



**ISA**  
Indian Society of  
Anaesthesiologists  
Delhi Branch

Eternal Vigilance

# Saluting Women in Anesthesia



# ISA DELHI

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## President (ISA Delhi Branch message)

Dear Friends

Greetings and wish you a very Happy Spring!

Now, as we gear up for, Yuvacon 2024, its true success lies in the active participation of each individual and institutions. I urge all esteemed members to request their students to participate in all these events including sports and cultural activities, contributing to its success and making it memorable.

I request participation from various institutions as your involvement will add to the success of these events. Your support and commitment are key to turning this dream into a reality.

The first three monthly meeting at Akash Hospital Dwarka, Rajeev Gandhi Super Speciality, Tahirpur & AIIMS, New Delhi were well attended.

I extend my heartfelt wishes to all on this Holi. May this day be a celebration of Colours of knowledge and wisdom.

Thank you for your dedication and contribution.

**Dr. Lokesh Kashyap**

Professor and Head

Department of Anesthesiology, Pain Medicine and Critical Care

AIIMS, New Delhi



## Vice President (ISA Delhi Branch message)

Respected Delhi ISAains,  
Warm Greetings.

The Feb. month of 2024 was auspicious as we celebrate the Basant Panchmi, Puja of Ma Saraswati. Ma Saraswati is the Goddess of Knowledge and wisdom; blessings of her make us to take more knowledge and judicious decisions.

ISA Delhi has launched “ISA Delhi academic series” from this month which has been coordinated by Dr. Nishkarsh Gupta, G C south zone. It was huge success as more than hundred anesthesiologists including PGs, senior faculty and Consultants participated in first webinar.

I invite you all to our annual event “**YUVACON 2024**” on 6th and 7th of April 2024 at Maulana Azad Medical College and our annual sports meet on 31st march 2024 at AIIMS Gymkhana. Yuvacon 2024 will be actually a Youth festival so as to celebrate the spirit of young anesthesiologists. I request our young budding anesthesiologists to participate in this program and make it like extravaganza fest.

Best Wishes to all.

Long live ISA.

**Dr. Arvind Arya**

Vice President Delhi ISA





## Honorary Secretary (ISA Delhi Branch message)

Dear Delhi ISAIans,

Greetings from ISA Delhi Headquarters!

Month of February holds a rich tapestry of cultural, historical and social engagements. It marks the gradual transition from winter to spring. It started with auspicious festival Basant Panchami when we offered our prayers to Goddess Saraswati for wisdom and wellbeing of our family and friends. On the other hand, when tulips were blossoming across the city, the month is marked as season of love for our loved ones.

I take privilege to invite you all to our Annual event “**YUVACON 2024**” on 6th and 7th of April 2024 at Maulana Azad Medical College and our annual sports meet on 31st march 2024 at AIIMS Gymkhana. It is a Youth festival so as to celebrate the spirit of Yuva ISAIans. In addition to academics there will be enough platform to showcase our talents during art, Literary, Cultural and photography sessions. I request you all to join the celebration in large numbers.

ISA Delhi will be soon launching “ISA Delhi academic series” from the coming month which shall be ably coordinated by Dr. Nishkarsh Gupta, G C south zone. We shall be having fortnightly webinars on the topics pertinent to postgraduate training in field of anaesthesiology and critical care.

I congratulate ISA Delhi East Zone for a very successful conduct of second monthly meeting at Rajiv Gandhi Super speciality hospital in month of January. It was largely attended by senior anaesthesiologists and resident doctors from institutions across the city.

I once again request my seniors and teachers to keep patronizing us with your experienced suggestions and motivate youngsters to join ISA Delhi YUVACON, our annual youth festival as the success of any event lies in wider and varied participation.

Long live ISA  
Long live ISA Delhi

Warm regards,  
**Dr Amit Kohli**  
Honorary Secretary



## Honorary Treasurer (ISA Delhi Branch message)

Dear ISA Delhi members,

Greetings from the treasurer's desk.

Wishing all the fellow ISAIans a vibrant and joyous Holi. With the wrap of this festival of colours and exuberant happiness, **ISA Delhi YUVA CON 2024** is ready to knock at our doors. You all are cordially invited to wholeheartedly participate in the upcoming extravaganza.

In the spirit of growth, ISA Delhi branch is embracing innovative initiatives which shall be unveiled in days to come. As we embark on this transformative journey, we encourage open dialogues and collaborations among the fellow ISAIans in days to come. We are not just adapting to change but we are actively shaping it. The feedback, ideas, and contributions of our fellow ISAIans regarding those activities shall fuel our progress as a society. With the vision of an abounding voyage ahead, I humbly request all our esteemed members to participate in the forthcoming ISA Delhi activities with full enthusiasm.

Before concluding, I would like to wish everyone a very happy Holi.

Thank you all for being valuable members of ISA Delhi.

Long live ISA.

Jai Hind.

With regards,

A handwritten signature in blue ink that reads "Abhijit Kumar".

**Dr. Abhijit Kumar**

Honorary treasurer, ISA Delhi.



## Editor (ISA Delhi Branch message)

Dear ISA Delhi Members, Greetings!

It is with immense pleasure that we present to you the 3rd issue of our monthly newsletter. This edition is crafted with the aroma of spring flowers of the season.

The newsletter contains recent advances, unknown topics, current opinions, relevant but less practiced guidelines, historical aspects with current relevance, sections of long case questions, quiz and crosswords.

We extend an invitation to all hospitals to submit case reports, review articles and studies for potential inclusion in the newsletter. We encourage all members to keep the articles coming, contributing to the richness of our community. Active participation from all members is encouraged to enrich the diversity and depth of our community's content.

In our pursuit for academic excellence, we welcome constructive criticism for improvement.

Wish you all a Happy Holi!

Long Live ISA! Long Live ISA Delhi!

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## THIRD MONTHLY CLINICAL MEET

The third monthly meet of Delhi state chapter of ISA was organized by the ISA south zone on 16th February 2024 at All India Institute of Medical Sciences (AIIMS), Delhi. The podium coordination was done by Dr. Swati and Dr. Anjalee. The clinical meet began with welcome address by Dr. Lokesh Kashyap, Professor & Head, Department of Anaesthesiology, Pain Medicine & Critical Care, AIIMS, Delhi who is also the current President of ISA Delhi chapter. Dr. Amit Kohli, Secretary ISA Delhi chapter addressed the gathering and shared information regarding the upcoming YUVACON (6th & 7th April 2024) and other activities and future projection of ISA Delhi chapter. The monthly ISA Delhi Newsletter under the able leadership of Dr. Puneet Khanna (Editor-in-chief) was released by the office bearers of ISA Delhi chapter, the editorial board of ISA Delhi Newsletter and other senior members of ISA Delhi. Subsequently, the presentations of the clinical meet were started. The abstracts of the presentations are given below:

1. Combined Trans-muscular Quadratus Lumborum and sacral Erector Spinae Plane block versus intrathecal morphine for perioperative analgesia in patients undergoing open gynaecological oncological surgery: Non-inferiority trial

Presenter: Dr. B Raga Brindha

Moderator: Dr. Debesh Bhoi

Conclusion: Combined Quadratus Lumborum with sacral Erector Spinae Plane block is non-inferior to intrathecal morphine in terms of perioperative analgesia and quality of recovery with lesser side effects in patients undergoing gynaecological oncology surgery

2. Evaluation of predictive ability of ultrasound parameters for difficult airway in paediatric patients of age group 1 to 10 years

Presenter: Dr. Aditya Ananad

Moderator: Dr. Mritunjay Kumar

Conclusion: Shortened HMDR (Hyometal distance ratio) could be associated with difficult airway in children. SHD (skin to hyoid distance) may be a useful predictor specially in 6-8 years age group. Usefulness of other parameters in children for difficult airway is an area which needs to be explored.

3. Successful use of Extra Corporeal Membrane Oxygenation (ECMO) in a case of Severe acute pancreatitis with ARDS

Presenter: Dr. Prashant

Moderator: Dr. Priyankar

Conclusion: Early initiation of VV ECHMO in patient of acute pancreatitis with ARDS improves the survival rate of these patients.

## THIRD MONTHLY CLINICAL MEET

### 4. Intraoperative ventilation strategies in paediatric patients

**Presenter: Dr. Nitin Choudhary**

**Moderator: Dr. Rakesh Kumar**

**Conclusion:** The topic focussed on the most commonly available modes of mechanical ventilation in the workstation namely volume-controlled ventilation (VCV), pressure-controlled ventilation (PCV) and pressure support ventilation (PSV). The advantages and drawbacks of these ventilation modes were explained. With the help of a flow chart a simple method for deciding the most appropriate mode of ventilation based on the airway device and the type of surgery was shown and some of the common clinical cases with respect to their intraoperative ventilation strategies were discussed for better understanding of the postgraduate students.

The presentations were followed by quiz which was conducted by Dr. Mritunjay Kumar. Prizes were distributed to the winners on the quiz in previous issue of newsletter. The clinical meet was attended in large number and was graced by many senior faculties across Delhi. The clinical meet was followed by high tea.

Author:

**Dr. Nitin Choudhary**

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## WOMEN IN ANAESTHESIOLOGY

Juggling with various roles and marching ahead!

We all women anaesthesiologists of India take pride in the fact that Rupa Bai Furdoonji: the World's first qualified lady anaesthetist belonged to India. However, for a female to rise and shine in her career and give her career a priority over family life never goes down well with society which stereotypes the women with labels like ambitious and selfish. All women who climbed up the ladder of leadership positions in anesthesia had to navigate the challenges of gender bias, work/life balance, mentoring, and leadership development. Despite an increase in the proportion of women anaesthesiologist, gender inequity remains prevalent in today's workforce. Gender disparity in the workplace contributes to a negative team culture and leads to provider burnout. Almost every major industries report under-representation of women, with the largest gender discrepancies in upper-rank leadership positions or as recipients of honour awards or academic promotions. Gender disparities continue to exist at the upper levels of leadership in academic anesthesiology, most importantly in the roles of full professor, department chair, and journal editors. However, there are some encouraging indicators that women may be on the path to leadership parity, most remarkably in terms of the increasing enrollment of women in anesthesiology residencies, and increases in faculty positions and research grants awarded to women.

In today's era, we see women juggle all the tasks in the field of anaesthesiology whether it is in the technical staff, nurse anesthetists, critical care physicians, pain physicians, freelancers, researchers, faculty positions, head of the department, organizing national level conferences and being chief editors of various academic journals. These roles are in addition to their indispensable roles as mothers, wives, daughters, sisters, and daughters-in-law which place them in situations of dilemma and cross swords with their professional goals many a time. There are many phases in a woman's life when her personal life gets an edge over her professional or academic life like motherhood or complicated pregnancies. When she tries to balance everything, the results may not be up to her optimal capacity and she often develops a sense of guilt and inferiority complexes. So many capable women have to leave their flourishing careers due to a lack of support at home front and end up being homemakers despite putting up all the effort and lifelong hard work to earn those degrees and accomplishments due to these hurdles. Most of those whose grit and determination are stanch end up settling for less than they deserve. The statistics from census report of the RCoA had suggested that approximately '17% of female consultants are working part time compared to 4.6% of males'.

Another important facet is in the field of academics. For women in anesthesiology,

## WOMEN IN ANAESTHESIOLOGY

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gender inequities exist along the academic pipeline, with greater disparity in the higher ranks of academia and leadership. A study by Bissing et al. reported that gender disparities continue to exist at the upper levels of leadership in academic anaesthesiology, most importantly in the roles of full professor, department chair, and journal editors. Demailly et al. reported that women are much less visible on social platforms dedicated to science research (e.g., Research Gate, Academia etc.). Our own Indian Society of Anaesthesiologists, has had only 6 lady anaesthesiologists as national presidents since its inception in 1947 and one lady Editor-in-Chief of the IJA since 1953.

Nevertheless, some indicators reflected that women may be on the path to leadership parity, for example since 2006, the odds that an anaesthesiology faculty member was a woman increased by approx. 2% per year, with an estimated OR of 1.02. The percentage of major research grants awarded to female anaesthesiologists were found to be increased significantly from 21% before 2007 to 31% till 2016.

Anesthesiology as a specialty, is making efforts to reform this gender disparity. Successful endeavors include rising awareness with white papers reporting data on both explicit and implicit disparities, encouraging comprehensive and transparent processes for promotion, faculty and leadership development opportunities and selection of leadership. The leadership of lady anaesthesiologists has been growing significantly in academia over the few past decades. An analysis of the abstracts of award papers selected at the Indian Society of Anaesthesiologists national conference 2019 disclosed an ample number of female award paper nominees with –50 out of 80 nominees in Kop's award for cardiac anaesthesia, obstetric anaesthesia, paediatric anaesthesia, neuroanaesthesia, clinical pharmacology, pain, trauma and critical Care and practitioners forum. Also, 9 out of 15 nominees for TN Jha award and KP Chansoriya Travel Grant were females. These statistics show a stark representation of Indian women on the podium of award paper presentations.

Women are certainly getting more powerful by the day. Their acceptance in leadership positions has increased due to drastically changed mindset of the society at a very fast pace and women are getting the full support of their families for their education and jobs. A full issue of IJA 2020 September was dedicated to women anaesthesiologists. The representation of women is increasing at all levels in anaesthesia, be it technical staff, postgraduates, super-speciality courses, professors, free lancers, departmental chairs, administrative posts etc. The technical staff now includes a sizeable number of female technologists, be it

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operation theater complex, complex endoscopy suits or cardiac catheterization labs. Their academic progress is signified by a striking increase in numbers of female anaesthesiologists as authors of research articles in reputed scientific journals, their fabulous performances as peer reviewers and editorial members and increasing participation as faculty at many national and international conferences. Thus, excellence does not see gender and does ultimately get its due recognition with time.

The ADVANCE programme run by National Science Foundation in USA, supports research 'to increase representation and advancement of women in academic science. Such kind of programs are the need of the hour in our country to increase awareness and extend support to this more vulnerable but very important strata of our medical fraternity to be able to meet their full potential.

In conclusion, women in anaesthesia are constantly faced with enumerable challenges on their career paths similar to women in other medical specialties. Women form an indispensable work force in anaesthesia and deserve equal opportunities as males in leadership positions, research, publications, teaching and academic positions in journals. Lot has been done towards bringing gender parity in workplace and academia but a lot more is still required. A change in the patriarchal mindset of the society will help the female anaesthesiologist balance her family and professional work well and improve her professional efficiency.

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Juggling with various roles and marching ahead!

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# FEMALE OFFSPRING COMMONER

## In Anaesthesiologists- Myth or Reality?

### Introduction

Healthcare professionals face the inherent risk of occupational exposure to drugs, radiation, infection etc. Chronic exposure to anaesthetic agents is seen among anaesthesia care providers. Possible adverse reproductive outcomes is a persistent concern among anaesthesiologists especially during the critical periods of fetal development. However, the existing literature does not clearly define the cause, type and extent of these adverse events.

Exposure to anaesthetic gases containing nitrous oxide and/or volatile agents has been reported to increase the risk of early miscarriage by approximately 50%<sup>1</sup>. There may also be risk of low birth weight and congenital anomalies in neonates born to exposed mothers. It is more so in the setting of inefficient or absent scavenging systems. Higher level of waste anaesthetic gases may be seen in labour analgesia suites, endoscopy room or paediatric OTs where inhalational induction is common<sup>2</sup>.

Presently there is no evidence of adverse effects from volatile anaesthetics when environmental levels can be maintained below the recommended threshold. Thus, efficient scavenging system and ventilation in the operation theatre can be of utility to mitigate the toxic effect of volatile anaesthetic agents.<sup>3</sup>

The level of permissible nitrous oxide is 100 ppm and isoflurane is 2 ppm as recommended by occupational safety standards. During inhalational induction, these levels may be crossed which can become an occupational hazard. As nitrous oxide and volatile agents are implicated with adverse pregnancy outcomes, use of total intravenous anaesthesia in operating rooms where a pregnant staff is working maybe a better option.

Apart from the frequently studied outcomes like miscarriage and congenital anomalies, anaesthetic exposure has also been associated with skewed offspring sex ratio (OSR) with higher proportion of female offspring<sup>4</sup>. OSR is defined as the ratio of males and females live births in a population. Paternal long term exposure to anaesthetic gases in OT personnel can influence the spermatozoa in unknown ways and bring about changes in OSR. Inhalational agents may also have an impact on the male reproductive system affecting the spermatogenesis, sperm count and motility.

### Proposed mechanism

Till date, increased female live birth among anaesthesiologist and its potential mechanism has not been validated. The viability of Y-bearing spermatozoa may be affected by occupational exposure to inhalational anaesthetics that may affect

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OSR in both male and female anaesthesia care providers. This could be due to impact of anaesthetic exposure on pre-coital or post-coital life cycle of sperm in the male and female genital tract respectively.

The selective effect of anaesthetic agents on Y chromosome while sparing the X chromosome needs to be elucidated. Morphology or motility of X and Y bearing spermatozoa is similar and no other differences in structure have been found<sup>5</sup>. In view of lack of evidence, some unidentifiable factor may be affecting the Y bearing spermatozoa which could be potentially lead to increased female births.

Direct damage to Y-bearing spermatozoa in male or female genital tract or immunological changes against Y-bearing sperms in female genital tract may be induced by exposure to waste anaesthetic gases.

Recently, evidence of genotoxicity and chromosomal damage after exposure to trace anaesthetic agents have been published.<sup>6</sup> Greater degree of chromatid breaks/gaps, micronucleus frequency and sister chromatid exchanges were found in those with chronic exposure to inhalational agents. There is established evidence about halothane, isoflurane, sevoflurane and desflurane causing DNA damage.<sup>7</sup> It may be hypothesised that these changes may be more pronounced in Y- chromosome than X- chromosome leading to the skewed OSR and other adverse reproductive outcomes.

### **What does the evidence say?**

Multiple epidemiological studies have been conducted to assess the impact of anaesthetic gases on pregnancy outcomes with varying observations. A study on Swedish anaesthesia nurses who had worked in the operating rooms (OR) over a period of 5 years showed a slightly higher incidence of perinatal deaths, preterm delivery and low birth weight infants compared to the control group and nationwide average<sup>8</sup>. A meta-analysis of epidemiologic studies showed an overall relative risk of 1.48 and an absolute risk of 6.24% for spontaneous abortions in women occupationally exposed to anaesthetic agents. However, one study in the review did not result in increased risk when scavenging system was used or exposure was low.<sup>9</sup>

Very few studies have been done to study the effect of inhalational agents on the male reproductive system. A study was done to compare the effects of exposure to sevoflurane on male reproductive system in rats. Compared with the control group, the sperm count, motility and the number of fetal rats was significantly reduced in the sevoflurane group. Also the arrangement of the seminiferous tubule was distorted and spermatocytes were detached and irregularly lined in the sevoflurane group.<sup>10</sup>

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Few surveys have been carried out to evaluate the outcomes of volatile agents on skewed OSR in anaesthetists. In a survey by Wyatt in United Kingdom on 87 male anaesthetists in 1973, more female children were born to anaesthetists (57%), which was significantly higher than the female live births proportion in general population.<sup>11</sup>

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In another survey by Gupta et al<sup>12</sup> in 443 anaesthetists working in USA, it was observed that there was a 6% increase in female offspring born to anaesthetists. It was also observed that the tendency of higher ratio of female/male offspring was associated with inhalational induction practice by anaesthetists during the periconceptual period. These findings suggest that exposure to inhalational agents may be related to higher female births.

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However, in a study conducted in Indian population by Nagella et al<sup>13</sup>, a survey was conducted on 1563 anaesthetists and no higher incidence of female live births was found. Nevertheless, spontaneous abortions and birth defects were higher in female anaesthesiologists who worked in the operation theatre in the first trimester of gestation. Even spouses of male anaesthesiologists had a greater risk for a first trimester miscarriage than the general population. These findings may suggest that exposure to anaesthetic gases may affect the germ cells/spermatozoa in males.

In another survey in Indian population, it was found that male parents were significantly more common to have worked in operating rooms around the time of conception of first-born or second-born children and practice of inhalational induction of anaesthesia was reportedly more common among Indian male anaesthesiologists during periconceptual period of their second-born female children<sup>14</sup>.

The results of these few observational and cross-sectional studies are intriguing and pave way for future research.

### **Rationale for further research**

The evidence regarding skewness of female offspring in anaesthesiologists is not robust enough, but there are indications to suggest that there might be some correlation with inhalational anaesthetic agents and their effect on spermatozoa. Larger surveys or laboratory studies should be designed to find out whether it is only an association reflecting coexistence of two factors or a direct causation with one factor leading to another. Research related to this field may be plagued by ethical concerns regarding pregnant human volunteers and research based on human semen samples. Large and robust survey studies and laboratory studies would be more feasible.

Further research can emphasize on the following points-

1. Effect of different inhalational agents with varying concentrations on X and Y chromosome bearing spermatozoa's functionality and motility.
2. Concentrations of X and Y bearing spermatozoa in male anaesthetists.
3. Surveys with larger sample size assessing exposure of inhalational anaesthetics on practicing anaesthesiologists and observing the OSR.
4. Risk of congenital anomalies in children of anaesthesiologists.



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5. Effect of inhalational agents on developing fetus.
6. Effect of nitrous oxide and volatile agents on spermatogenesis.
7. Comparison of inhalational anaesthesia and total intravenous anaesthesia in terms of impact on germ cells and spermatozoa in males .

Future studies need to elicit whether the OSR's skew is related to the effect on germ cells and sperms due to exposure of male anaesthetists or Y-bearing sperms failing to fertilize the ova or failure of implantation of male zygote due to female anaesthesia care providers' occupational exposure.

The studies should also focus on cellular and genetic effects of inhalational agents on rapidly growing embryo and fetus. Research into this less commonly explored area may prompt us to practice alternative forms of anaesthesia delivery and protect the medical personnel of childbearing age in OT from potential harmful effects of gases.

Health and well-being of medical personnel is an integral part of quality healthcare delivery and it should be routinely assessed. Establishing an evidence-based data will ensure future attempts at quality improvement and decreasing work place occupational hazards.

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# UNVEILING THE INTRICACIES

## Hormonal basis of sexual differences in anaesthesia sensitivity

### Introduction

The field of anaesthesia encompasses a diverse array of drugs and techniques aimed at inducing a reversible state of unconsciousness to facilitate painless medical or surgical procedures. However, within this realm lies a fascinating area of study- the variance in anaesthesia sensitivity between males and females. Research indicates that there are notable differences in how males and females respond to anaesthesia, and a deeper understanding of the hormonal basis behind these disparities can offer valuable insights for optimizing anaesthesia practices.

### Hormonal influence on anaesthesia sensitivity

The interplay between hormones and anaesthesia sensitivity is multifaceted. Hormones, such as estrogen and testosterone, play pivotal roles in modulating various physiological processes, including pain perception, metabolism and neurotransmitter regulation, all of which can impact anaesthesia sensitivity differently in males and females.

#### 1. Estrogen

It is often regarded as the quintessential female hormone and exerts profound effects on various physiological processes, including pain perception and neurotransmitter regulation. Females are more sensitive than males to opioid receptor agonists, as shown for morphine as well as for a number of kappa (OP2) receptor agonists. On this basis, males require 30-40% higher doses of opioid analgesics than females to achieve similar pain relief. On the other hand, females may experience respiratory depression and other adverse effects more easily if they are given the same doses as males. In anaesthesiology, several human studies have reported that women appear to be less sensitive to propofol than men. A retrospective study of nearly 26,000 patients first demonstrated that men require more time to emerge from propofol anaesthesia than women. Subsequent reports have since confirmed that not only do women emerge more rapidly, but they have faster plasma clearance and require greater doses of propofol to achieve equivalent anaesthetic depth based on processed EEG. Estrogen attenuates alpha-2 adrenergic receptor-mediated analgesia explaining why the alpha-2 adrenergic agonist dexmedetomidine produces weaker morphine-sparing effects postoperatively in women than in men. The antidepressant effects of low-dose ketamine are amplified by oestrogen and progesterone. However, it is unknown whether these sex differences impact the hypnotic actions of

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dexmedetomidine and ketamine. Overall, estrogen emerges as pivotal player in shaping anaesthesia sensitivity, highlighting the need for tailored anaesthesia protocols that account for hormonal fluctuations.

### 2. Testosterone

In contrast to estrogen, testosterone, the predominant male hormone, has garnered attention for its role in conferring greater tolerance to certain anaesthetics in males. This could also explain why males require 30-40% higher doses of opioid analgesics than females to achieve similar pain relief. Research suggests that males may require higher doses of anaesthesia for adequate induction compared to females, partly attributable to testosterone's effect on pain processing pathways and the expression of pain-related genes.

### 3. Progesterone

While estrogen and testosterone often steal the spotlight, progesterone, another key female hormone, remains relatively understudied in the context of anaesthesia sensitivity. However, it is widely recognised that pregnancy reduces the minimum alveolar concentration for inhaled anaesthetics, presumably because of elevated progesterone levels. Studies using the bispectral index to titrate anaesthetic depth reveal that patients in the luteal phase of the menstrual cycle have elevated serum progesterone concentrations and require less sevoflurane. Additionally, elevated progesterone levels during pregnancy are believed to contribute to reduced isoflurane requirements in pregnant women. Consistent with these findings, there is evidence that women emerge faster from sevoflurane and isoflurane anaesthesia.

### 4. Gonadotropins

Gonadotropins, including luteinizing hormone (LH) and follicle-stimulating hormone (FSH), play crucial roles in regulating sex hormone production and gonadal function. While their direct impact on anaesthesia sensitivity remains less clear, gonadotropins indirectly influence anaesthesia responses through their modulation of estrogen and testosterone levels. Fluctuations in gonadotropin levels throughout the menstrual cycle and across stages of life underscore their relevance in shaping hormonal profiles and, consequently, anaesthesia sensitivity.

### **Clinical implications:** Toward personalised anaesthesia management

Understanding the hormonal basis of sexual differences in anaesthesia sensitivity holds significant clinical relevance. Tailoring anaesthesia protocols based in

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gender-specific hormonal profiles may lead to more precise dosing, improved patient outcomes, and reduced risks of complications. Clinicians must consider individual variability in hormone levels, along with other factors such as age, genetics and comorbidities, when devising personalized anaesthesia strategies. Moreover, recognising the impact of hormonal fluctuations such as that occurring during pregnancy or menopause, is essential for optimising anaesthesia management in vulnerable populations. By integrating hormonal considerations into clinical practice, healthcare providers can enhance the safety, efficacy and patient satisfaction associated with anaesthesia administration.

### **Challenges and future directions:** Navigating the complexities

Despite the growing body of research elucidating the hormonal influences on anaesthesia sensitivity, several challenges remain. Interindividual variations in hormonal levels, along with factors as age, genetics, and comorbidities, complicate the establishment of universal anaesthesia protocols. Additionally, the intricate interactions between hormones and anaesthesia demand further exploration through interdisciplinary studies integrating pharmacology, endocrinology and neuroscience. Addressing these challenges requires collaborative endeavours aimed at elucidating the underlying mechanisms and developing tailored approaches to anaesthesia management.

### **Conclusion:** A paradigm shift in anaesthesia pharmacology

The hormonal basis of sexual differences in anaesthesia sensitivity represents a paradigm shift in anaesthesia pharmacology, emphasizing the need of personalized medicine in anaesthesiology. By unravelling the complex interplay between hormones and anaesthesia, clinicians can optimize anaesthesia protocols to better meet the unique needs of individual patients, ultimately enhancing safety, efficacy, and patient satisfaction. Continued research in this field promises to refine our understanding of anaesthesia pharmacology and pave the way for more tailored and precise anaesthesia management strategies.

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# NANOTECHNOLOGY

## & Nanotherapeutics in Anaesthesiology

In the Greek language, the word nano means “dwarf” and the System International (SI prefix) denotes  $10^{-9}$  or 0.000000001. By definition, nanotechnology is a fusion of advanced manufacturing science and engineering where the synthesis or assembly of material is aimed at the nanometre scale (1–100 nm) or one-billionth of a meter. Nanotechnology has widespread applications in various sectors ranging from agriculture to medicine. In medicine, nanoparticles are continuously being improved for drug delivery, screening of diseases, and tissue engineering.

Anaesthesiologists in their practice use many drugs for the provision of hypnosis and analgesia. Many of these drug formulations have undesirable features such as pain on injection, limited duration of action, and potential toxicity. Nanotechnology has a promising role in precision medicine and target drug delivery by nanocarriers. The unique property of nanosized material compared to bulk material is more surface-to-volume ratio which enables them to carry drug molecules and penetrate most inaccessible sites and tiny capillaries in the body. These nanocarriers can overcome various key biological barriers, improve drug bioavailability, increase intracellular penetration and retention time, achieve drug enrichment, and control drug release.

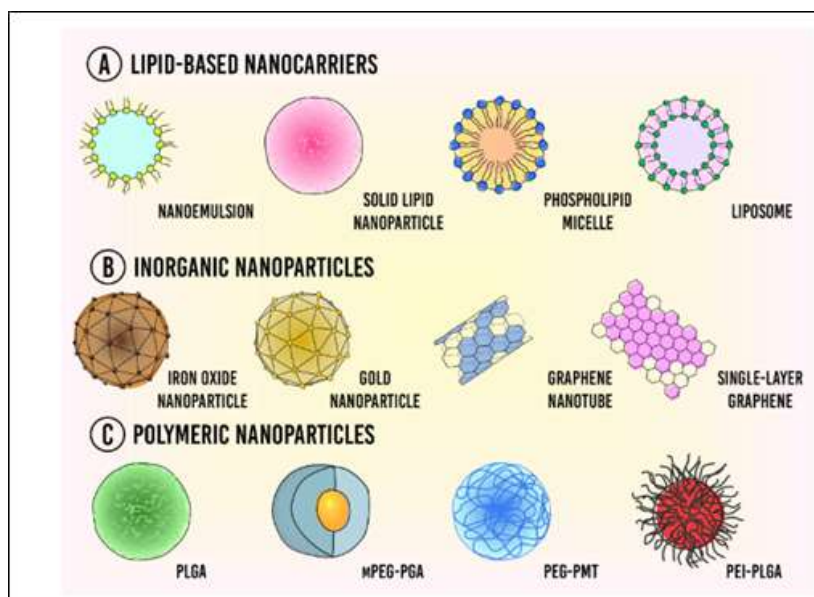
Nanocarriers can be classified into three categories (Figure 1) based on the materials that they are made from (A) lipid-based nanoparticles, (B) polymeric nanoparticles, and (C) inorganic nanoparticles.

### **Lipid-based Nanoparticles:**

**a.Liposomes:** The most widely utilized nanocarrier is liposome which consists of a phospholipid bilayer encapsulating an aqueous core. They may be unilamellar, multilamellar, or multivesicular. Multivesicular liposomes have been utilized in FDA-approved EXPAREL and DepoDur which are the extended-release formulation of bupivacaine and morphine respectively. Apart from a longer duration of action, the coating of a liposome with polymers enables stability and preparation in the gastrointestinal tract. The modification of the surface of liposomes with polymers has been utilized in improving the oral bioavailability of tramadol and endomorphin-1. A peptide-coated liposome is another strategy to enhance the analgesic effects of opioids following intranasal administration.

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**Figure 1: Categories of nanocarriers**

**b. Nanoemulsions:** The term 'nano emulsion' refers to a mini emulsion that is fine oil/water or water/oil dispersion stabilized by an interfacial film of surfactant molecules having a droplet size range of 20–600 nm. Because of their small size, nanoemulsions are transparent.

**c. Lipid nanoparticles:** Lipid nanoparticles are of two types; solid lipid nanoparticles and nanostructured lipid carriers.

**Solid lipid nanoparticles (SLNs)** are the first generation of lipid-based nanocarriers that are formulated from lipids, which are solid in the body temperature and stabilized by emulsifiers. SLNs have submicron (less than 1000 nm) sizes. They have numerous advantages such as ease of large-scale production, biocompatibility, and biodegradability. SLNs have also some disadvantages; because of their perfect crystalline structure, they have low drug-loading efficiency and the possibility of drug expulsion due to the crystallization process during the storage conditions.

**Nanostructured lipid carriers (NLCs)** are second-generation lipid-based nanocarriers formed from a mixture of solid and liquid lipids and have unstructured matrices due to the different moieties of the constituents of NLCs. NLCs were designed to overcome the SLN's limitations. NLCs have higher drug loading capacity because of imperfect crystal structure and could avoid drug expulsion by avoiding lipid crystallization during the manufacturing and storage

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periods. Due to the presence of liquid lipids in NLC formulation expulsion of loaded drug after formulation and during the storage period is minimized.

### **Polymeric nanoparticles:**

Polymeric nanocarriers are synthesized from different types of natural and synthetic polymers that generally have good biocompatibility and biodegradability. The advantages of these polymer nanomaterials compared to other nanocarriers include stability in various microenvironments, slow release of drugs due to polymer degradation, and their diversity in the types of polymers and types of drugs to be encapsulated. The hydrophobicity and hydrophilicity within the polymer structure can be controlled to suit a variety of drug molecules

**Inorganic nanoparticles:** Inorganic nanoparticles are non-toxic, hydrophilic, biocompatible, and highly stable compared to organic materials. E.g. gold nanoparticles, quantum dots

These nanocarriers have been extensively investigated for various classes of anaesthetic drugs. Tables 1 and 2 show the use of nanotechnology for induction agents and Local anaesthetic agents respectively.



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Drug	Nanocarrier	Results from experimental studies
<b>Propofol</b>	A peptide-based nanocarrier called GQY	<ul style="list-style-type: none"> <li>had greatly reduced the pain on injection effect compared to traditional propofol lipid emulsion</li> <li>Anaesthetic efficacy of GQY-based formulations was found to be superior to that of lipid or propylene glycol-based emulsion</li> </ul>
	Octanol-grafted alginate (Alg-C8) encapsulated propofol	superior chemical and physical stability at room temperature for at least 6 months, compared to the currently used lipid propofol emulsions
	propofol loaded into propionylated amylose helix (HLEAH) nanoclusters	HLEAH nanoclusters possess high BBB permeability and specificity, rapid onset, short maintenance time, and rapid recovery, and require a small drug dosage
<b>Etomidate</b>	ETM-ILE	ETM-ILE showed highly improved stability and drug loading efficiency, as well as reduced cytotoxic reactions compared to ETM-SOL
	Etomidate-loaded poloxamer micelles (Eto-SOPM)	The release rate of this nanomedicine was found to be greater than that of the lipid emulsion while maintaining the potency of etomidate
<b>Ketamine</b>	ketamine-encapsulated single polymer PEG-PLGA nanoparticles and double polymer PEG-PLGA/shellac nanoparticles	drug-loaded nanoparticles showed sustained-release characteristics for over 5 days following intravenous injection in mice and for up to 21 days in vitro

Table 1: Nanomedicine in Intravenous Induction Agents

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Drug	Nanocarrier	Results from experimental studies
<b>Lidocaine</b>	lidocaine-loaded nanostructured lipid carriers (LBL-LA/NLCs) using layer-by-layer technology	Nearly twice the skin permeability of the free drug during transdermal administration  Sustained release capabilities
	LDC LPHNs (lidocaine hybrid lipid-polymer nanoparticles)	The injection pain was reduced and the mid-term duration of painless anaesthesia was prolonged to 20 hours
	Solid lipid nanoparticles, polymeric micelles and microemulsion incorporated within carbomer hydrogels  (Self-nano emulsifying drug delivery systems SNEDDs)	Reduced lag time for skin permeability compared to EMLA
<b>Ropivacaine</b>	Liposomal bupivacaine	Extensive soft tissue release achieved
<b>Bupivacaine</b>	Micelles	Prolonged duration of action

**Table 2: Nanomedicine in Local anaesthetic drug formulation**

Apart from induction agents and local anaesthetic drugs, the nanotechnology application is being investigated in other drugs such as opioids, NSAIDs, volatile agents, and opioid antagonists.

In general, the nanocarriers in anaesthetic drugs are being developed and studied with the following objectives;

- Extended-release of drugs for prolonged drug effects
- Drug delivery to the target site e.g. to increase the oral bioavailability of opioids, topical use of local anaesthetic drugs
- For alleviating anaesthesia-associated complications by formulation of safer nanoformulation or by sequestration of overdosed anaesthetic drugs by nano antidote
- To develop a newer class of drug with unique properties e.g. Zinc oxide nanoparticles having antinociceptive effects.

# NANOTECHNOLOGY

## & Nanotherapeutics in Anaesthesiology

In conclusion, the integration of nanotechnology with clinical anesthesia has the potential to advance precision medicine toward more personalized and precise approaches in anaesthesia, and pain management. However, most of these advanced technologies in the field of anesthesia are still at the stage of animal or clinical studies. Accordingly, further research is warranted to facilitate their clinical application

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# MUSIC THERAPY

## In the Indian healthcare scenario

If I were to tell you that the type of music you listen to, can help enhance your memory before an exam, or reduce anxiety before a performance or even enhance your troubleshooting and problem-solving abilities.... You would probably not believe me. Hence I decided to write this awareness piece about an allied health specialty called music therapy. We listen to music to while away time, to relax and unwind, during gatherings or parties, and for pure entertainment. The use of music has helped humans become more socially interactive beings. But guess what, ancient civilizations from India, Arabs, and Greece, also utilized music for therapeutic purposes. The idea of music as a healing influence that could affect health and behavior is as old as the writings of Aristotle and Plato and in some cultures, long before that. The notion of music as therapy is based on ancient cross-cultural beliefs that music can have a "healing" effect on the mind and body. Music therapy aims to help patients work through psychological or emotional struggles they may be encountering at any given time. It engages with all aspects of therapy that one would encounter in a typical therapy session but does so assisted by music.

In India, it was started in the form of Raga Chikitsa where different ragas were used to promote emotional well-being. In the United States, music therapy formally began after World War I and World War II when community musicians of all types, both amateur and professional, went to Veterans hospitals to play for the thousands of veterans suffering both physical and emotional trauma from the wars. The patients' notable physical and emotional responses to music led the doctors and nurses to request the hiring of musicians by the hospitals. Thayer Gaston, known as the "father of music therapy," was instrumental in moving the profession forward in terms of an organizational and educational point of view. As physicians, we have several goals and objectives when it comes to managing our patients. There are ways in which we can develop or customize an intervention and use music to achieve these goals.

Music therapy is the use of clinical evidence-based music or organized sound be it in the form of playing and instrumental, engaging in vocal and body percussion or receptive listening, song writing or meditative music. Explanations for the therapeutic mechanisms in music have almost always included cultural and social science-based causalities about the uses and functions of music in society.

Music therapy can be either active engagement where a music therapist uses live musical interventions to achieve certain objectives with the patient/children with

# MUSIC THERAPY

## In the Indian healthcare scenario

autism to improve social communication or it can be receptive music therapy where patients listen to prerecorded musical pieces for sedation, anxiety reduction, hemodynamic stability etc.

Dr. Paul Nordoff, an esteemed composer, a graduate of the Philadelphia Conservatory of Music and the Juilliard Graduate School, and Dr Clive Robbins, a special education teacher, identified new ways to teach specially abled children and develop their cognitive processes.

The collective findings, from all these early pioneers of music therapy, seem to have been that music when used with intention, increased engagement levels that unlocked hidden potential and developed new strengths.

Indian ragas have an untapped potential thereby utilizing the science behind the ragas, and implementing raga-based music therapy methods into healthcare settings could become an important part of physicians' wider medical interventions. Hospitals and other healthcare institutions such as rehabilitation centres, mental health institutions, and special schools, need to be made aware of this form of medicine. By exploring its scope and drawing on a combination of clinical assessment, creative art, empathetic interventions, and innovation can help physicians provide the best possible care to their patients.

Although music therapists constitute a small group compared to other better-known professionals, music therapy can be utilized to fill necessary gaps for individuals and groups in the areas of mood, motivation, and memory domains. As a music therapist, I have used these interventions to help school and college-going students inculcate much-needed life skills such as building empathy and resilience, stress management, problem-solving, active listening and communication. Music therapy can also be used to improve motor coordination, concentration, memory for elderly people living in geriatric homes

# MUSIC THERAPY

In the Indian healthcare scenario



Images 1 and 2 – Using music therapy for the geriatric population to improve motor coordination, memory, and focus

As a practicing anaesthesiologist, I am slowly trying to increase the use of music therapy in the hospital setting to:

1. Reduce the stress of surgery
2. Improve overall patient satisfaction post-surgery
3. Reduce intraoperative awareness
4. Improve pain management
5. Use music as an adjuvant for sedation in difficult airway
6. I realized during the pandemic as covid intensivist, the importance of preventing posttraumatic stress of ICU stay and isolation from family. I have used music therapy for sedation and decreasing the discomfort during ventilation in ICU patients

# MUSIC THERAPY

In the Indian healthcare scenario



**Image 3 – Using receptive music therapy for sedation in OT**

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# CONSTRUCTIVE FEEDBACK

## A look beyond the layers of sandwich!

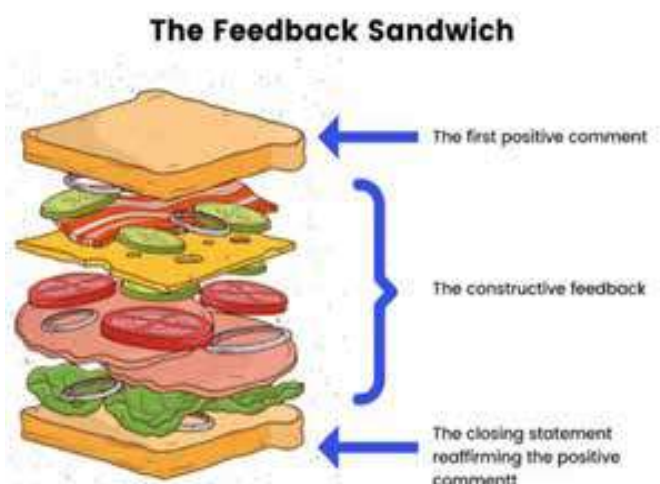
Constructive feedback is essential for growing mindset and is defined as a response to person's activity with the purpose of helping them to become more effective. Giving and receiving feedback is an art that is perhaps difficult to master. It is a collaborative process that is a two way dialogue and not a one way communication. The goals of feedback are to motivate, identify strength and weakness and provide opportunity for learning and growth.

While delivering the feedback one should keep following things in mind:

1. Be specific
2. Be objective
3. Be timely
4. Be constructive
5. Be empathetic

Some of the common avoidable mistakes are being vague, getting personal, too much focus on negatives, not providing actionable ideas and forget to follow up. Various methods have been described to deliver constructive feedback known as feedback models. Whatever method is used for the feedback, it is very important to remain respectful and empathetic. One should be professional, have a positive tone and keep the conversation open ended.

The sandwich feedback also known as the hamburger model is the most popular technique of providing feedback. This method combines constructive criticism with positive reinforcement making it palatable. The top layer is positive reinforcement of the behaviour or actions that are considered good, the filling is constructive criticism that includes areas that need improvement or change and the bottom layer is encouragement and motivating words.





# CONSTRUCTIVE FEEDBACK

## A look beyond the layers of sandwich!

This constructive criticism sandwich or the 'Slug Sandwich' approach has many advantages:

- it helps in giving a balanced and comprehensive feedback based on both positives and negatives.
- It shows that the efforts of the receiver are being appreciated and respected.
- It helps in maintaining a good rapport.
- It prevents the feeling of being attacked and discouragement.

Recently, the sandwich method is being labelled as manipulative and insincere.

The disadvantages of this method are:

- It may break the honesty and trust between people and receiver may even doubt the validity of feedback.
- The message sometimes is not delivered and feedback remains vague.
- The receiver may either end up in focussing on only positives or only negatives.
- This method has also become very predictable.

The method of feedback depends upon the situation and the goal. Therefore, delivering feedback should not be one size fits all but a tailored and flexible approach. Some of the other feedback models are:

**1. Feedback wrap:** Feedback sandwich has clear demarcation between positive and negative whereas Feedback wrap shifts the focus from person to problem. WRAPs are built with four key ingredients: What/Where: State what has happened and where it is happening. Reason: Describe the reason this issue requires attention. Affect: Explore emotions this causes. Prompt: Shift from judgment to problem-solving by eliciting ideas from the other person.

**2. COIN Model:** Context is reference to the event that is to be discussed, observation is description specific to the event, impact is how the event under discussion has affected you, your team and next is steps that can be taken in future.

**3. SBI Model:** Situation, behaviour and impact model sets the tone of the feedback by focusing on specific situation, behaviour in that situation and the

# CONSTRUCTIVE FEEDBACK

## A look beyond the layers of sandwich!

impact of the said behaviour. It allows the receiver to see the situation from another perspective and areas of improvement.

**4. Pendleton Model:** Pendleton's rules for structured feedback are based on self-assessment and reflection. Here the focus is on learner and learner should start by saying what went well and what could be improved. The observer (the person giving feedback) should then add their perspective on the same aspects as the learner. After discussing the areas of agreement and disagreement, the learner should summarize the main points of feedback and identify any actions they will take to improve.

**5. Feed forward:** Feedback is focused on the past actions whereas in feed forward focus is on future. Past actions cannot be changed but same issues can be tackled in future in a positive manner. It empowers the receiver to take different course in future and reinforces inter-personal relationships.

To sum up, feedback is a powerful tool that carries a strong impact on individual growth and learning. It has a power to evoke range of emotions from excitement to trepidation. It is a key skill that all of us need to practice and master.

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## TIME TO GAME UP

### The potential for Gamification in Anaesthesia

Ever wondered why we still have fond childhood memories of long summer vacations spent immersed in video games? Crossing each hurdle or achieving a higher level felt like an accomplishment in itself and a motivation to push further, what one might call "gaming up the game". In a more technical context, Pavlov's classic experiments portrayed how conditioning with positive reinforcements led to development of strong neural associations, resulting in faster and stronger responses with each passing bell, akin to how gamers sharpen their skills with each challenge.

Thus, competition and reward have long been known to capture interest of human minds, not only propelling individuals towards their goals but also honing their skill sets, fostering a self-driven pursuit of further accomplishments. These principles could particularly be fruitful in speciality training of critically intensive specialities like anaesthesia, where a faster response time, accurate decision making and a proficient skill set in a stressful environment can prove lifesaving. And all this could be achieved by the new kid on the block, Gamification.

As defined by Deterding et al., Gamification is a dynamic approach that involves the seamless integration of various gaming elements into a context that, under ordinary circumstances, might not be associated with traditional gaming activities. Incorporating the gaming strategy for learning crucial (serious) scenarios for fostering knowledge and skill development renders the term of "serious games" quite apt for this new concept of medical education. This seemingly new and upcoming strategy of medical education and training has huge potential for mass education, yet being able to be tailored as per individual competencies of anaesthesia trainees.

#### **Why to play along: effective role of gamification in medical training**

Training of professionals in the speciality of anaesthesia, which showcases a perfect amalgamation of knowledge and skills has come a long way. Use of traditional teaching methods like textbook teaching along with supervised clinical training on human subjects still waters the roots of medical education but have quite lost their repute due to availability of more ethically correct and technologically advanced alternatives. Simulation based teaching has been well acknowledged for development of clinical skills as well as critical thinking but procurement and maintenance of this resource intensive method needs alternatives for mass training. Thus, gamification of anaesthesia training provides

# TIME TO GAME UP

## The potential for Gamification in Anaesthesia

a cost friendly low maintenance approach with easier access to the ever increasing number of anaesthesia trainees. Anaesthesia professionals play a critical role in ensuring patient safety and comfort during stressful perioperative periods. Maintaining competence in a rapidly escalating field necessitates continuous learning and skill development. Gamification, by incorporating game-like elements such as points, badges, leader boards, and challenges, offers a promising alternative to enhance the learning experience and improve outcomes.

### **How does it work: effective role of gamification in medical training**

Gamification taps into humanity's innate drive for competition, accomplishment, and social connection. By incorporating principles of game design into various real-world scenarios, it aims to inspire active involvement, deepen engagement, and encourage desired actions. One of its key features is placing the user in the forefront of the learning journey, empowering them to shape their own educational experiences through hands-on learning. This approach boosts motivation, leading to more effective retention of knowledge. As learning becomes intertwined with enjoyable and fulfilling activities, the merger of acquiring knowledge with engaging experiences not only deepens comprehension but also cultivates a sense of fulfillment and excitement, motivating individuals to seek further opportunities for growth.

### **What lies in the basket: the present cascade of Gamification in anaesthesia:**

Gamification encompasses a variety of approaches, which provides platforms for anaesthesia training and can further provide the basis for development and implementation of further projects. Some of the examples of gamification in the medical field have been discussed as below:

- **Escape rooms:** This educational space offers a risk-free environment for participants to engage in group problem-solving, fostering collaboration even among individuals who may not know each other beforehand. Effective escape room design sets clear objectives and incorporates specific elements to help participants achieve those objectives, facilitating knowledge acquisition through team building and hands-on experience. This also introduces performance stress through time limits, presenting challenges, and encouraging collaborative strategy even amongst unfamiliar team members.
- **SimWars:** It is a competitive approach to gamification for trainee education,

# TIME TO GAME UP

## The potential for Gamification in Anaesthesia

focusing on decision-making in simulated patient emergencies. In this format, teams compete with each other within a simulated environment. This approach promotes teamwork, accurate assessment, and correct decision-making, offering participants and observers valuable learning experiences.

- **SonoGames:** a competition-based gamification training tool is used for enhancing ultrasound based knowledge and clinical use among participants. This event combines group-based and hands-on learning in a risk-free environment, making it particularly appealing to younger learners.
- **Leader boards and dashboards:** Gamification methods for behaviour modification, such as unit-based leader boards and performance dashboards are increasingly utilized in acute care facilities to encourage desired outcomes. These methods provide visual feedback on individual, team, or unit performance, motivating participants to achieve aspirational goals compared to established baselines.

### **What's on board: current progress in gamification in anaesthesia**

- **Simulation and immersive technologies:** Simulation exercises can encompass a wide spectrum, ranging from technical skills training to multidisciplinary simulations involving various healthcare professionals. These simulations cover diverse scenarios, including airway management such as standard intubation or difficult airway, cardiac arrest and resuscitation, intraoperative crises like massive bleeding or equipment failure, patient safety protocols for identifying and managing potential hazards, medication errors, and other adverse events. It has also been used to foster effective communication and coordination among team members and healthcare professionals, encouraging effective communication, leadership, situational awareness, decision-making, and teamwork.
- **Ultrasound-guided regional anaesthesia:** Virtual Reality ultrasound guided training program with motion capture technology and high-resolution ultrasound imagery have been developed that aim to develop the cognitive-motor skills necessary for effectively performing ultrasound-guided regional anaesthesia procedures. Gamification in this area has shown to successfully improve knowledge and skills amongst trainees, improving their learning curve fostering safer patient management

# TIME TO GAME UP

## The potential for Gamification in Anaesthesia

- **Obstetric anaesthesia training:** Online courses and use of serious gaming apps for training anaesthesia training in the administration of general anaesthesia for caesarean delivery have been documented to show considerable improvement in acquisition of knowledge and skill amongst trainees. And provide platform for development of further serious games in this field.
- **Reducing preoperative anxiety amongst patients:** Use of virtual reality and games for preoperative acclimatization of patients, has been shown to reduce perioperative anxiety scores amongst adult as well as paediatric patients. Such engaging methods could not only help reduce the perioperative pain scores and analgesic requirements, but also improve the stress response and overall satisfaction scores amongst patients studies have successfully shown to reduce preoperative fear and anxiety levels among children after a virtual operation theatre tour prior to their scheduled surgery
- **Other applications:** perioperative training, avatars, and research  
Gamification presents opportunities for prehabilitation of patients with modifiable comorbidities by helping them participate in pre-operative training programs. Gamified health apps and wearable technologies to effectively target specific medical conditions have worked effectively. These tools are also utilized to improve patient adherence to post-operative care instructions, which may include following medication schedules, engaging in prescribed exercises, and attending follow-up appointments. Virtual health coaches (avatars) can guide patients through exercises, dietary plans, and medication schedules using gamified methods. These avatars offer real-time feedback and motivation, enhancing the overall management of patients' health. This collaborative approach promotes a sense of responsibility and dedication among patients, encouraging them to actively participate in their recovery journey.
- **Research avenues:** Gamification holds promise in anaesthesia research. By combining simulation-based techniques with gamification principles, researchers can explore various areas, including the effectiveness of training programs, evaluation of skills, improvement of patient safety and quality of care, and enhancement of patient experiences and educational initiatives.

### **Not a kid's play:** limitations and challenges

Numerous factors must be considered when implementing gamification in educational and training settings. Some points to ponder are as follows:

## TIME TO GAME UP

### The potential for Gamification in Anaesthesia

- Excessive emphasis on competition within gamified systems can induce stress and prove counter-productive for collaboration among students and trainees, potentially undermining the desired learning environment.
- The effectiveness of gamification may wane over time after an initial period of motivation as users become accustomed to its mechanics.
- Excessive reliance on extrinsic rewards poses a significant risk, as participants may prioritize earning rewards over genuine learning, resulting in superficial engagement and diminished long-term motivation once rewards are no longer offered.
- Gamification structures might not appeal to all users or suit every scenario, as digitalization of teaching might not be accepted by many trainees or faculty, especially those lacking technological proficiency, leading to non-uniformity of methodologies
- Resource constraints might complicate implementation, as gamification often demands significant planning, equipment, digital resources, and manpower.
- The selection of outcome assessment tools must align with the specific event being tracked, necessitating tailored approaches such as leaderboards for unit-based outcomes and dashboards for service line or facility-based metrics.

These multifaceted challenges highlight the importance of careful planning and consideration when introducing gamification initiatives in educational and training environments.

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# GUIDE TO PSYCHOSPIRITUAL

## Needs of patients in terminal care

### **Psychospiritual needs of patients in terminal care**

Despite advancements in medical science, including curable treatments, many patients often have limited lives with advanced diseases. These patients not only have a high symptom burden from the disease but can also experience psychological, spiritual, social, and financial distress. These combined effects can affect the quality of life of these patients in the last few days. Caring for these patients can often be overwhelming not only for the family but also for the medical staff looking after them. Therefore, it is equally important to find ways to acknowledge and help patients and everyone involved in their care. Physicians are entrusted with the profound responsibility of caring for patients during their most vulnerable moments. While we excel in diagnosing and treating physical ailments, it is equally crucial to recognize and address the psychospiritual dimensions of our patients' experiences.

### **Psychospiritual needs of the patient**

Spiritualism is multidimensional and is connected to religion, existentialism, and humanism. Patients in terminal care can have various spiritual concerns like reinterpretation and meaning of life, finding hope, peace, confrontation with death, relationship with God/religion, Unmet psychospiritual well-being can lead to unresolved physical symptoms, resulting in a worse quality of life. It can exacerbate the perception of anxiety, futility, meaninglessness, sense of loss, and lack of support. All these symptoms can further lead to symptoms such as aggravated pain, depression, guilt loss, sadness, adjustment disorders, self-esteem, communication problems with family and friends, questions about meaning in life, and religious struggles ("Why me?"), etc.

In a positive sense, psycho-spiritual well-being includes the following attributes: self-awareness, coping and adjusting effectively to stress, having satisfying relationships and connectedness with others, a sense of faith, a sense of empowerment and confidence, and living with meaning and hope.

The psychospiritual needs of a patient incorporate both emotional health and meaning into life concerns.

### **Psychosocial needs of the patient:**

- Treatment and physical symptom-related needs: physical impairment, fatigue,

## GUIDE TO PSYCHOSPIRITUAL

### Needs of patients in terminal care

sleep disturbance, and side effects of treatment.

- Psychological and social needs: Emotional distress, depression, loss of sense of control, affected body image, impaired social function, and relationships.
- Informational needs: illness management, prognosis, treatment options and side effects, support groups, and complementary therapies.

Therefore, the impact of positive psychospiritual well-being should not be overlooked by physicians and staff caring for end-of-life patients. A drastic improvement in the quality of life can be seen by emphasizing psychospiritual needs. Even then, we can sometimes see the minimum importance assigned to such aspects.

There are various reasons for the lack of importance of psychosocial needs. These may include a lack of education and experience in such topics (including physicians, patients, and family), the thought of being unscientific when discussing religion, lack of communication skills, heavy patient load, poor support from family and society, financial distress, marginalization, and devaluing of psychosocial and spiritual care during medical training.

#### **Assessment of spiritual needs**

Considering the importance of psychospiritual concerns, physicians need to assess and treat them. It should begin with the training of healthcare personnel in psychospiritual screening and history taking. Healthcare personnel have five major skills:

- Hearing
- Sight
- Speech
- Touch
- Presence

#### **A good history should serve the following goals.**

- To understand patients' beliefs and values better.
- To identify psychospiritual themes and assess psychological distress and spiritual resources.
- To connect with the patient more profoundly.
- To empower patients to find inner resources for healing and acceptance.

## GUIDE TO PSYCHOSPIRITUAL Needs of patients in terminal care

- Identify spiritual and religious beliefs that might affect healthcare decision-making.

Assessing psychospiritual needs is difficult. Various models can help healthcare personnel evaluate patients. These include FICA, HOPE, and SPIRIT. Because of the vast aspects of these concerns, no single model is ideal for all situations.

Therefore, an ideal assessment tool should be easy to use, flexible, and use little time to assess the psychospiritual state of the patient at different times and in different situations. The results of spiritual screening, history, and assessment should be communicated and documented in patient records (e.g., charts and computerized databases) and shared with the interprofessional healthcare team. Follow-up spiritual histories or assessments should be conducted for all patients whose medical, psychosocial, or spiritual condition changes and as part of routine follow-up in medical history. Specialized care and consultation should be provided if the need arises after history taking and assessment.

Psychotherapy is another modality that can be used effectively. Various forms of psychotherapy can help in these situations. Meaning-centered psychotherapy, spiritual therapy interventions, life review, dignity therapy, and meditation. Group and individual interventions and psychotherapies can also help address these concerns. These therapies are designed to assist patients in sustaining a sense of meaning, purpose, and peace in their lives.

Psychospiritual wellness can be enhanced or diminished in patients with terminal illnesses. When ignored, they may lead to worse physical symptoms and quality of life. When enhanced, they help cope more effectively with terminal illness, finding peace and meaning in life. Open communication and positive relationships with health professionals are important to cope with psychosocial concerns. Therefore, healthcare providers need to access and provide psychospiritual care for holistic treatment of patients, which will lead to improved quality of life.

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## CAREER PROSPECTS In Liver Transplant Anaesthesia

Liver diseases are fast being recognized as one of the major public health problems in India. The liver disease burden in India is significant. As in 2015, Liver related aetiologies in India alone contributed to 18.3% of the two million liver disease related deaths globally. This is a significant area of concern despite the limitations in the quality of the available epidemiological data resources in liver disease.

In fact, India is passing through a cultural lifestyle transition with progressive adoption of a western diet, sedentary habits, along with an aura of freedom from long-held taboos around alcohol in the society. The contribution of cirrhosis and its complications, collectively chronic liver diseases (CLDs), as causes of mortality in India have progressively increased over years. Different CLDs and cirrhosis accounted for 2.1% of all deaths in India in the year 2016. (1)

As per an unconfirmed data, nearly two lakh people die of liver disease every year in India and 50 thousand liver transplants are required annually. However, only approximately 3900 liver transplants were performed in the year 2023. Further, a large number of patients are international patients with the relative proportion reaching up to even 80-90% at many centres. Hence, the requirement for liver transplant in India and its neighbouring countries is much larger.

National Organ Transplant Programme, in 12th Five-year Plan, aims to improve access to the life transforming transplantation for needy citizens of our country by promoting deceased organ donation. (2) Recognising the gaps in the system and the gravity of the problem, Directorate General of Health Services, Government of India is implementing National Organ Transplant Programme for carrying out the requisite activities. As per an amendment in the Act, training of manpower and promotion of organ donation from deceased persons is being promoted. The government of India also aims to create one nodal multi-organ transplant centre in each state.

Liver Transplant Anaesthesia is an evolving subspecialty of anaesthesia. The working in this field is both interesting and challenging, encompassing the preoperative, perioperative and postoperative care. The challenges in this emerging field are manifold and include patient related, aetiology related and procedure related factors. The patients with liver disease are a unique subgroup wherein the disease spectrum may impact any and every organ system. The aetiology of liver disease includes but not limited to genetic, metabolic, infectious, malignancy, drug induced, poisoning, addictive behaviour (alcoholic liver disease). The indication for liver transplant could be an acute liver failure (ALF),

## CAREER PROSPECTS In Liver Transplant Anaesthesia

complications associated with chronic liver disease and malignancy. The procedure is being performed as elective (live-donated) as well as emergency (in cases of deceased donation and ALF). Similarly, spectrum of patients ranges from neonates to elderly. Further, the indications and upper age limit for liver transplant is increasing. The steps involved in the procedure are complex and have their specific requirements. Perioperative care involves advanced hemodynamic, metabolic and coagulation monitoring. Further, the procedures can be unpredictably long and require working for odd and long hours. In addition, the range of work is not limited to providing care in operation theatre. It includes ICU care for post-transplant donor and recipient; pre-surgical optimization and treatment of various complications associated with liver disease like; hepatic encephalopathy, variceal bleeding, hepato-renal syndrome, spontaneous bacterial peritonitis, sepsis, pulmonary complications, etc. Further, spectrum of work includes providing anaesthesia for endoscopic procedures like; endoscopic variceal ligation and glue injection, ERCP, etc. The interventional radiology endovascular procedures like Trans-jugular Intra-hepatic Porto-Systemic Shunting (TIPSS), Balloon-occluded retrograde transvenous obliteration (BRTO) of varices and hepatic artery recanalization and stenting make it further interesting.

Currently, there are around 200 approved centres for liver transplant in India, majority being in private sector. There are only few 'active' liver transplant centres in public sector. The new centres are being added every year. Further, government decision to create nodal centres in state would further create requirement for trained anaesthesiologists in the field and would create new career opportunity. The opportunities may not be limited to India alone as UAE has started country's first liver transplant centre in Dubai.

It is a well-recognised fact that outcomes are superior with designated teams. (3) But trained anaesthesiologists are not available in accordance. Currently, limited options are available for a formal training. (4) The various paths available for training are:

- a. DM (3-year course) in Organ Transplant Anaesthesia and Critical Care – is available at two centres in India.
- b. PDCC (1-year course) in Organ/ Liver Transplant Anaesthesia and Critical Care is also available at a few centres.
- c. Fellowship – Fellowships are offered by few organizations under Liver Transplant Society of India. And, few organizations are running their own fellowship programs.
- d. Getting trained while working in a Liver Transplant Unit – currently, this is the

## CAREER PROSPECTS In Liver Transplant Anaesthesia

commonest and easiest route for training.

e. Attending a training program/ fellowship overseas.

After completion of training, joining a running or new program may be considered. Path for promotion would depend upon risk taking ability, the opportunities of promotion being higher in a new program. On one side it involves better designation and perks, on the other hand it also incorporates the probability of failure of a new program. Further, in the initial phase workload may not be adequate keep oneself busy. It entails the risk of de-skilling, job security and diversion from work. One could consider maintaining cross-functionality till adequate growth. One may also consider working in full spectrum of liver disease related procedures to avoid monotony.

It is also imperative to focus on the financial and economic aspects for a career in Liver Transplant Anaesthesia. It is considered one of the highest paid subspecialties. But the 'premium' comes at a cost. Stresses posed by the long working hours, night calls and demanding interpersonal relations between the team members have been listed as few of the drawbacks. (4) At times, it is labelled as 'dependent' branch. However, this interdependence is mutual between surgeons and anaesthesiologists.

With the start of new centres. the team sizes are getting smaller both as a result of lack of available manpower and economic constraints. Moreover, there is always a possibility of an emergency liver transplant. This comes with the cost of ability to ensure the availability practically 24x7. Hence, there is a bearing on work-life balance with impact on personal and family life. Many teams are now pursuing hub and spoke model functioning and even performing the procedure abroad. Hence, travel with team would as well be involved for both elective and emergency cases. A collaboration between two smaller teams could be a possible solution for lack of manpower. But this is currently happening only on a very small scale.

In summary, the career in Liver Transplant Anaesthesia brings its specific excitement and challenges. As with working in any subspecialty, it brings both benefits, drawbacks and recognition.

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## **CAREER PROSPECTS**

### **In Liver Transplant Anaesthesia**

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# ASSET ALLOCATION FOR BEGINNERS

Everyone has dreams and aspirations. It could be owning your own house to get rid of annoying landlords, saving up enough to send your kids abroad for education, or buying a Range Rover by the time you turn 50! Having clear goals along with a reasonable timeframe for achieving them will help figure out the required rate of returns.

The most important thing one must know before starting investing for goals is oneself. By that I mean that you should know what your risk appetite is. If even a small loss of your corpus upsets you, then you would do well to stick with fixed deposits or debt mutual funds. Would you be ok if your investments lost 20% of their value overnight? If yes, maybe you can consider equities. There are numerous quizzes online that can provide you with your investor profile depending on how you answer a few questions. Once you know what your own risk appetite is, and the rate of return needed for a certain goal, then we can start the process of allocating funds. This means that you may have to distribute your money to different asset classes to achieve your various financial goals.

Going back to our example of you planning to buy a house in five years and assuming that you are willing to take high risks with your investment, you can consider opting for equity as an asset class that offers higher potential returns but carries higher risks too.

On the other hand, for your child's higher education, you can opt for a medium-risk alternative like a balance of equity and fixed-income investments to create a portfolio that has tolerable risks with reasonably high returns.

Asset allocation will depend upon the three parameters discussed initially – financial goals (returns expectations), risk tolerance, and investment horizon. In essence, the steps to asset allocation are:

## **Step 1: Assess your Risk Tolerance level.**

As explained above, your tolerance to investment risks can help you determine the asset classes that suit you. Risks mean the possibility of losing a part of your invested capital due to an underperforming investment.

Returns are directly proportional to risks. Hence, higher risks would mean higher potential returns and vice-versa. Each asset class has a risk level associated with it. By assessing your risk tolerance level, you can choose asset classes that are best suited to you.

## **Step 2: Identify your Investment Goals and Time Horizon**

This will also help to determine the asset classes that are ideal for you. If you have

# ASSET ALLOCATION FOR BEGINNERS

short-term goals with no or low appetite for risks and are comfortable with medium-to-low returns, then Cash or Cash Equivalents (fixed deposits) can be considered. On the other hand, if you have a long-term horizon with a high tolerance to risks and desire high returns, then equity as an asset class becomes a better option.

## **Step 3: Choose a mix of asset classes to suit your requirements.**

Let's say that you have a medium-to-high risk tolerance, an investment horizon of around 10 years, and the expectation of a double-digit return. While this sounds like the profile of an investor who should opt for Equity as an asset class, it does not mean that he/she should not consider other asset classes. Keeping your investment plan in mind, create a portfolio that has a mix of asset classes working together to minimize risks and maximize returns. Hence, you can look at Real Estate or even

Fixed-Income securities (bonds, debt funds) and create a diversified portfolio. Diversification is all about investing in assets that have a low correlation to each other. Therefore, when one drops in value, the other is not impacted.

## **Step 04: Always keep the broader financial picture in view.**

Most investors make some tax-saving investments, an insurance policy, and have bank fixed deposits before they start looking at investing for achieving other financial goals. Hence, while creating an investment plan and allocating assets keep all these investments in mind and don't allow your investments to skew in any one direction. A balanced approach to investments is the best one.

## **Step 05: Review and Rebalance Regularly**

Life is dynamic. Hence, financial goals and risk tolerance levels can change with time. Therefore, it is important to review your investments regularly and rebalance them based on any changes in preference that you might experience.

It is always advisable to consult with a SEBI registered financial planner who can help you decide your asset allocation depending on your financial goals.

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# AWAKE CRANIOTOMY

## In a 5-year-old child-Unveiling our experience

Awake craniotomy is a surgical procedure performed to remove the brain lesions in or near the functional (eloquent) areas of the brain. Being awake during a neurosurgical procedure can be quite stressful for a patient due to the fear of awareness and pain during surgery. Not only does it require, a willing and motivated patient, but a good cooperation of patient throughout the procedure is also essential. Performing such a procedure in a child is far more challenging. Many ethical, psychological concerns arise in such cases to perform an awake procedure. Here we share our experience of conducting awake procedure in a 5-year-old child.

The child had undergone excision of the tumour under general anaesthesia 2 years back. However, some part of the tumour was left behind, due to the location of tumour near the speech area. The neurosurgeon desired to undergo the surgery under awake conditions to monitor and preserve the speech area during the resection of the residual tumour. We considered a detailed preoperative evaluation of the psychological status of the child and a meticulous preoperative counselling of the child as well as the parents regarding the procedure. The chances of conversion to general anaesthesia amidst surgery if need arise was also discussed for which the parents consented. During evaluation, the child has shown high cooperation and emotional stability. After a thorough discussion, among the members of the team, the decision to execute the “asleep – awake – asleep” technique for the procedure was made. We interacted with the child in the preoperative period to know her favourite cartoons, games, rhymes and stories. The audio-visuals of the procedure and operating room were shown to the parents and the child. Also, the child was shown some pictures of common objects, and animals, which she could easily identify correctly. A good rapport was established with the child before planning for the surgery.

On the day of surgery, the child was calm and cooperative while she was wheeled into the operating room. The preoperative vitals of the child were stable and oxygen was started through nasal cannula. After securing the intravenous line, the scalp nerve block was administered using the landmark techniques under dexmedetomidine sedation. Throughout the process, the child cooperated well and an adequate level of scalp blockade with local anaesthetic was achieved. The child had no complaints of pain during the head pin fixation or skin incision. The child remained sedated but arousable during the initial part of the surgery until the resection of the tumour was started. The dose of sedation was titrated to allow the child to communicate and cooperate for speech monitoring during the tumour resection while keeping the child comfortable at the same time.

## AWAKE CRANIOTOMY

### In a 5-year-old child-Unveiling our experience

The interaction we had with the child during the preoperative phase helped significantly during the awake part of the surgery where distracting the child was easy with her favourite games and cartoons on mobile. Recitation of her favourite rhymes and stories was quiet engaging for the child and it also helped us in evaluating the speech during tumour resection. The stimulation of the area which lead to impairment of identification/naming the objects shown or slurring of speech or speech arrest were identified and preserved. Following complete resection of tumour, the child was again sedated by titrating the dose of dexmedetomidine to make here sleep comfortably till the skin closure. After surgery the patient was fully awake with no pain or any other complaint and her speech was fully intact post-surgery. She was observed for few hours in the ICU and then shifted to ward. The child was discharged home with no deficit on post-operative day three.

Though, initially, it was quite difficult on our part to take the decision of awake craniotomy in such a small child, however, the emotional, and psychological stability shown by the child during the preoperative assessment and the demand of the surgery, propelled us to take the challenge. The extensive cooperation and participation of the child during the initial assessment gave us the confidence to plan for the awake craniotomy. Efforts made to know the child's frame of mind during the initial assessment played a great role in the selection of the patient for awake procedure, intraoperative management and overall success of the surgery.



**Child being operated under awake craniotomy**

## AWAKE CRANIOTOMY

In a 5-year-old child-Unveiling our experience



The child being asked to identify and name the pictures of objects (shown in the mobile phone) while being monitored for speech and language during awake craniotomy.



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# OBSTRUCTIVE JAUNDICE

## For Whipple's Surgery

1. How does the liver contribute to maintaining metabolic homeostasis in the body?
2. Explain the role of the liver in detoxification and metabolism of drugs.
3. Describe the hepatic blood flow regulation mechanisms and their significance in anesthesia management.
4. What are the different types of jaundice, and how do they differ in terms of etiology, pathophysiology and clinical presentation?
5. Discuss the metabolism of hemoglobin.
6. How does jaundice impact the body's ability to metabolize anesthetic agents?
7. What are the key components of preoperative assessment for a patient scheduled for Whipple's surgery?
8. How does obstructive jaundice influence preoperative optimization strategies, including fluid management and nutritional support?
9. What specific laboratory investigations are essential in the preoperative evaluation of a patient with obstructive jaundice?
10. Discuss the pathophysiological effects of cholestasis on various organ systems.
11. Discuss the importance of nutritional support in the perioperative period for patients undergoing Whipple's surgery with obstructive jaundice.
12. How do you adapt anesthetic induction techniques for patients with obstructive jaundice to minimize the risk of hepatic injury?
13. What strategies can be employed to manage intraoperative hypotension in patients with obstructive jaundice?
14. How do you adjust perioperative fluid therapy to mitigate risks and optimize outcomes?
15. Explain the alterations in coagulation parameters observed in patients with obstructive jaundice, and how does this influence perioperative management?
16. Explain the significance of the MELD-Na (Model for End-Stage Liver Disease - Sodium) score in assessing the severity of liver disease. How does incorporating serum sodium into the MELD score impact risk stratification and perioperative management?
17. Discuss the potential renal complications associated with obstructive jaundice, including hepatorenal syndrome and acute kidney injury. How do you monitor and manage these renal complications perioperatively in patients undergoing Whipple's surgery?
18. Discuss the potential perioperative complications associated with obstructive

# OBSTRUCTIVE JAUNDICE

## For Whipple's Surgery

jaundice and Whipple's surgery.

19. What strategies are employed for effective postoperative pain management in patients with obstructive jaundice following Whipple's surgery?
20. How do you diagnose and manage hepatic encephalopathy in the postoperative period?
21. What are the immediate and delayed post-operative concerns following Whipple's surgery?
22. Explain the key principles of post-operative management following Whipple's surgery.
23. What are the pathophysiological mechanisms underlying hepatic encephalopathy, and how does it manifest clinically in patients with liver disease?
24. How do you diagnose and manage hepatic encephalopathy in the preoperative and postoperative periods in patients undergoing liver transplantation?
25. How does the PELD (Pediatric End-Stage Liver Disease) score differ from the MELD score in terms of parameters used and prioritization of patients for liver transplantation?
26. How do you assess and manage complications such as graft rejection and infection in patients following liver transplantation?
27. How do you tailor anesthetic drug selection and dosing in patients with liver disease undergoing liver transplantation to minimize the risk of hepatic encephalopathy and other complications?

### **Suggested readings:**

- Wang L, Yu WF. Obstructive jaundice and perioperative management. *Acta Anaesthesiol Taiwan*. 2014 Mar;52(1):22-9. doi: 10.1016/j.aat.2014.03.002. Epub 2014 May 17. PMID: 24999215.
- Yue Long, Weidong Mi, Wei-feng Yu. Anesthesia for Patients with Obstructive Jaundice. *J Anesth Peri-oper Med* 2018;5:149-60. doi: 10.24015/JAPM.2018.0058

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## PHOTO QUIZ

### ISA Delhi QUIZ #3

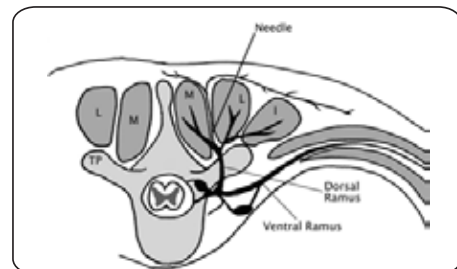
Q1. Identify this Anaesthesiologist  
Clue: Started World's first Intensive  
Care Unit



Q2. Who is credited with  
establishing First ICU in Delhi

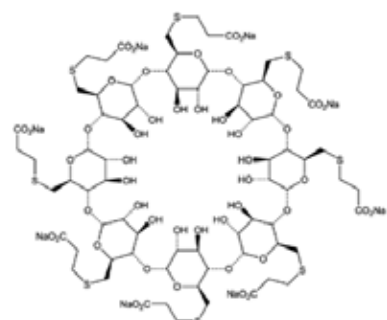
Q3. How long does rivaroxaban  
should be stopped, before  
performing a neuraxial block?

Q4. Identify the block depicted  
in this illustration



Q5. TACA method is used for identification of which  
structure on ultrasound?

Q6. Identify this anaesthetic molecule





## PHOTO QUIZ

Q7. Which supraglottic airway device can be used in a hyperbaric chamber?

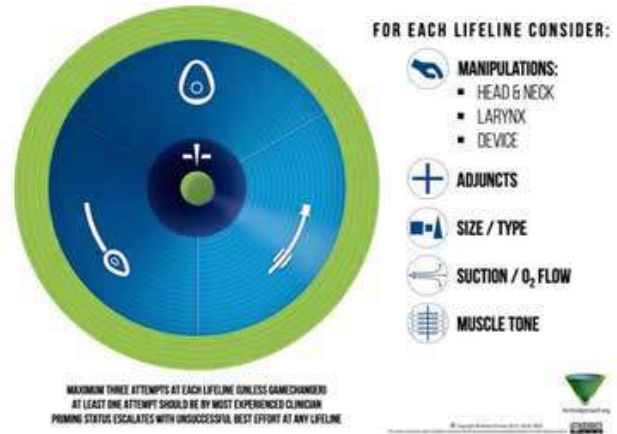
Q8. What is the name of this high acuity implementation tool for emergency airway management?

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### Answers to previous Quiz

#### Part 1

Ans 1:

- SEDASYS, a computer-assisted personalized sedation (CAPS) system
- FDA approved in 2013, to provide mild-to-moderate sedation to patients undergoing colonoscopy and esophagogastroduodenoscopy

Ans 2:

- ProVu Videolaryngoscope
- Expensive and Single use only

Ans 3:

- SAFIRA: Safer Injection for Regional Anaesthesia
- Creates a single operator procedure, Reduces chance of nerve injury, Control injection pressure threshold

#### Part 2

Ans 1: Karl Landsteiner

Ans 2:

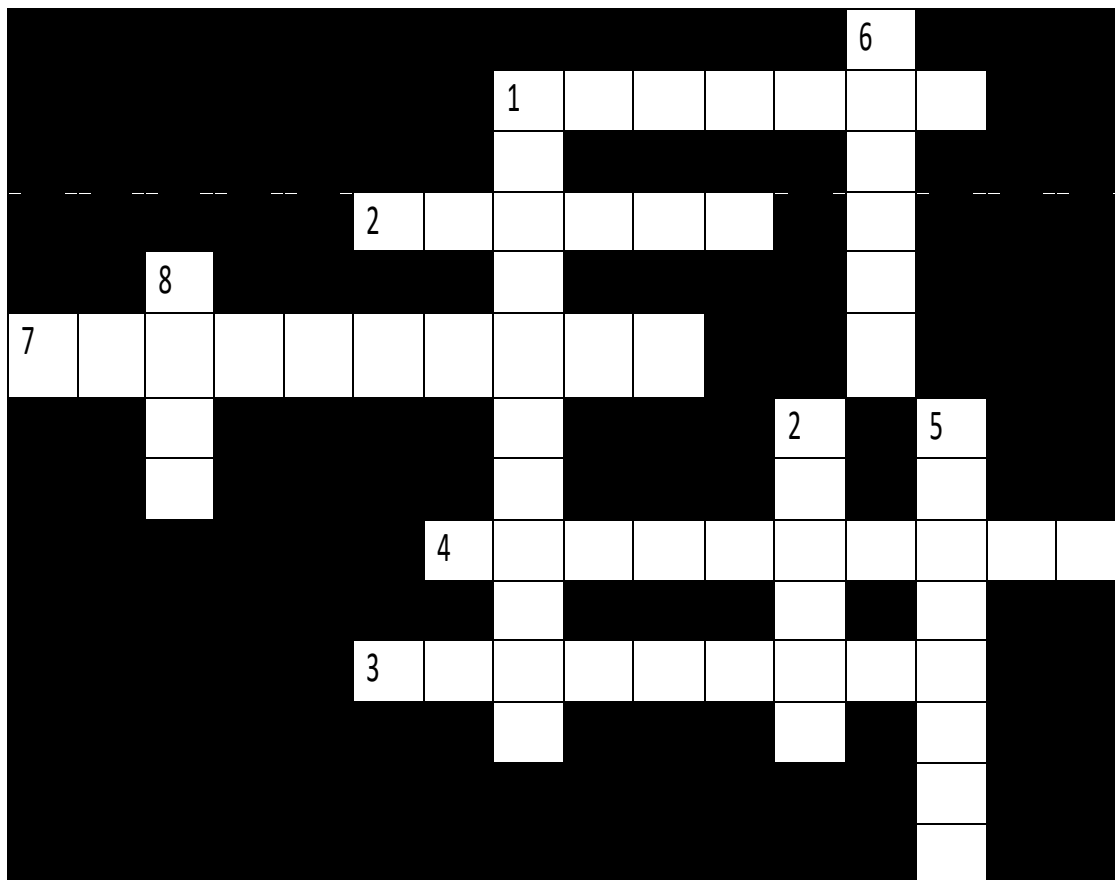
- ROTEM : ROfational ThromboElastoMetry.
- MCF reflects the absolute strength of the fibrin and platelet clot

Ans 3:

- Perftoran
- Perflouorocarbons (PFCs)

Entries to be sent at [isadelhiexecutive@gmail.com](mailto:isadelhiexecutive@gmail.com) and [dramitkohli@yahoo.com](mailto:dramitkohli@yahoo.com) by 22 March 2024, first three correct entries will be given a token of appreciation in the next clinical meeting

# CROSSWORD



## Across

1. A popular wetting solution used in tumescent anesthesia for liposuction is named after \_\_\_\_\_
2. Risk score for prediction of ease of laryngoscopy including weight, neck and jaw movements, mandible position, buck teeth
3. Insertion of anterior scalene muscle is known as \_\_\_\_\_ tubercle
4. Scoring system to predict risk adjusted mortality and morbidity rates in surgical procedures named after this university
7. capnography type in which no gas is removed from circuit for analysis

## Down

1. Syndrome associated with postoperative vision loss due to direct pressure by head rest on orbital contents
2. Computer controlled mannequin patient simulator developed in 1960s.
5. Antidote for calcium channel blockers toxicity
6. His career is largely associated with development of endotracheal anesthesia
8. He performed first surgery under spinal anesthesia for ankle resection

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## January Crossword Answers

1. Dantrolene
2. Simpson
3. Sufentanil
4. Microshock
5. Negative
6. Proseal
7. Bupivacaine
8. Methoxyflurane
9. Granisetron
10. Chloroform
11. Normeperidine
12. Etomidate
13. Hyperkaloemia
14. Calabadian
15. Amygdala

# MONTHLY MEET CALENDER

Sr No	Month	Institution/ Venue	Contact Person
1.	December 2023	West zone at Aakash Health care	Dr Anshu Gupta(GC) & Dr Namita sharma
2.	January 2024	East zone at RGSSH	Dr Arvind Arya and Dr Geetanjali(GC)
3.	February 2024	AIIMS	Dr Lokesh Kashyap, Dr Puneet Khanna & Dr Nishkharsh Gupta (GC)
4.	March 2024	VMMC & Safdarjung Hospital	Dr Sujata Choudhary & Dr Nishkharsh Gupta (GC)
5.	April 2024	MAMC	Dr Munisha Agarwal & Dr Ridhima Sharma(GC)
6.	May 2024	ESIC Group of Hospitals	Dr Prasad CGS & Dr Sudhir Gupta
7.	June 2024	Sir Gangaram Hospital	Dr Jayshree Sood & Dr Ridhima Sharma (GC)
8.	July 2024	LHMC	Dr Maitree Pandey & Dr Ridhima Sharma (GC)
9.	August 2024	UCMS	Dr R.S. Rautela & Dr Geetanjali (GC)
10.	September 2024	PGMER & RML	Dr Neerja Banarjee & Dr Ridhima Sharma (GC)



## ISA Delhi Secretariat

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