  2. Impact on response to medications : physiological changes can affect the body's response to medications used in general anesthesia
  3. Increased risk of bleeding : physiological changes can increase the risk of bleeding during surgery
- Conclusion
 

Physiological changes in the elderly can affect general anesthesia in various ways . physicians should take necessary precautions to reduce risk , including thorough pre-operative evaluations choosing the right anesthesia , and close monitoring during surgery

  - a. Cardiac diseases and their impact on general anesthesia in the elderly : ( Hossain ,, 2023,, page 133-140 )
 

cardiac diseases can affect general anesthesia in the elderly in various ways . here are some ways cardiac diseases can impact general anesthesia
- Effects of cardiac diseases on general anesthesia
  - Increase risk of cardiac complications: cardiac diseases can increase the risk of cardiac complications during general anesthesia , such as heart attack or heart failure .
  - Impact on cardiac function :cardiac diseases can affect cardiac function leading to decreased blood pressure or increased heart rate during general anesthesia .
  - Impact on blood flow : cardiac diseases can affect blood flow to vital organs , leading to inadequate oxygen and nutrient delivery .
  - Increased risk of cardiac arrest : cardiac diseases can increased the risk of cardiac arrest during general anesthesia , especially if not managed properly.
- Common cardiac diseases affecting general anesthesia

- Hypertension : can increase the risk of cardiac complications during general anesthesia
- Atherosclerosis : can affect blood flow to vital organs by decreased the blood flow
- Heart failure : can affect cardiac function and increase the risk cardiac multiplications
- Atrial fibrillation : can increase the risk of cardiac arrest during general anesthesia

- Cardiac problems in the elderly understanding the risks and precautions for general anesthesia :

Cardiac problems in the elderly can be serious and life-threatening , especially when undergoing anesthesia . it's essential to understand the common cardiac problems , causes symptoms , and factors affecting anesthesia in this population (Clinical anesthesia 8<sup>th</sup> ,1165-1184 , 2019)

- Common cardiac problems in the elderly
  - Hypertension : increases the risks of cardiac reduplications during general anesthesia
  - Atherosclerosis : reduces blood flow to the heart and brain , increasing the risk of cardiac multiplications
  - Heart failure : reduces the heart's ability to pump blood effectively increasing the risks of cardiac complications
  - Atrial fibrillation : increases the risk of cardiac complications ,such as stroke .
  - Myocardial infarction : can occur due to reduced blood flow to the heart , increasing the risk of cardiac multiplications ( johnj Najelhout, (1992),6th )

## 1. Causes of cardiac problems in the elderly

- Aging : can increase the risk of cardiac multiplications due to physiological changes

- Hypertension : can increase the risk of complications ,such as myocardial infraction , stroke
- Diabetes : can increase the risk of cardiac reduplications such as , atherosclerosis , and heart failure
- High cholesterol : can increase the risk of cardiac complications , such as myocardial infraction , atherosclerosis
- Smoking : can increase the risk of cardiac multiplications atherosclerosis and myocardial infraction .

## 2. Symptoms of cardiac problems in the elderly

- Chest pain :can be sharp or dull and may radiate to the arms , back or jaw
- Shortness of breath : can occur due to reduced blood flow to the lungs or heart failure
- Fatigue : can occur due to reduced blood flow to muscles and tissues .
- Palpitations : can occur due to arrhythmias
- Dizziness and nausea : can occur due to reduced blood flow to the brain

## 3. Factors affecting anesthesia in the elderly

- Type of anesthesia : can affect cardiac and respiratory function .
- Dose and duration of anesthesia : can affect cardiac and respiratory function
- Overall health status : can affect the patient's ability to tolerate anesthesia .
- Presence of other chronic diseases : can affect cardiac and respiratory function
- Medical history : can affect the choice of anesthesia and dosing

## 4. Potential complications

- Cardiac arrest : can occur due to reduced blood flow to the heart or arrhythmias

- Myocardial infraction : can occur due to reduced blood flow the heart
- Heart failure : can occur due to reduced cardiac function
- Hypertension : can occur due to reduced blood flow to the kidney or hormonal imbalances
- Hypotension : can occur due to reduced blood flow to vital organs

## 5. Precautions to reduce risks

- Thorough pre-anesthesia evaluation : help identify potential risks and improve anesthesia outcomes .
  - Using anesthesia medications judiciously : can help reduce potential risk and improve anesthesia outcomes .

## 6. Others cardiac problems

- Decreased cardiac function : with aging , cardiac function can decline , which can affect the heart's ability to pump blood effectively this can increase the risk of cardiac complications under general anesthesia .
- Increased vascular resistance : vascular resistance can increase with aging which can affect blood flow to vital organs , this can increase the risk of cardiac complications under general anesthesia
- Decreased vascular elasticity : vascular elasticity can decrease with aging , which can affect the blood vessels ability to dilate and constrict . this can increase the risk of cardiac reduplications under general anesthesia
- Increased risk of myocardial infraction : the risk of myocardial infraction can increase with aging especially in the presence of risk factors such as hypertension and atherosclerosis , this can increase the risk of multiplications under general anesthesia
- Changes in cardiac neural signaling : changes in cardiac neural signaling can occur with aging , which can affect the heart's ability to respond to changes in oxygen and carbon dioxide levels , this can increase the risk of complications under general anesthesia

It is essential to carefully evaluate patients health status before surgery and provide appropriate medical care during and after surgery to avoid these complications , some measure that can be taken to reduce the risk of cardiac reduplications under general anesthesia include :

- Evaluating cardiac function before surgery controlling risk factors such as hypertension and atherosclerosis
- Using anesthesia techniques that minimize stress on the heart
- Monitoring the patient's cardiac status during and after surgery

In general cardiac problem in older adults can increase the risk of cardiac multiplications under general anesthesia , it is crucial to carefully evaluate the patient's health status and provide appropriate medical care to avoid these complications

- b. Respiratory diseases and physiological changes causing problems in older adults under general anesthesia can be significant !

( Elazzazi,Hesham (2011),2nd,)

Due to the physiological changes that occur with aging . the respiratory system of elderly individuals undergoes significant changes with age including decreased strength of respiratory muscles , increased airway resistance , and decreased lung capacity . these changes can lead to breathing difficulties during and after surgery , especially if the patient has pre-existing respiratory conditions . general anesthesia can affect lung function , increasing the risk of respiratory problems .anesthesia can cause a decrease in respiratory volume , increased airway resistance , and other effects on the respiratory system . this can lead to severe respiratory problems , such as pneumonia or respiratory failure , elderly individuals with chronic obstructive pulmonary disease (

COPD ) may be more susceptible to respiratory problems during and after surgery . these diseases can increase the risk of respiratory complications such as pneumonia or respiratory failure , to minimize the risks associated with respiratory problems in elderly individuals under general anesthesia necessary measures should be taken before surgery . this includes assessing lung function before surgery , optimizing control of chronic lung diseases and using anesthesia techniques that minimize risks . after surgery , necessary care should be provided to minimize risks and improve health outcomes . by taking necessary measures and providing appropriate care , the risks associated with respiratory problems in elderly individuals under general anesthesia can be reduced , and health outcomes for these patients can be improved .

#### 7. The impact of respiratory problems in elderly individuals under general anesthesia :

- Decreased respiratory efficiency : as people age the efficiency of the respiratory system decreases increasing the risk of respiratory complications during and after surgery .
- Decreased lung capacity : elderly individuals may experience a decline in lung capacity making breathing more difficult during and after surgery.
- ( The inside ,, 2023 ,, page 133-140)
- Increased risk of pneumonia : elderly individuals are more susceptible to developing pneumonia after surgery especially if they have pre-existing respiratory conditions .
- Impact of anesthesia on lung function : general anesthesia can affect lung function increasing the risk of respiratory problems .
- Increased risk respiratory complications : elderly individuals with chronic lung diseases may be more vulnerable to respiratory problems during and after surgery .

## 8. Causes of increased risk of respiratory problems in the elderly :

- Natural physiological changes : physiological changes that occur with aging can affect lung function .
- Chronic lung diseases : chronic lung diseases such as chronic obstructive pulmonary disease ( COPD) can increase the risk of respiratory problems in the elderly
- Smoking : smoking can increase the risk of respiratory problems in the elderly .

## 9. Measures to reduce risks

- Assessing lung function before surgery : lung function should be assessed before surgery to determine potential risks .
- Optimizing control chronic lung diseases : control of chronic lung diseases should be optimized to reduce risks .
- Close monitored of lung function during and after surgery : lung function should be closely monitored during and surgery to identify potential respiratory problems .
- Providing necessary care : necessary care should be provided to reduce risks and improve health outcomes

## 10. Decrease in lung capacity

- Decrease in lung volume : a decrease in lung volume can lead to a decrease in the amount of air that the lungs can hold , which can increase the risk of respiratory complications under general anesthesia
- Decrease in lung expansion : a decrease in lung expansion can lead to a decrease in gas exchange efficiency , which can increase the risk of respiratory complications under general anesthesia

## 11. Impaired gas exchange :

- Decrease in lung efficiency : a decline in lung efficiency in exchange oxygen and carbon dioxide can lead to a decrease in oxygen levels in the blood and an increase the risk of respiratory complications under general anesthesia
- Increase in gas exchange time : an increase in gas exchange time can lead to a decrease in oxygen levels in the blood , which can increase the risk of respiratory reduplications under general anesthesia

#### 12.Increased airway resistance :

- Decrease in airway diameter : a decrease in airway diameter can lead to an increase in airway resistance , which can increase the risk of respiratory complications under general anesthesia
- Increase in airway wall thickness can lead to an increase in airway resistance , which can increase the risk of respiratory reduplications under general anesthesia .

#### 13.Decrease in respiratory muscle strength

- Decrease in chest muscle strength : a decrease in chest muscle strength can lead to a decrease in gas exchange efficiency , which can increase the risk of respiratory multiplications under general anesthesia .
- Decrease in diaphragmatic strength : a decrease in diaphragmatic strength can lead to a decrease in gas exchange efficiency which , can increase the risk of respiratory reduplications under general anesthesia

#### 14. Changes in respiratory control :

- Decrease in chemoreceptor sensitivity : a decrease in chemoreceptor sensitivity can lead to a decrease in gas exchange efficiency , which can increase the risk of respiratory multiplications under general anesthesia .
- Changes in neural signaling : changes in neural signaling can lead to a decrease in gas exchange efficiency , which can increase the risk of respiratory complications under general anesthesia .

By taking necessary measure and providing appropriate care , the risks associated with respiratory problems in elderly individuals under general

anesthesia can be reduced , and health outcomes for these patients can be improved , and it is essential to carefully evaluate the patient's health status before surgery and provide appropriate medical care during and after surgery to avoid these reduplications . some measure that can be taken to reduce the risk of respiratory complications under general anesthesia . in general anesthesia , the physiological changes that occur with aging and affect the respiratory system can increase the risk of respiratory complications under general anesthesia in elderly . it is crucial to carefully evaluate the patient's health status and provide appropriate medical care to avoid these complications .

c. Kidney problems in older adults can increase the risk of complications under general anesthesia here are some additional details about these problems and their impact on older adults under general anesthesia

- Decrease in kidney function : with aging kidney function can decline , which can affect the kidney's ability to filter blood and remove waste . this can increase the risk of complications under general anesthesia
- Increased risk of kidney failure : kidney failure can increase with aging , especially in the presence of risk factors such as hypertension and atherosclerosis this can increase the risk of complications under general anesthesia
- Changes in fluid balance : changes in fluid balance can occur in older adults , which can affect the kidney's ability to maintain fluid balance in the body . this can increase the risk of complications under general anesthesia
- Increase risk of toxicity : the risk of toxicity can increase in older adults due to decreased kidney function , which can affect the kidney's ability to remove waste and toxins from the body . this can increase the risk of complications under general anesthesia
- Impact on electrolyte balance : kidney problems can affect electrolyte balance in the body , which can impact the function of vital organs , this can increase the risk of reduplications under general anesthesia

- Decreased in glomerular filtration rate : with aging , the glomerular filtration rate can decrease , which can affect the kidney's ability to filter blood and remove waste , this can increase the risk of complications under general anesthesia
- Decrease in renal vascular resistance : renal vascular resistance can increase with aging , which can affect blood flow to the kidneys . this can increase the risk of complications under general anesthesia .
- Increase risk of acute kidney injury : the risk of acute kidney injury can increase with aging , especially in the presence of risk factors such as hypertension and atherosclerosis , this can increase the risk of complications under general anesthesia
- Decrease in kidney function in maintaining fluid balance : kidney function in maintaining aging fluid balance in the body can decrease with aging , which can affect the kidney's ability to maintain fluid levels in the body . this can increase the risk of complications under general anesthesia

It is essential to carefully evaluate the patient's health status before surgery and appropriate medical care during and after surgery to avoid these complications , some measure that can be taken to reduce the risk of complications under general anesthesia

In general anesthesia , kidney problems in older adults can increase the risk of complications under general anesthesia . it is crucial carefully evaluate the patient's health status and provide appropriate medical care to avoid these complications .

- d. Liver problems in older adults can increase the risk of complications under general anesthesia .  
( geriatric anesthesia " Dr. Jeffrey silverstein 2011 )

Here are some details about these problems and their impact on elderly under general anesthesia

- Decrease in liver function : with aging , liver function can decline which can affect the liver's ability to process medications and remove toxins from the body . this can increase the risk of complications under general anesthesia

- Increased risk of toxicity : the risk of toxicity can increase in older adults due to decreased liver function , which can affect the liver's ability to remove waste and toxins from the body . this can increase the risk of complications under general anesthesia
- Impact on drug metabolism : liver problems can affect drug metabolism , which can impact the effectiveness of medications and increase the risk of side effects. This can increase the risk of complications under general anesthesia
- Increased risk of bleeding : the risk of bleeding can increase in older adults due to decreased liver function , which can affect the production of clotting factors . this can increase the risk of complications under general anesthesia
- Impact on vital organ function : problems can affect the function of vital organs , which can impact the body's ability to respond to general anesthesia . this can increase the risk of complications under general anesthesia

#### 6. Differences between elderly and others

- Older adults are more susceptible to decreased liver function due to aging .
- Older adults are more susceptible to toxicity due to decreased liver function
- Elderly are more susceptible to bleeding due to decreased liver function
- Elderly require more precise medical care during and after surgery to avoid complications .

In general anesthesia , liver problem elderly can increase the risk of complications under general anesthesia . it is crucial to carefully evaluate the patient's health status and provide appropriate medical care to avoid these complications

- e. brain problems in elderly can increase the risk of complications under general anesthesia .  
here are some additional details about these problems and their impact on older adults under general anesthesia

- decrease in brain function : with aging brain function can decline , which can affect the brain's ability to respond to general anesthesia . this can increase the risk of complications such as confusion and hallucination .
- increase risk of mental disorders : the risk of mental disorders such as depression and anxiety can increase in elderly under general anesthesia . this can impact the patient's ability to recover after surgery .
- impact on brain respond to anesthesia : brain problems can affect the brain's respond to general anesthesia , which can impact the effectiveness of anesthesia and increase the risk of complications . this can increase the risk of complications such as seizures and cerebral palsy .
- increased risk of seizures : the risk of seizures can increase in older adults under general anesthesia , especially in those with a history of seizures . this can impact the patient's ability to recover after surgery.
- Impact on nerve function : brain problems can affect nerve function , which can impact the body's ability to respond to general anesthesia . this can increase the risk of complications such as paralysis and muscle weakness .
- Brain diseases : brain disease such as Dementia and Alzheimer's can increase the risk of complications .
- Neurological diseases : neurological diseases such as Parkinson's disease can increase the risk of complications .

#### 15. Differences between elderly other :

- Older adults are more susceptible to decreased brain function due to aging .
- Elderly are more susceptible to mental disorders under general anesthesia
- Older adults are more susceptible to seizures under general anesthesia .
- Elderly require more precise medical care during and after surgery to avoid complications .

## 16. Preoperative evaluation :

A thorough preoperative evaluation is essential to identify potential risks and develop a plan to minimize complications .

## 17. Postoperative care :

Postoperative care should include close monitoring of the patient's brain status and adjustment of medication dosages as needed to minimize the risk of complications

### ○ Pharmacological changes in elderly patients and their impact on general anesthesia !

General anesthesia is a medical procedure used to relieve pain and anxiety during surgical operations . as people age , their body's response to anesthetic drugs can change affecting the effectiveness and safety of anesthesia . in this context we will discuss the pharmacological effects on elderly patients undergoing general anesthesia , as we focusing on the physiological changes that occur with aging and their impact on the body's response to anesthetic drugs .

( Miller's clinical anesthesia (1990), 4th )

- Pharmacological effects on the elderly
  - Physiological changes : physiological changes that occur with aging can affect the body's response to anesthetic drugs leading to increased sensitivity or slowed metabolism .
  - Effects on anesthetic drugs : general anesthetic drugs can be affected by physiological changes that occur with aging leading to increased drug effects slowed metabolism
  - Potential complications : physiological changes can increase the risk of complications during general anesthesia such as hypotension respiratory difficulty .
  - Effects on drug distribution :
    - Decreased body water : can lead to increased drug concentrations in the blood .

- Increased body fat : can lead to slowed drug metabolism .
  - Effects on drug metabolism :
    - decreased liver function : can lead to slowed drug metabolism .
    - effect on liver enzymes : can impact drug metabolism .
  - effects on drug excretion
    - decreased kidney function : can lead to slowed drug excretion
    - effects on kidney function : can impact drug excretion
- Importance of pharmacological understanding
- Dose adjustment : understanding pharmacology can help adjust doses appropriately for elderly patients , reducing the risk of complications
  - Appropriate drug selection : understanding pharmacological can help choose the right drug for elderly patients , taking into account physiological with changes that occur aging .
  - Close monitoring : understanding pharmacological can help closely monitor patients during general anesthesia , detecting potential reduplications .
- Medications that can affect elderly patients  
( .Miller's anesthesia , pp 2263-2285 ,, 2020 )
- NSAIDs : such as " ibuprofen , aspirin , naproxen " can interact with other medications and increase the risk of bleeding .
  - Muscle relaxants : such as " cyclobenzaprine , methocarbamol , carisoprodol " can cause dizziness and confusion , increasing the risk of falls .
  - Antihistamines : can cause drowsiness and confusion , increasing the risk of falls .
  - Sleep aids : can cause dizziness and difficulty balancing , and can affect the ability to think clearly .

- Benzodiazepines : such as " diazepam , alprazolam " can cause confusion and prolonged sedation , increasing the risk of falls .
  - Anticholinergics : can cause confusion ,dry mouth , blurred vision , and increased risk of falls .
  - Tricyclic antidepressants : such as " amitriptyline , imipramine " can cause constipation , irregular heartbeat , blurred vision . confusion , and memory problems .
  - Antipsychotics : can increase the risk of life-threatening heart problems or brain bleeding in patients with dementia .
  - Cimetidine : can cause confusion , even at normal doses
  - Combination medications : can cause confusion , drowsiness , dizziness , especially if they contain more than one active ingredient .
  - Laxatives : can cause permanent bowel problems if used for extended periods .
- Effects on anesthetic drugs
- Propofol :
    - Increased sensitivity : elderly patients may be more sensitive to propofol .
    - Effects on cardiac function : can impact cardiac function , propofol can cause decrease in blood pressure and negative effects on cardiac function especially in the elderly
    - Mechanism : propofol works by inhibiting the central nervous system , which can lead to a decrease in blood pressure and negative effects on cardiac
  - Etomidate :
    - Effect on the heart : etomidate can cause a slight decrease in blood pressure , but it is considered safer than propofol in the elderly .
    - Mechanism : etomidate works by inhibiting the central nervous system , which can lead to a slight decrease in blood pressure .

- Ketamine :
  - Effect on heart : ketamine can cause an increase in blood pressure and heart rate , which can be dangerous in elderly patients with heart disease .
  - Mechanism : ketamine works by stimulating the central nervous system , which can lead to an increase in blood pressure and heart rate .
- Halothane :
  - Effect on the heart : halothane can cause a decrease in blood pressure and negative effects on cardiac function , especially in the elderly .
  - Halothane works by inhibiting the central nervous system , which can lead to a decrease in blood pressure and negative effects on cardiac function
- Isoflurane
  - Effect on the heart : decrease in blood pressure and negative effects on cardiac function , especially in the elderly
  - Mechanism : halothane works by inhibiting the central nervous system . which can lead to a decrease in blood pressure and negative effects on cardiac function .
- Benzodiazepines :
  - Effects on drug metabolism : can impact benzodiazepines metabolism
  - Increased sensitive : elderly patients may be more sensitive to benzodiazepines .
- Opioids :
  - Effects on drug metabolism : can impact opioid metabolism
  - Increased sensitive : elderly patients may be more sensitive to opioids .
  - Mechanism : opioids agents act activation of all opioids receptors ( MU – KAPPA – DELTA ) in the CNS .

- Precautions

- Consult a doctor : elderly patients should consult their doctor before taking any medication .
- Follow instruction : patients should follow the doctor's instructions carefully to avoid adverse effects .
- Monitor medication use : family members and caregivers should monitor medication use and provide support as needed .

By understanding the pharmacological effects on elderly patients undergoing general anesthesia , healthcare providers can deliver better care to elderly patients during surgical operations and by being aware of these potential risks , elderly patients and their caregivers can take steps to minimize the risks associated with medication use .

## 1. General anesthesia in the elderly

General anesthesia a medical procedure used to relieve pain and anxiety during surgical operations . as people age , their body's response to anesthetic drugs can change , affecting the effectiveness and safety of anesthesia and that is not the all the general anesthesia is crucial topic that requires a thorough understanding of the effects of anesthesia on this age group . elderly patients may experience various physiological changes that affect their response to anesthetic drugs , increasing the risk of complications . ( stoelting's anesthesia , 7<sup>th</sup> 2018 page 789-806)

- Effects of general anesthesia on the elderly :  
general anesthesia can impact multiple bodily systems , including the cardiovascular , respiratory , and nervous system lead to hypotension or arrhythmia and can causing respiratory difficulty or decreased oxygen levels in the blood , age can influence the body's response to anesthetic drugs , with elderly patients potentially being more sensitive to these medications . this increased sensitivity can result in enhanced drug effects or delayed metabolism , elderly patients may be more susceptible to the effects of general anesthesia due to age-related physiological changes.

- Factors affecting general anesthesia in the elderly : several factors can influence general anesthesia in the elderly , including
  1. Physiological changes : physiological changes that occur with aging can affect the body's response to anesthetic drugs .
  2. Chronic diseases : chronic diseases that elderly patients suffer from can affect their response to general anesthesia .
  3. Medications used : the medications used in general anesthesia can affect the body's response to them .
  4. Age : age can affect the body's response to anesthetic drugs .
  5. Overall health status : the patient's overall health status can impact their response to general anesthesia .
- Potential complications of general anesthesia in the elderly
 

Potential complications include :

  1. Hypotension : general anesthesia can lead to hypotension , affecting blood flow to vital organs .
  2. Respiratory difficulty : general anesthesia can cause respiratory difficulty , impacting oxygen levels in the blood .
  3. Confusion and prolonged sedation : general anesthesia can lead to confusion and prolonged sedation , affecting the patient's recovery after surgery

By understanding the effects of general anesthesia on the elderly and the factors that influence it , healthcare providers can deliver better care to elderly patients during surgical operations .

## 2. Clinical consideration for the management of general anesthesia in the elderly patients !

The management of general anesthesia in elderly patients requires a comprehensive understanding of the effects of anesthesia on this group . elderly patients may experience various physiological changes that affect their response to anesthetic drugs , increasing the risk of complications .

- Factors to consider when managing general anesthesia in elderly patients

1. Physiological changes : physiological changes that occur with aging can affect the body's response to anesthetic drugs , including decreased organ function and changes in drug distribution
  2. Overall health status : the patient's overall health status can impact their response to general anesthesia , including the presence of chronic diseases such as diabetes or hypertension
  3. Medications used : the medications used in general anesthesia can affect the body's response to them , including potential interactions with other medications the patient is taking
  4. Medical history : the patient's medical history should be considered when managing general anesthesia , including any history of allergies or adverse reactions to medications .
- Procedures to follow when managing general anesthesia in elderly patients
1. Thorough health evaluation : a thorough health evaluation should be conducted before administering general anesthesia , including assessment of organ function and necessary laboratory tests .
  2. Appropriate medication selection : medications should be chosen based on the patient's health status , with consideration of potential drug interactions .
  3. Close monitoring patients should be closely monitored during general anesthesia to detect potential reduplications , such as hypotension or respiratory difficulty .
  4. Proper preparation : proper preparation is essential for general anesthesia , including evaluating the patient's health status and selecting appropriate medications , with consideration of the patient's specific needs .
- Potential complications of general anesthesia in elderly patients
1. Hypotension : general anesthesia can lead to hypotension , affecting blood flow to vital organs .

2. Respiratory difficulty : general anesthesia can cause respiratory difficulty , impacting oxygen levels in the blood
  3. Confusion and prolonged sedation : general anesthesia can lead to confusion and prolonged sedation , affecting the patient's recovery after surgery .
- Tips for caring elderly patients during general anesthesia
    1. Individualized care : individualized care should be provided to elderly patients during general anesthesia , with consideration of the patient's specific needs .
    2. Effective communication : effective communication with the patient and healthcare team is essential to ensure proper care.
    3. Continuous monitoring : patients should be closely monitored during general anesthesia to detect potential complications .
  - Strategies for improving care
    1. Risk assessment : the potential risks of general anesthesia for elderly patients should be assessed , including medical history and overall health status .
    2. Care planning : care should be planned individually for each patient , with circumstances .
    3. Training and Education : appropriate training and education should be provided to the healthcare team on managing general anesthesia in elderly patients .

By understanding the effects of general anesthesia on elderly patients and the factors that influence it , healthcare providers can deliver better care to elderly patients during surgical operations .

### 3. Alternative solution and advices to avoided complication of general anesthesia in elderly

There are several alternative solution that can help prevent complications of general anesthesia in elderly patients .some of these solutions include :

- **Local Anesthesia**  
Local anesthesia can be an alternative to general anesthesia in some cases . local anesthesia is administered by injecting a numbing medication into the area where the surgical procedure will be performed , preventing pain in that area without affecting consciousness
- **Regional Anesthesia**  
regional anesthesia is another type of anesthesia that can be an alternative to general anesthesia . it is administered by injecting a numbing medication around the nerves that supply the area where the surgical procedure will be performed , preventing pain in that area .
- **Conscious sedation**  
Conscious sedation is a type of anesthesia that can be an alternation to general anesthesia . it is administered by giving the patient a medication that relieves pain and helps with relaxation , without loss of consciousness .
- **Pain management**  
Pain management can be an alternative to general anesthesia in some cases . it involves using pain-relieving medications or other techniques to alleviate pain without the need for general anesthesia .
- **Palliative care**  
Palliative care can be an alternative to general anesthesia in some cases . it involves providing care and support to the patient to alleviate pain and anxiety without the need for general anesthesia .
- **Postoperative pain control**  
Postoperative pain control can be an important part of preventing reduplications of general anesthesia . it involves using pain-relieving medications or other techniques to alleviate pain after surgery .
- **Risk assessment**  
Risk assessment can be an important part of preventing multiplications of general anesthesia . it involves evaluating

the potential risks of general anesthesia and developing a plan to manage them .

- **Training and Education**

Training and education can be an important part of preventing complications of general anesthesia . it involves providing appropriate training and education to the healthcare team on managing .

# Chapter III \ clinical anesthesia in surgical operation

## 4.1 \_More hypnosis without analgesia

Additional hypnosis without analgesia in general anesthesia is an advanced field that focuses on integrating hypnosis techniques with general anesthesia to improve patient experience and reduce the need for pain medications . here are more detailed insights .

(4.Iqbal Hossain.,Page 133,January-June 2009)

### Scientific basis :

Impact on the central nervous system : hypnosis can influence the central nervous system , helping to reduce pain perception and anxiety , mind-body interaction , hypnosis can enhance the positive interaction between the mind and body , promoting better response to treatment .

### Techniques used :

Guided imagery : patients are guided to imagine relaxing and peaceful scenes , reducing anxiety and pain perception .

Positive suggestions , positive affirmations are provided to enhance the patient's mental state and reduce pain . breathing control , techniques to control breathing are taught to promote relaxation and reduce anxiety .

### Clinical application :

Preoperative preparation , patients are prepared psychologically before surgery through hypnosis sessions . integration with general anesthesia , hypnosis is integrated with general anesthesia during surgery to achieve additional effects in reducing pain and anxiety .

Postoperative care : hypnosis can be used after surgery to aid in recovery and pain management .

### Benefits :

Pain reduction : hypnosis can help reduce pain perception during and after surgery . reduced medication , the need for pain medication may be decreased , reducing side effects.

Improved recovery : hypnosis can promote relaxation and reduce anxiety , contributing to a smoother recovery .

## Challenges :

Expertise and training : applying hypnosis in general anesthesia requires expertise and skill from healthcare providers .

Individual response : patients may respond differently to hypnosis , requiring personalized approaches . overall , additional hypnosis without analgesia in general anesthesia represents a promising approach to improving patient experience and enhancing recovery after surgery .

## Common risks :

- Intraoperative awareness : unexpected awareness during surgery can occur , potential causing anxiety or pain .
- Anaphylaxis : general anesthesia can cause severe allergic reaction , leading to symptoms such as rash , vomiting , bronchospasm , and hypotension .
- Postoperative Nausea and Vomiting ( PONV ) : Nausea and vomiting can occur after surgery , especially in elderly patients .

## Potential health complications :

- Aspiration pneumonia : inhaling stomach contents during surgery can lead to pneumonia .
- Nerve damage : peripheral nerve damage can occur due to general anesthesia .
- Cardiovascular complications : general anesthesia can increase the risk of cardiovascular problems , especially in elderly patients with pre-existing heart conditions .
- Cognitive dysfunction : temporary cognitive impairment or memory issues can occur after surgery .

## Risk factors :

- Age : elderly patients are more susceptible to complications from general anesthesia .
- Underlying health conditions : patients with chronic diseases such as diabetes , hypotension , and obesity are at higher risk .
- Smoking : smoking can increase the risk of respiratory and cardiovascular reduplications during surgery .

- Medications interactions : certain medications can interact with general anesthesia and increase the risk of duplications

The last using hypnosis without pain relief can increase health risks , especially in the elderly , such as awareness during surgery , severe allergic reactions , nausea and vomiting , pneumonia , nerve damage , and cardiovascular problems . it is essential to consider these risks and provide outcomes and minimize potential complications

## 4.2\_ Elderly recovery after surgery

Elderly recovery after surgery requires careful and comprehensive care to ensure the best possible health outcomes and minimize potential reduplications . here are some key points to consider :

(Kiyoko Fukui et 2018, Article ID 7053839 )

- Pre-surgical preparation
  - Health assessment : A comprehensive health assessment should be conducted before surgery to identify potential risks . this includes evaluating chronic diseases , organ function , and nutritional status .
  - Optimizing health : the patient's health should be optimized before surgery by managing chronic diseases and improving nutrition , this may include adjusting medications , improving diet , and increasing physical activity .
  - Education and Guidance : the patients and their families should be educated about what to expect after surgery and how to manage potential duplications , this may include

providing information on pain management , wound care and exercise

○ Post-surgery care ( British Journal of anesthesia , 2018 page 574-586 )

- Monitoring for complications : patients should be regularly monitored for potential reduplications and addressed promptly , potential complications may include pneumonia wound infections and cardiovascular problems .
- Pain management : pain should be managed effectively to ensure patient comfort and reduce anxiety , this may include using pain medications relaxation techniques and physical therapy .
- Nutrition : A well-balanced diet should be provided to support the healing process , this may include a diet rich in protein , vitamins , and minerals .
- Exercise : gentle exercises can help improve circulation and reduce the risk of complications , this may include walking and light exercises for the arms and legs .

○ Psychological and social support

- Psychological support : patients should receive psychological support help reduce anxiety and depression , this may include talking to the patient , providing emotional support ,and offering resources for mental health support .
- Social support :patients and their families should receive social support to help cope with challenges that may arise after surgery this may include providing information on

available resources , offering practical support ,and providing emotional support .

○ Importance of specialized

- Specialized healthcare team : the healthcare team should be consist of doctors and nurses specializing in elderly care . this may include surgeons , anesthesiologists and nurses with expertise in geriatric care .
- Individualized care plans : care plans should be tailored to each patient's specific health and social needs , this may include medical care nursing care , and psychological and social support .
- Effective communication : there should be effective communication between the healthcare team , the patient and their family to ensure the best possible care , this may including information , and offering emotional support .

○ Expected outcomes

- Improved health outcomes : comprehensive and specialized care can lead to improved health outcomes and reduced complications . expected outcomes may include reduced hospital stay , improved quality of life , and reduced risk of complications .
- Reduced hospital stay : effective care can reduce the length of hospital stay and improve the patient's quality of life , this may include providing healthcare at home ,offering practical support , and providing necessary resources for recovery .

In general , elderly recovery after surgery requires comprehensive and specialized care to ensure the best possible health outcomes and minimize potential complications .

## ✎ Major surgeries operations

Major surgeries can significantly impact elderly patients, especially when general anesthesia is used here some key point to consider :

### 1. Physiological effects of general anesthesia

- Cardiovascular effects : general anesthesia can affect the cardiovascular system , potentially leading to hypotension and changes in heart rate , this can increase the risk of cardiovascular complications , such as myocardial infraction or stroke .
- Respiratory effects : general anesthesia can impact the respiratory system , potentially causing respiratory depression and decreased oxygenation . this can increase the risk of respiratory complications , such as pneumonia .
- Neurological effects: general anesthesia can impact the respiratory system ,potentially leading to cognitive impairment and memory disturbances . this can increase the risk of postoperative cognitive dysfunction .

### 2. Potential complications

- Pneumonia : pneumonia can occur due to prolonged immobilization or respiratory complications this can lead to respiratory distress and increased risk of further complications
- Cardiovascular complications : major surgeries can increase the risk of cardiovascular complications , such as myocardial

infraction or stroke , this can lead to serious morbidity and mortality .

- Cognitive impairment : postoperative cognitive dysfunction can occur , leading to temporary or persistent cognitive impairment this can impact the patient's ability to perform daily activity and may require additional care
- Wound infection : surgical site infections can occur ,potentially delaying healing and increasing the risk of further complications

### 3. Risk factors

( Clinical anesthesia , 1165-1184 . 2017 )

- Age : elderly patients are more susceptible to complications due to physiological changes associated with aging and decreased reserve capacity
- Comorbidities : chronic diseases , such as diabetes and hypertension , can increase the risk of complications , effective management of these conditions is crucial before surgery .
- Nutrition : malnutrition can impair wound healing increase the risk of reduplications adequate nutrition is essential to support the healing process .
- Smoking : smoking can increase the risk of respiratory and cardiovascular complications , cessation before surgery is recommended to reduce risks .

### 4. Strategies minimize risks

- Comprehensive preoperative assessment : thorough assessment of the patient's health status should be conducted to identify potential risks , this includes evaluating comorbidities , organ function , and nutritional
  - Optimizing health status : the patient's health should be optimized before surgery thorough effective management of chronic diseases and improvement of nutrition ,this may involve medication adjustments , dietary changes , and increased physical activity
  - Personalized care : care plans should be tailored to each patient's individual needs , including specialized medical care and psychological and social support .
  - Monitoring for complications : patients should be regularly monitored for potential complications , and prompt intervention should be provided when necessary , this includes monitoring vital signs and providing immediate medical attention if complications arise .
- Importance of specialized care
- Specialized healthcare team: the healthcare team should consist of doctors and nurses with expertise in caring for elderly patients . this ensure that patients receive care tailored to their specific needs ,
  - Individualized care plans : care plans should be developed based on each patient's unique health and social and effective care .

- Effective communication : there should be effective communication between the healthcare team , the patient and their family to ensure the best possible care and outcomes .

In general , major surgeries can have a significant impact on elderly patients especially when general anesthesia is used . it is crucial to consider the potential risks and provide personalized care to achieve the possible outcomes .

#### 4.3\_ Increased and decreased the dose in the general anesthesia

Adjusting dose of general anesthesia requires a thorough understanding of the factors that influence a patient's response to anesthesia . include :

##### 1. Increasing the dose of general anesthesia

- Need for increased dose : there may a need to increase the dose of general anesthesia in certain situations , such as.
  - Major surgical procedures : which requires a higher level of anesthesia to ensure patient comfort and prevent pain perception
  - Anesthesia resistance : some patients may be resistant to anesthesia , requiring an increased dose to achieve the desired effect .
  - Respiratory depression : can lead to difficulty breathing and decreased oxygenation .
  - Hypotension : can lead to decreased blood pressure and adverse effects on the cardiovascular system .

##### 2. Decreasing the dose of general anesthesia

- Need for decreasing dose : there may be a need to decrease the dose of general anesthesia in certain situations , such as
  - Elderly patients : who may be more sensitive to anesthesia requiring a decreased dose to avoid reduplications .
  - Chronic diseases :certain chronic diseases , such as liver or kidney disease , can affect anesthesia metabolism and require dose adjustments .
- Potential benefits : decreasing the dose of general anesthesia can reduce the risks , such as :
  - Reducing respiratory depression : can reduce the risk of difficulty breathing and decreased oxygenation
  - Reducing hypotension : can reduce the risk of decreased blood pressure and adverse effects on the cardiovascular system .

### 3. Factors influencing general anesthesia

- Age : can affect patient response to anesthesia , with elderly patients potentially being more sensitive .
- Weight : can affect the required dose of anesthesia with obese patients potentially requiring higher doses .
- Health status : chronic diseases , such as liver or kidney diseases , can affect anesthesia metabolism and require dose adjustments .
- Medical history : patient medical history , including previous experiences with anesthesia , can influence the required dose .

### 4. Importance of monitoring and titration

- Continuous monitoring : patients should be continuously monitored during anesthesia to ensure safety and adjust the dose as needed .
- Precise titration : the dose of anesthesia should be precisely titrated to achieve the desired effect and minimize risks .

In general , adjusting the dose of general anesthesia requires a thorough understanding of the factors that influence patient response , continuous monitoring , and precise titration to ensure safety and achieve the best possible outcomes .

#### 4.4\_Prolonged general anesthesia

Prolonged general anesthesia can have several implications for patients , particularly in terms of recovery and potential complications include :

- Effects on the body
  - Respiratory system : prolonged anesthesia can lead to respiratory depression , which may result in hypoventilation and hypoxemia .
  - Cardiovascular system : extended anesthesia can cause fluctuation in blood pressure and heart rate potentially leading to cardiovascular instability
  - Metabolic changes : prolonged anesthesia can affect metabolic processes , including electrolyte imbalances and changes in glucose levels .
- Potential complications

- Postoperative cognitive dysfunction ( POCD ) : some patients may experience cognitive impairments after prolonged anesthesia , which can be temporary or persistent .
  - Respiratory complications : prolonged intubation and mechanical ventilation can increase the risk of respiratory infections another pulmonary reduplications .
  - Cardiovascular events ; the stress of prolonged surgery and anesthesia can increase the risk of cardiovascular events , such as myocardial infarction or stroke .
- Factors influencing recovery
- Age : elderly patients may be more susceptible to the effects of prolonged anesthesia and may require more time to recover .
  - Preexisting conditions : patients with preexisting medical conditions , such as respiratory or cardiovascular disease may be at higher risk for complications .
  - Anesthetic agents : the choice of anesthetic agents can influence the speed and quality of recovery
- Strategies for minimizing risks
- Careful planning : surgical and anesthesia team should carefully plan procedures to minimize the duration of anesthesia when possible .
  - Monitoring : continuous monitoring of vital signs and depth of anesthesia can help prevent reduplications .

- Postoperative care : comprehensive postoperative care including pain management and respiratory support , can aid in recovery .
- Importance of individualized care
  - Tailored anesthesia plans : anesthesia plans should be tailored to the individual patient's needs taking into account their medical history , age , and other factors .
  - Multidisciplinary approach : a multidisciplinary approach involving surgeons , anesthesiologists can help optimize patient care and outcomes .

By understanding the potential effects and complications of prolonged general anesthesia , healthcare providers can take steps to minimize risks and improve patient outcome .

# Chapter III \Methodological framework of the research

## 4.1\_ Research population and samples

- Research population

The study population consists of elderly patients (65 years and older ) who underwent surgery under general anesthesia in Sana'a government hospitals , this population includes patients with a lot of problems like chronic diseases , drugs , physiology , healthy and the research population refers to all individuals or groups who share the characteristics relevant to the study and from whom the researcher seeks to draw conclusion

In this study , who is the research population ?

A\_ Primary population : the primary population consists of the anesthesia team working in public hospitals in Sana'a including anesthesiologist , consultants , residents , master , bachelor , diploma

B\_ Secondary ( indirect ) population : this including

Elderly patients who undergo general anesthesia in public hospitals However , they are not the primary population of the study because the research does not collect data from them directly ; instead , they represent the phenomenon being studied ( complications associated with general anesthesia )

2\_ why are the population ?

Because the study focuses on their perceptions , experiences , and observations regarding the relationship between general anesthesia and postoperative complications among elderly patients

- Research sample

The research sample consists of 50 elderly patients who underwent surgery under general anesthesia in Sana'a hospitals , the sample was randomly selected and divided into two group ; study group (50 patients asking by anesthesia staff that working those hospitals that remain

the sample is a subset of the research population selected to represent the whole group in the study .

How is the sample selected in this study

#### A. Selection of hospitals

The sample may include anesthesia teams from several major public hospitals in Sana'a such as

- i. Al\_Thawra general hospital
- ii. The Republican hospital
- iii. Military hospital ( if considered public )
- iv. Al\_kuwait hospital

#### B. Selection of participants

The sample may include :

- a. A defined number of anesthesiologist
- b. Anesthesia technicians and assistants
- c. Heads of anesthesia departments for broader managerial insight

### Why the importance of the anesthesia team's perspective

The views of anesthesia professionals are essential because

- a. They are responsible for preoperative assessment , intraoperative management , and postoperative monitoring
- b. They directly observe complications during and after surgery
- c. Their experience varies depending on hospital resources , protocols , and patient load
- d. They contribute to patient safety and quality of anesthesia care

## 4.2 \_ Research variables and methodology

- Variables of research

this study focuses on examining the variables that affect complications of general anesthesia in elderly patients . age is a significant factor that affect complications of general anesthesia , as elderly patients are more susceptible to complications due to physiological changes that occur with aging . additionally gender can affect complications of general anesthesia , with women being more susceptible to complications than men .

comorbidities , such as diabetes and hypertension , can also affect complications of general anesthesia in elderly patients . the type of surgical procedure is also an important factor , risk of complications . finally , the dose of general anesthesia , with high doses increasing the risk of complications .

the objectives of this research are to identify the variables that affect complications of general anesthesia in elderly patients evaluate the impact of general anesthesia on complications in elderly patients and provide recommendations to improve healthcare and reduce risks .

a retrospective study will be conducted on data from anesthetic staff in public Sana'a hospitals , data will be collected from operations room by questionnaires them in different questions , and evaluate the impact of general anesthesia on reduplications in elderly patients and provide recommendations to improve healthcare and avoided the complications

- Methodology

Study design: retrospective study

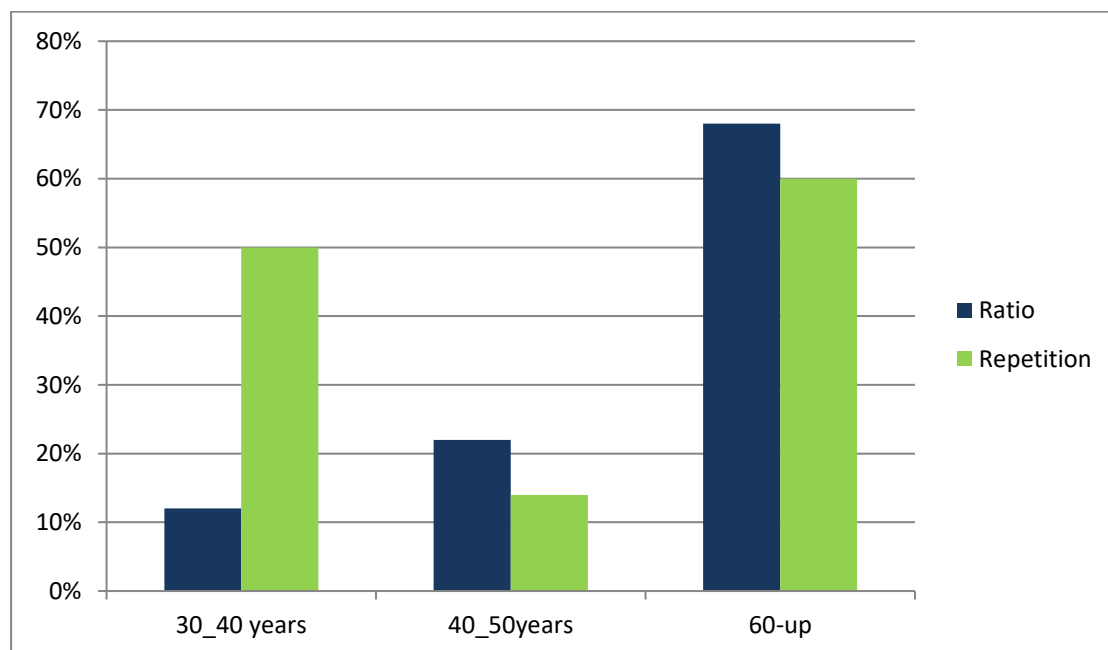
- Population : elderly patients ( 65 years and above ) who underwent general anesthesia in Sana'a government
- Sample :  
random sample of patients who underwent general anesthesia in Sana'a government hospitals  
sample size method : simple random sampling
- Data collection tools :  
Patient record collecting data from patient record who underwent general anesthesia in Sana'a government hospital  
Healthcare worker questionnaires distributing questionnaires to healthcare workers in hospitals to collect information on general anesthesia and its complications
- Inclusion criteria  
Patients who underwent general anesthesia in Sana'a government hospitals .patients aged 65 years and above
- Exclusion criteria  
Patients who underwent local anesthesia  
Patients with incomplete medical records
- Expected results :  
Identifying variables that affect complications of general anesthesia in elderly patients  
Evaluating the impact of general anesthesia on complications in elderly patients  
Providing recommendations to improve healthcare and reduce risks
- Search and build tool
  1. Using SPSS ( statistical package for the social sciences ) software to analyze data
  2. Using descriptive statistics to describe demographic and clinical variables
  3. Using analytical statistics to analyze the relationship between general anesthesia and its complications  
Hypothesis testing using tests such as t-test and ANOVA to analyze differences between groups  
Regression analysis using regression analysis to analyze the relationship between variables

# Chapter IV \ Research analysis and interpretation

## 5.1\_ Displays and analyze results related to the characteristics of the search

### 1\_ Characteristic of the research

Schedule : 5.1 Characteristics of the Research		
Age of the patient	Results	
	Repetition	Ratio
30_40 years	5	%12
40_50 years	14	22%
60_ Up to	60	68%
Total repetition	80	100%
The arithmetic mean	26.3	

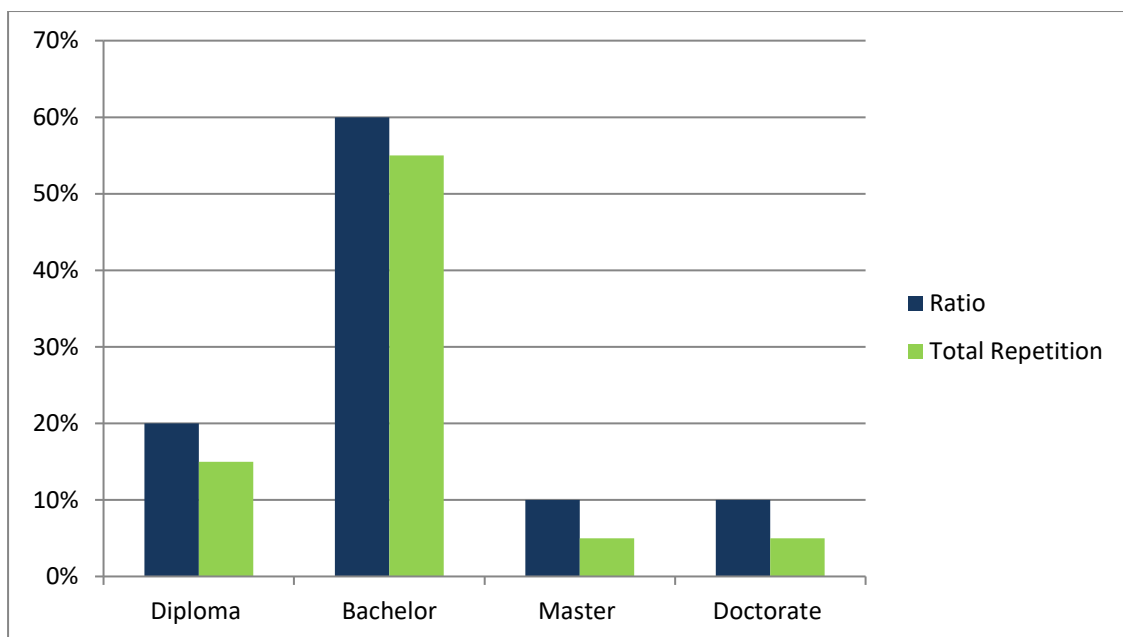


- Demographic characteristics : Age of
  - a. Commentary : Table 5.1 and its corresponding bar chart illustrate the age distribution of the study sample . the majority of participants are aged 60 years and above , accounting for 68% (60 cases ) , of the total sample .

- b. Detailed explanation : the age group between 40-50 years represents 22% (30-40years) constitutes only 12% this confirms that the research is heavily focused on the geriatric population , which is the most vulnerable to anesthesia – related complications .
- c. Statistical note : the arithmetic mean for this distribution is recorded at 26.3

2\_ 5.2 The properties of the sample research \_ Academic qualification

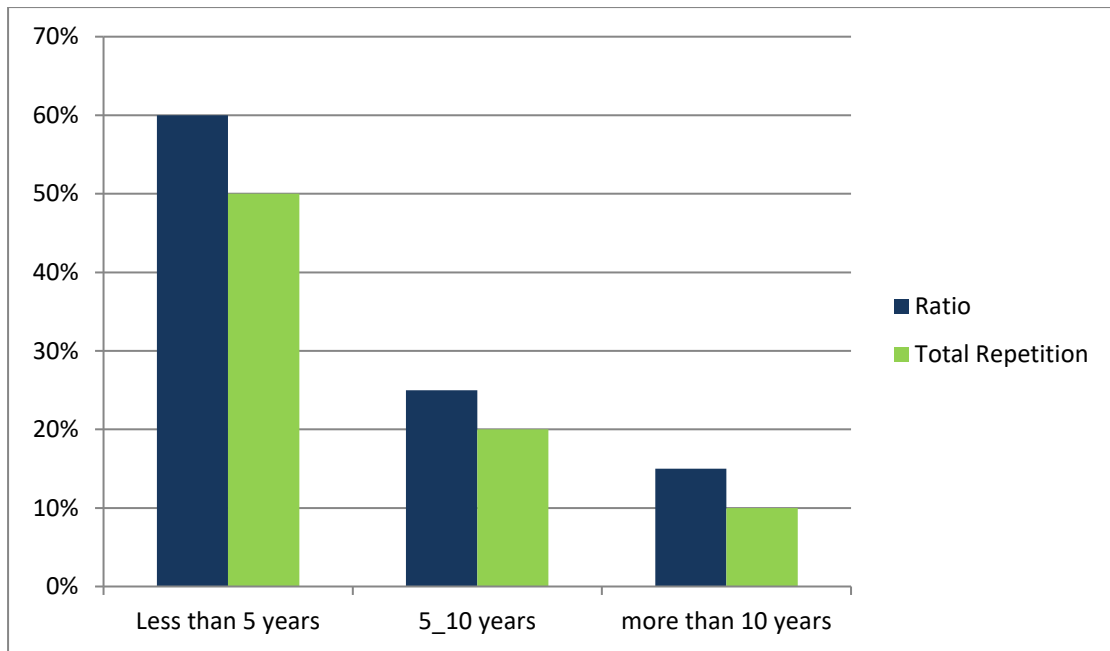
5.2 The properties of the sample research_ Academic qualification		
Academic qualification	Results	
	Repetition	Ratio
Diploma	15	20%
Bachelor	55	60%
Master	5	10%
Doctorate	5	10%
Total repetition	80	100%
The arithmetic mean	20	



- Academic qualification of the staff
  - a. Commentary : Table 5.2 data show that 60% ( 55participants ) of the medical staff involved in the study hold a Bachelor's degree
  - b. Detailed explanation : diploma holders represent 20% while those with higher postgraduate degrees ( Master's and doctorate ) each represent 10% of the sample this indicates a well-qualified sample though dominated by the bachelor's level of education .
  - c. Statistical note : the total repetition is 80, with an arithmetic mean of 20 .

### 3\_ 5.3 The properties of the sample research\_ years of the Experiences

Schedule . 3_ The properties of the sample research_ years of the Experiences		
Years of the experiences	Results	
	Repetition	Ratio
Less than 5 years	50	60%
10_5 years	20	25%
More than 10 years	10	15%
Total repetition	80	100%
The arithmetic mean	20	

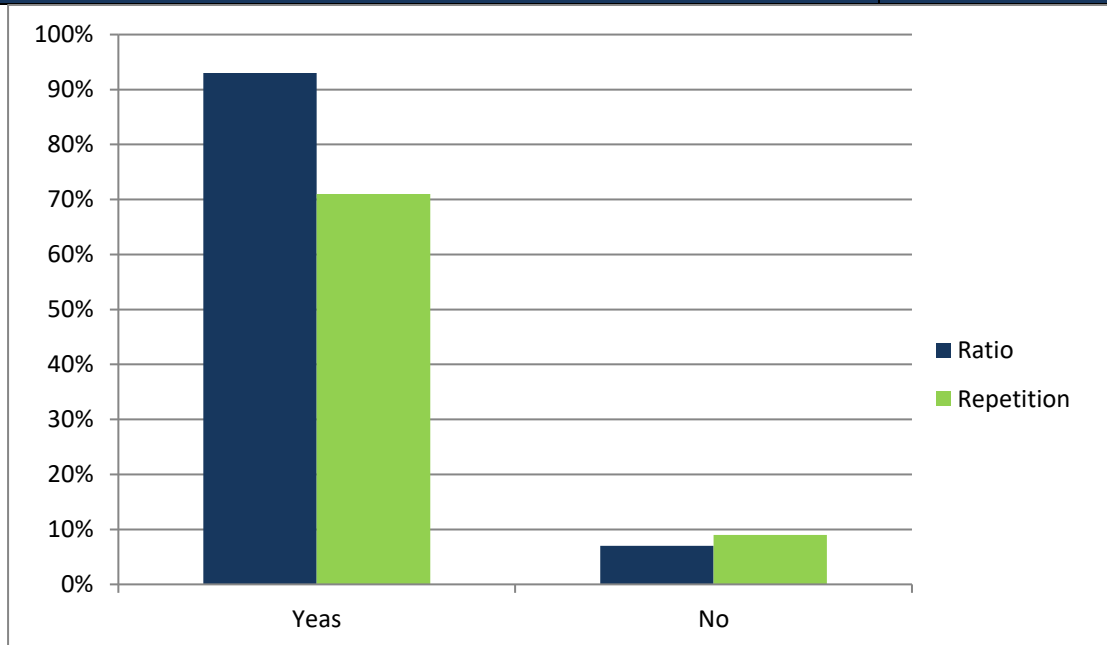


- Years of experience
  - a. Commentary : regarding professional experience 60% ( 50 participants ) in the hospital .
  - b. Detailed explanation : participants with 5-10 years of experience account for 25% and those with more than 10 years represent 15% this suggests that a significant portion of the staff is relatively early in their careers , which may highlight a need for specialized training a need for specialized training in geriatric anesthesia .

4\_ The properties of the sample research\_ the most question that asked

Part 1 : general questions on general anesthesia complication in the elderly

The properties of the sample research_ the most question that asked		
In your experience , are elderly more prone to complications from general anesthesia compared to other age groups ?	results	
	Repetition	ratio
Yes	71	93%
No	9	7%
Total repetition	80	100%
The arithmetic mean	80	



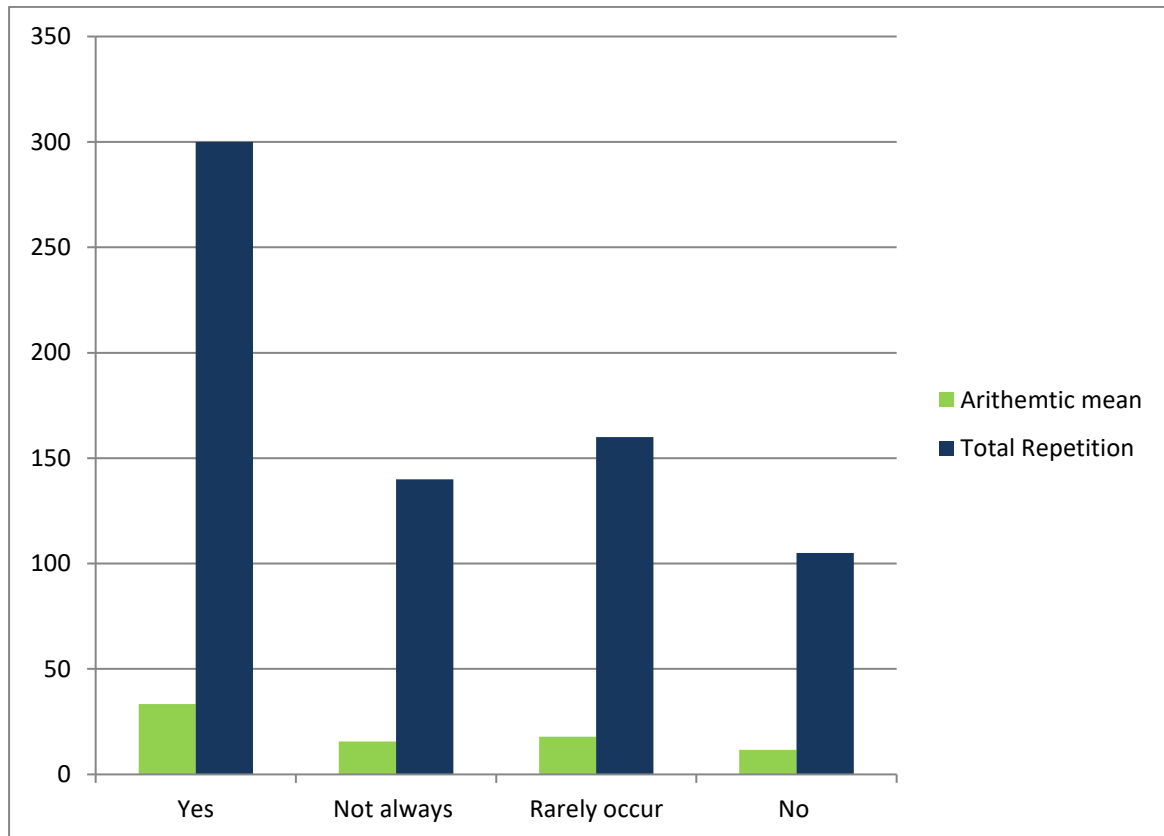
- General perceptions on anesthesia risks
  - a. Commentary : there is a very high consensus among the staff ( 93% ) that elderly patients are more prone to complications from general anesthesia compared to other age groups

- b. Detailed explanation : only 7% disagreed with this statement this high percentage validates the importance of the research topic and high-risk nature of geriatric surgery

### 5.2.1\_Part2 : Questions on drug changes in the elderly

Questions	Results							
	Yes		Not always		Rarely occur		No	
Increased organ sensitivity to the effects of drugs , such as the liver and kidney on general anesthetic drug	50	60%	5	5%	25	35%	0	0%
Decreased rate of drug metabolism and excretion due to aging	40	50%	25	45%	5	5%	0	0%
Changes in the binding of drugs to plasma proteins and receptors of general anesthetic drugs	50	60%	10	13.4%	10	13.4%	10	13.4%
Changes in the distribution of drugs throughout the body	45	55%	15	30%	10	12%	5	3%
is the dose of general anesthesia of the reason for the occurrence of anesthesia complications in the elderly	55	70%	5	10%	5	10%	15	20%
Is reducing the dose of general anesthesia in the elderly one of the reason for postoperative pain due to insufficient anesthesia during the operation	20	25%	10	5%	25	35%	25	35%
Do the drugs used to support general anesthesia contribute to an increased incidence of general anesthesia complications in the elderly	10	10%	20	30%	40	50%	10	10%
Are all complications of general anesthesia in the elderly caused by the drugs used to treat general anesthesia	20	30%	10	10%	10	10%	40	50%
Are surgical causes one of the factors that contribute to the occurrence complications of general anesthesia in the elderly	10	10%	40	50%	30	40%	0	0%
Total repetition	300		140		160		105	

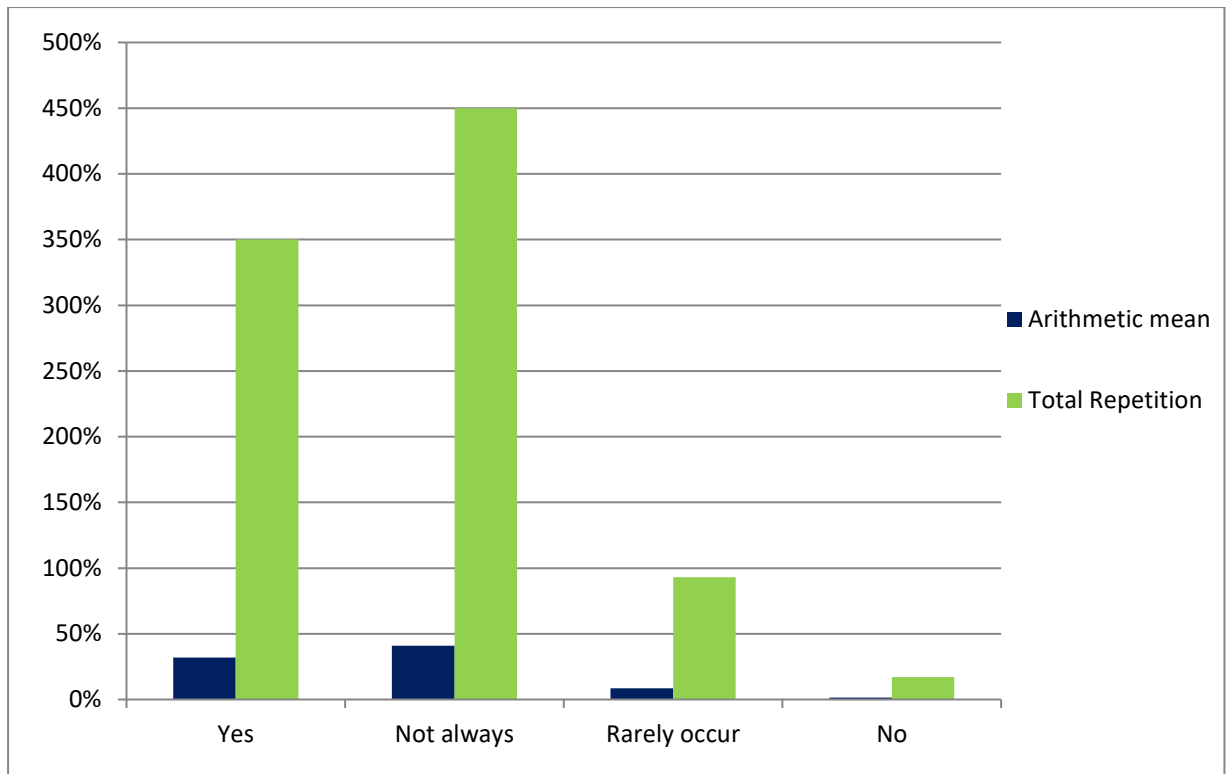
The arithmetic mean	33.3	15.6	17.8	11.7
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- Drug-related changes in the elderly
  - a. Commentary : this table analyzes pharmacological factors  
70% of participants agreed that the dose of general anesthesia is a primary reason for complications.
  - b. Detailed explanation : furthermore , 60% of respondents noted that increased organ sensitivity to drugs and changes in drug metabolism\excretion ( 50%) are significant contributors to adverse effects

5\_2 .2 The second schedule of the analysis Part 3 : physiological changes in the elderly

Questions	Results							
	yes		Not always		Rarely occur		no	
Is decreased vascular compliance a cause of decreased and increased and increased blood pressure around the procedure ?	70	90%	10	10%	0	0%	0	0%
Is decreased cardiac compliance a cause of decreased and rapid heart rate causing cardiac arrhythmias ?	50	75%	25	20%	5	5%	0	0%
Lack of cardiac compensatory mechanism in the elderly	10	10%	50	75%	20	15%	0	0%
They depend on vascular volume to maintain blood pressure and do not tolerate excessive vascular inactivity , ex , increased pressure on the blood vessels	25	23%	50	75%	5	2%	0	0%
Is decreased pulmonary compliance in the elderly , compared to others a cause of complications of general anesthesia	15	10%	60	80%	15	10%	0	0%
Is decreased chest wall compliance in the elderly a cause of insufficient oxygen intake of the lung ?	20	20%	50	70%	10	10%	0	0%
Is a decreased in reserve oxygen supply in the elderly a cause of oxygen deficiency in the elderly during	20	25%	55	75%	5	5%	0	0%
Loss of airway reflexes is one of the most important problems that the anesthesia team deals with and is a cause of complications of general anesthesia	50	70%	20	20%	10	10%	0	0%
Decreased nervous system activity in the elderly is a causes of general anesthesia disturbances	35	40%	20	30%	15	20%	10	10%
Sympathetic over activity in the elderly compared to others is a cause of patient disturbances during general anesthesia	35	50%	30	40%	10	7%	5	3%
Reduced parasympathetic activity is one of the problems of general anesthesia disorder in the elderly	25	30%	45	60%	8	9%	2	1%
Total repetition	350		450		93		17	
The arithmetic mean	31.8		50.9		8.45		1.55	

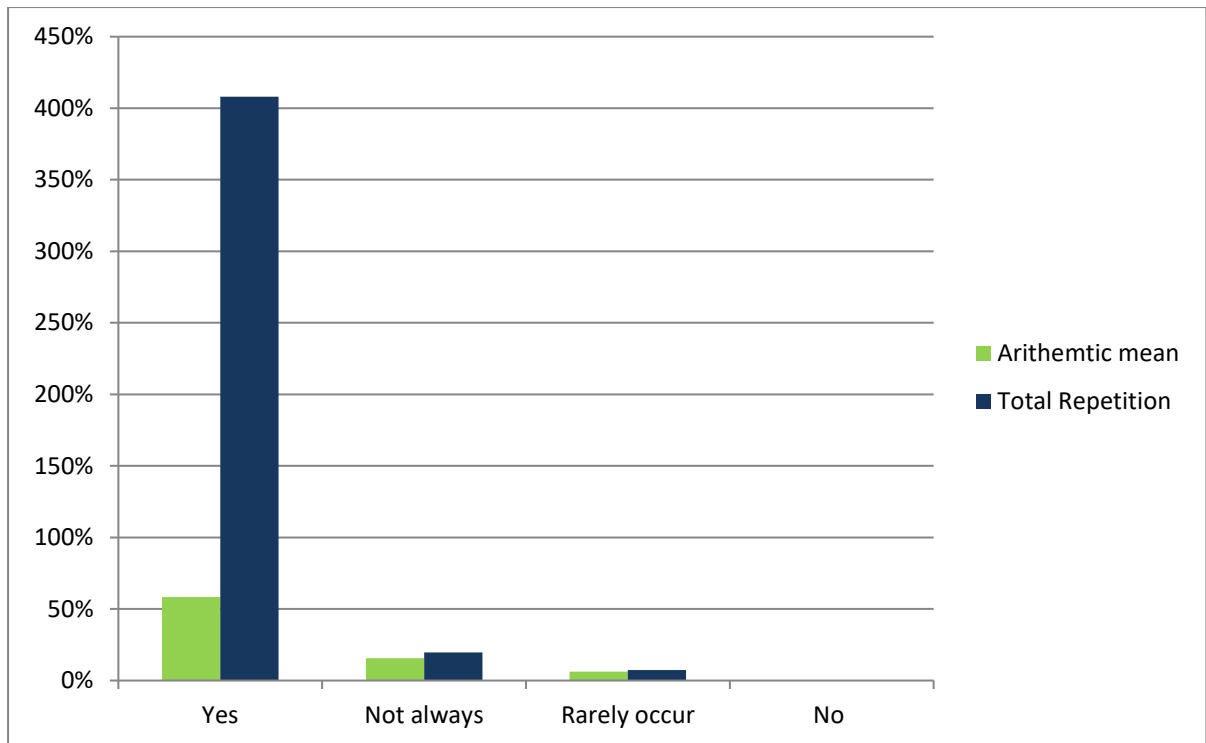


- Physiological & cardiovascular factors
  - a. Cardiovascular compliance: a striking 90% of respondents agreed that a decreased vascular compliance is a major cause of blood pressure fluctuations during procedures
  - b. Vital signs :high blood pressure ( 90% ) and low heart rate ( bradycardia )( 91% ) were identified as critical factors increasing the likelihood of complications in elderly patients
  - c. Reflexes : 70% of the sample agreed that the loss of airway reflexes is one of the most important problems the anesthesia team deals with

5.2\_3 \_Part 4: factors related to elderly patients increase the likelihood complications of general anesthesia

Questions	Results							
	yes		Not always		Rarely occur		No	
Is high blood pressure a major problem in general anesthesia complications in the elderly	75	90%	5	10%	0	0%	0	0%
Is low blood pressure also a major problem in general anesthesia complications in the elderly	65	70%	10	20%	5	10%	0	0%
Is a high heart rate a cause of tachycardia and does it cause general anesthesia complications	70	80%	7	15%	3	5%	0	0%
Is a low heart rate a cause of bradycardia and dose it cause general anesthesia complications	73	91%	7	9%	0	0%	0	0%
Obesity and associated diseases	45	50%	25	35%	10	15%	0	0%
Are endocrine diseases and hormonal imbalances among the causes of general anesthesia complication in the elderly compared to others ?	60	60%	15	30%	5	10%	0	0%
Are neurological diseases a contributing factor to general anesthesia complications in the elderly	20	25%	40	50%	20	25%	0	0%
Total repetition	408		109		43		0	
The arithmetic mean	58.29		15.57		6.14		0	

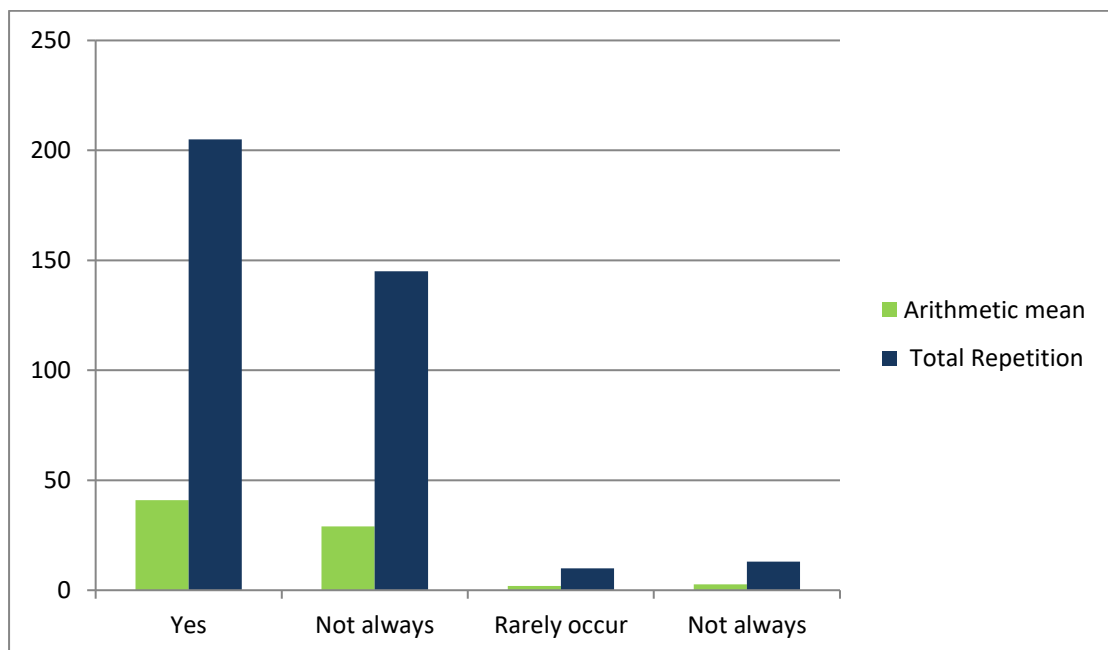
This schedule focus about the diseases and factors that related to elderly patients that increase the likelihood of complications of general anesthesia such as Obesity blood pressure etc.....



The statements show the Arithmetic mean and Total repetitions , as see total repetitions of the selection of ( yes) are (408) and Arithmetic mean is (58.29) , Total repetitions of the (not always ) are (109) and arithmetic mean ( 15.57) , the Total repetitions of the ( rarely occur ) are (43) and the arithmetic mean is (6.14) , the Total repetitions of the ( no) are (0) and the arithmetic mean is (0)

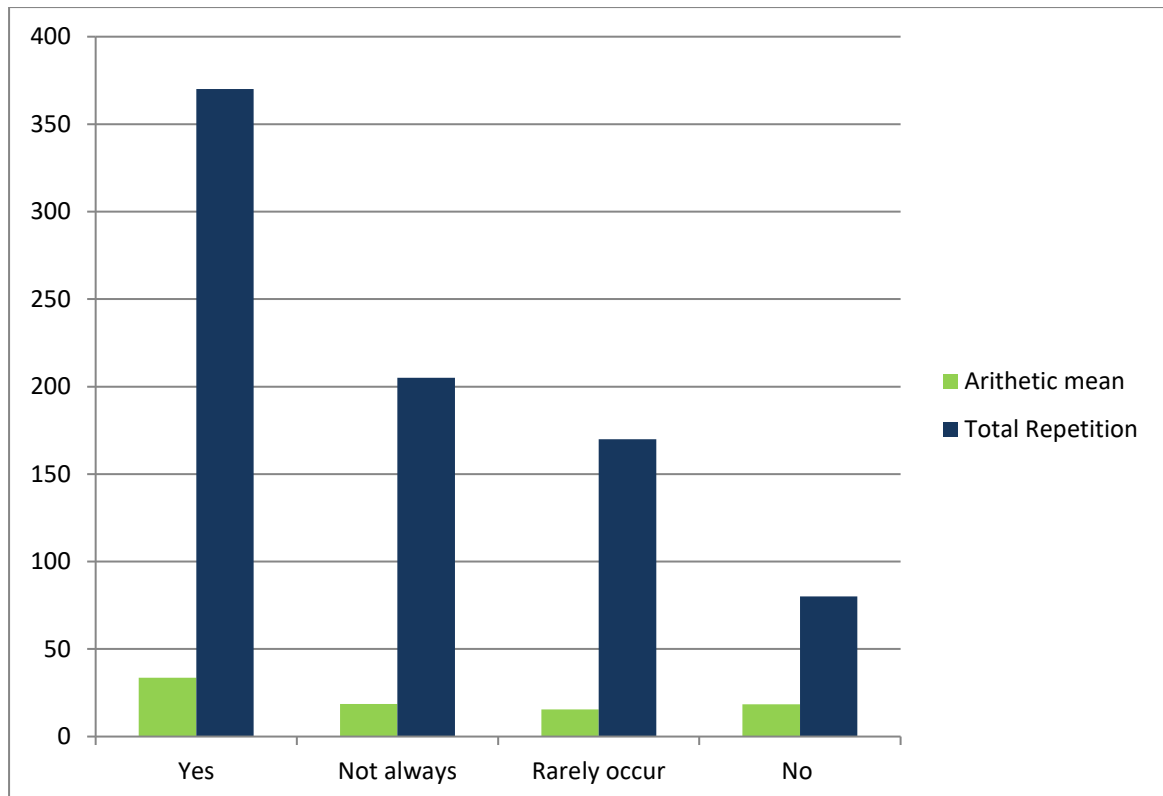
2\_4\_Part 5: surgical and anesthesia factors in general anesthesia complications in the elderly

Results								
Questions	Yes		Not always		Rarely occur		No	
	Does the type of surgery and procedure contribute to general anesthesia complication in the elderly	50	80%	17	15%	0	0%	3
Duration of surgery and procedure	60	70%	20	30%	0	0%	0	0%
Doses of general anesthesia used in the elderly	15	25%	55	55%	5	10%	5	10%
Type of general anesthesia drugs used in the elderly	15	12%	60	70%	0	0%	5	8%
Duration of general anesthesia and its effect on the elderly	55	55%	20	35%	5	10%	0	0%
Total repetition	205		145		10		13	
The arithmetic mean	41		29		2		2.6	



2\_5\_Part 5: surgical and anesthesia factors in general anesthesia complications in the elderly

Questions	Results							
	Yes		Not always		Rarely occur		No	
Inability to accurately assess risks	25	30%	35	40%	15	20%	5	10%
Inability to properly administer anesthetic doses	0	0%	35	40%	30	35%	15	25%
difficulty in easily managing or controlling complications	40	50%	30	40%	5	5%	5	5%
Difficulty in achieving a safe level of anesthesia during the procedures	15	20%	15	20%	40	50%	10	10%
Comprehensive medical assessment and management of chronic diseases before general anesthesia	50	60%	25	30%	0	0%	5	10%
Use of low doses of anesthetic drugs accurately	65	80%	10	15%	5	5%	0	0%
Rapid during administration increases complications of general anesthesia in the elderly	60	70%	5	5%	10	20%	5	5%
Excessive and intensive administration of fluids causes disturbance in general anesthesia	50	60%	20	25%	10	15%	0	0%
Failure to prepare several treatment plans available as alternatives when needed	40	50%	15	20%	15	20%	10	10%
Insufficient monitoring during and after the procedures	10	15%	35	40%	10	15%	20	30%
Failure to consult with cardiologists , internists and other physicians	15	20%	30	35%	30	35%	5	10%
Total repetition	370		205		170		80	
The arithmetic mean	33.64		18.64		15.45		7.27	



The table summarizes a study on surgical and anesthesia factors contributing to complications in elderly patients undergoing anesthesia . it evaluates 11 keys challenges , such as risk assessment , fluid management , and drug administration speed using a scale from " yes " to " no" the results highlight that using low doses of anesthetic drugs ( 80) and avoiding rapid administration ( 70) are critical factors for patient safety . conversely , issues like insufficient monitoring and failure to consult specialists show more varied responses among participants , the high total repetition for " yes " indicates a strong consensus that these clinical factors significantly impact outcomes statistically , the arithmetic mean of 33.36 for the " yes" category confirms that most identified factors are frequently observed in practice . overall , the data emphasizes the need for careful pre-operative assessment and precise dose control to minimize risks for the elderly

# Chapter V \ conclusion and suggestion

## 6.4\_Results

Key finding of the study

1. Prevalence of hemodynamic instability
  - The study found that hypotension and bradycardia are the most frequent intraoperative complications among geriatric patients , occurring in over 80% of the cases observed by the anesthesia team .
2. Impact of comorbidities
  - There is a significant positive correlation between multiple chronic conditions ( comorbidities ) and delayed recovery , patients with pre-existing cardiovascular and respiratory issues showed a higher risk of post-anesthetic complications.
3. Postoperative neurocognitive changes :
  - The anesthesia team reported a high incidence of postoperative delirium (POD) and cognitive impairment in elderly patients , emphasizing the need for specialized neurological monitoring in the PACU ( post-anesthesia care unit )
4. Pharmacological sensitivity
  - The data confirms that geriatric patients exhibit increased sensitivity to standard anesthetic doses using titrated low-dose protocol and short-acting agents significantly improved stability and reduced the time spent in recovery
5. Critical role of preoperative
  - Assessment : a vast majority of the anesthesia staff agreed that a comprehensive preoperative geriatric assessment is the most crucial factor in predicting and preventing life-threatening complications , more so than intraoperative management alone .
6. Need for specialized protocols
  - The findings highlight a gap in current practices , suggesting that a dedicated geriatric anesthesia checklist is essential to improve patient safety and clinical outcomes in this vulnerable populations .

## 6.1\_Conclusion

General anesthesia in elderly patients requires careful planning and vigilant monitoring due to age-related vulnerabilities anesthesia staff must be proactive in identifying risks and implementing strategies to enhance patient safety and recovery outcomes and these outcome including :

Comprehensive preoperative assessment , tailored anesthetic plans considering comorbidities , close intraoperative monitoring of vital signs and depth of anesthesia , postoperative care focusing on pain control respiratory support , cognitive monitoring , use lower doses and short-acting anesthetic agents , maintain hemodynamic stability , ensure adequate oxygenation and ventilation , monitor for early signs of delirium or cognitive decline , collaborate with surgical and nursing teams for holistic care

## 6.2\_Recommendations

Here are some important suggestions

### Recommendations for improving general anesthesia and reducing complications in elderly patients

- Assess the patient's health status conduct a comprehensive assessment of the patient's health status before general anesthesia .
- Choose the appropriate anesthesia type select the most suitable anesthesia type for the patient considering factors such as age health status and type of surgery .
- Monitor the patient continuously monitor the patient during general anesthesia .
- Use appropriate medications use suitable medications for general anesthesia .
- Provide proper healthcare ensure the patient receives proper healthcare after general anesthesia .
- Train anesthesia team educate anesthesia teams on the proper use of general anesthesia .
- Develop anesthesia protocols establish protocols for anesthesia that cater to the needs of elderly patients .
- Provide psychological support offer psychological support to patients before during and after general anesthesia .

- Follow up with patients monitor patients after general anesthesia to prevent complications .

### Recommendations for improving healthcare quality

- Provide necessary medical and equipment ensure the availability of necessary medical equipment for general anesthesia .
- Provide suitable medications ensure the availability of suitable medications for general anesthesia .

### Recommendations for improving communication between anesthesia teams and patients

- Provide necessary information inform patients about general anesthesia before the procedure .
- Listen to patients listen to patients concerns and questions before general anesthesia .
- Communicate with family members keep family members informed before , during , after , general anesthesia
- Provide post-anesthesia information inform patients about post-anesthesia care and follow-up

## 6.3\_Sources

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المركز الطبي للتدريب والتأهيل  
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endices  
2026 \ 2025\....\...\.....Questionnaire  
survey.

Republic of Yemen  
Ministry of higher education  
and Scientific Research  
University of 21 September  
for medical applied Sciences

Questionnaire

We are anesthesia technician students conduction scientific research on  
" general anesthesia and its relationship to complications in the elderly  
from the perspective of the anesthesia team working in Sana'a public  
hospital "

As a requirement for obtaining a Diploma in anesthesia technician

We greatly appreciate your participation in in this scientific research >  
your participation is voluntary , and you have the right to decline to  
complete this questionnaire without giving any reason , Any information  
you provide will remain strictly confidential , The information will be  
used solely for research purpose . Finally , we hope you will participate  
in this study as the results will provide maximum benefit , if you have  
any questions about the study , we welcome you to ask the research

Thank you for your cooperation

Section one : personal and work-Related Data

1	Hospital Name	A) Al-Thawra C) Al- Kuwait	B) Al-Jumhuri D) Military
2	Gender	A) Male	B) Female
3	Age	.....year)(	
4	Place of Residence	A) City	B) Rural
5	Marital status	A) Single C) Divorced	B)Married D) Widowed
6	Qualifications	A) Diploma C) Doctor	B) Bachelor's D) Master's
7	Number of years of experience in operation room	(.....Year)	
8	Work system	A) shifts	B) morning

		C) Mixed
9	Daily working hours in the operation room	(.....Hours )
10	How-would you rate your level of physical activity	A) Regular activity      B) Moderate C) Average                  C) Inactive
11	Are you satisfied with the work and working conditions	A) Yes .....                  B) No.....
12	Do you suffer from any illnesses	A) Yes.....                  B) No.....
13	Is your income adequate for your lifestyle	A) Yes .....                  B) No.....
14	Nature of work	A) Good                          B) Moderate C) Acceptable                  D) Poor
15	Smoking	A) Yes .....                  B) No.....
16	Khat	A)Yes.....                  B)No.....

Part 1 : general questions on general anesthesia complication in the elderly

N	Questions	yes	Not always	Rarely occurs	no
1	In your experience < are elderly more prone to complications from general anesthesia compared to other age groups ?				
2	Do complications from general anesthesia always occur in the elderly due to pre-existing medical conditions before general anesthesia ?				
3	Are there guidelines followed by the anesthesia team to avoid these complications in the elderly ?				
4	Are complications from general anesthesia easy to manage in the elderly ?				
5	Dose the anesthesia team have all the necessary equipment and medications in the operations rooms to avoid complications in the elderly ?				

6	Does the post-anesthesia care room help elderly patients recover from complications that occur during anesthesia				
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### Part2 : Questions on drug changes in the elderly

N	Questions	Yes	Not always	Rarely occur	No
1	Increased organ sensitivity to the effects of drugs , such as the liver and kidney on general anesthetic drug				
2	Decreased rate of drug metabolism and excretion due to aging				
3	Changes in the binding of drugs to plasma proteins and receptors of general anesthetic drugs				
4	Changes in the distribution of drugs throughout the body				
5	is the dose of general anesthesia of the reason for the occurrence of anesthesia complications in the elderly				
6	Is reducing the dose of general anesthesia in the elderly one of the reason for postoperative pain due to insufficient anesthesia during the operation				
7	Do the drugs used to support general anesthesia contribute to an increased incidence of general anesthesia complications in the elderly				
8	Are all complications of general anesthesia in the elderly caused by the drugs used to treat general anesthesia				
9	Are surgical causes one of the factors that contribute to the occurrence complications of general anesthesia in the elderly				

### Part 3 : physiological changes in the elderly

N	Questions	Yes	Not always	Rarely occur	No
1	Is decreased vascular compliance a cause of decreased and increased and increased blood pressure around the procedure ?				

2	Is decreased cardiac compliance a cause of decreased and rapid heart rate causing cardiac arrhythmias ?				
3	Lack of cardiac compensatory mechanism in the elderly				
4	They depend on vascular volume to maintain blood pressure and do not tolerate excessive vascular inactivity , ex , increased pressure on the blood vessels				
5	Is decreased pulmonary compliance in the elderly , compared to others a cause of complications of general anesthesia				
6	Is decreased chest wall compliance in the elderly a cause of insufficient oxygen intake of the lung ?				
7	Is a decreased in reserve oxygen supply in the elderly a cause of oxygen deficiency in the elderly during				
8	Loss of airway reflexes is one of the most important problems that the anesthesia team deals with and is a cause of complications of general anesthesia				
9	Decreased nervous system activity in the elderly is a causes of general anesthesia disturbances				
10	Sympathetic over activity in the elderly compared to others is a cause of patient disturbances during general anesthesia				
11	Reduced parasympathetic activity is one of the problems of general anesthesia disorder in the elderly				

Part 4: factors related to elderly patients increase the likelihood general anesthesia

N	Question	Yes	Not always	Rarely occur	No
1	Is high blood pressure a major problem in general anesthesia complications in the elderly				
2	Is low blood pressure also a major problem in general anesthesia complications in the elderly				
3	Is a high heart rate a cause of tachycardia and does it cause general anesthesia complications				
4	Is a low heart rate a cause of bradycardia and dose it cause general anesthesia complications				
5	Obesity and associated diseases				
6	Are endocrine diseases and hormonal imbalances				

	among the causes of general anesthesia complication in the elderly compared to others ?				
7	Are neurological diseases a contributing factor to general anesthesia complications in the elderly				

Part 5: surgical and anesthesia factors in general anesthesia complications in the elderly

N	Questions	Yes	Not always	Rarely occur	No
1	Does the type of surgery and procedure contribute to general anesthesia complication in the elderly				
2	Duration of surgery and procedure				
3	Doses of general anesthesia used in the elderly				
4	Type of general anesthesia drugs used in the elderly				
5	Duration of general anesthesia and its effect on the elderly				

Part 5: surgical and anesthesia factors in general anesthesia complications in the elderly

N	Questions	Yes	Not always	Rarely occur	No
1	Inability to accurately assess risks				
2	Inability to properly administer anesthetic doses				
3	difficulty in easily managing or controlling complications				
4	Difficulty in achieving a safe level of anesthesia during the procedures				
5	Comprehensive medical assessment and management of chronic diseases before general anesthesia				
6	Use of low doses of anesthetic drugs accurately				
7	Rapid during administration increases complications of general anesthesia in the elderly				

