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Delhi Branch
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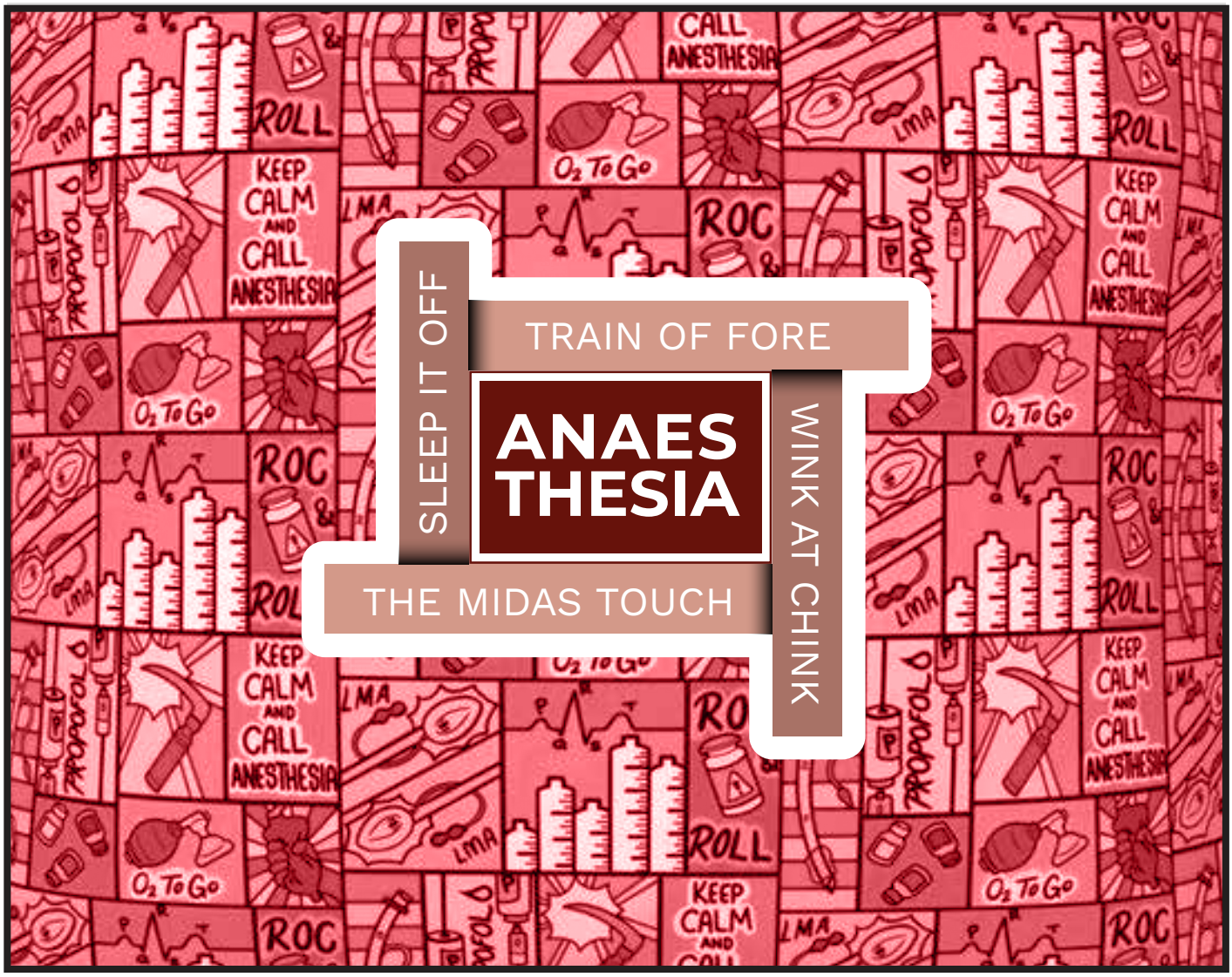

ISA DELHI

7th ISSUE, June 2024

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ISA Delhi Secretariat
Room no 415, BL Taneja Block Department of Anaesthesia & Intensive Care,
Maulana Azad Medical College, New Delhi-110002
Email: isadelhisecretariat@gmail.com | **Website:** www.isawebdelhi.in

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President (ISA Delhi Branch message)

Dear Friends

Greetings

Now we have to gear up for annual ISA Delhi conference. 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. Annual delhi ISA Conference will be held for three days (Workshops 27 September & Conference 28 - 29 September 2024 at Hyatt Centric Janakpuri, New Delhi

The first Seventh monthly meetings at Akash Hospital Dwarka, Rajeev Gandhi Super Speciality, Tahirpur, AIIMS, VMMC & SJH, MAMC, ESI Basai Darapur and Sir Ganga Ram Hospital, New Delhi were well attended.

Best Wishes to all.

Long live ISA.

Dr. Lokesh Kashyap
President Delhi ISA
Ex 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.

Last ISA Delhi clinical CME meet of June2024 was organized by Sir Gangaram Hospital in Siddharatha JP Hotel. Inspite of very hot summer, it was well attended by senior faculty and residents. Clinical meeting was excellent with good discussion followed by high tea.

Medico legal and ethics cell of ISA Delhi has been created to discuss and help various medico legal problems of all ISA Delhi members.

ISA Delhi has launched “ISA Delhi academic series”, which has been huge success. Anesthesiologists including PGs, senior faculty and Consultants participated in webinars. Last topic on PIH was very pertinent due to high maternal mortality in India.

Preparation for our annual event, ISACON 2024 has already been started and flyer has been released for both Conference and Workshops.

Next monthly ISA Clinical meet will be organized by Lady Hardinge Medical College on 26 July 2024. I request all to attend these clinical meetings in large numbers and do register for ISACON Delhi 2024.

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!

June in Delhi is a month of record-making and record-breaking when it comes to temperatures, mostly soaring above 40 degrees. In addition humidity levels start to rise which is even more discomforting. ISA Delhi once again advices its members to stay well hydrated and avoid outdoor activities during peak afternoons. We all congratulate you for beginning of Puri's Rath Yatra.

ISA Delhi congratulates Department of Anaesthesiology, Sir Ganga Ram hospital under the leadership of Dr Anil Jain and blessings of Dr Jayashree Sood for successfully organizing 7th CME and Clinical meeting at plush Jaypee Sidhartha on 22 June 2024. It was well attended by many head of departments and budding anaesthesiologists. Versatility of topics and sumptuous high tea was icing on the cake.

ISA Delhi also congratulate and thank Department of Anaesthesiology GIPMER under leadership of Dr Monica Tondon and Dr Ankit Sharma for successfully conducting CME and workshop on POCUS in June 2024 under the aegis of ISA Delhi branch. It was very well attended by large number of delegates from across the state.

I am pleased to share with you all that ISA Delhi is now on all social media platforms, requesting you to subscribe so as to get timely updates about branch activities.

Governing council ISA Delhi and organizing committee of 63 annual conference of ISA Delhi ISACON 2024 is all set to welcome you all to the biggest academic extravaganza of the state. There will be eight specialty workshops at different institutions of Delhi on 27th September 2024. Academic fiesta will be on 28th and 29th September 2024 at hotel Hyatt centric. From this year we have started lots of new awards in paper and poster categories so requesting seniors to please encourage residents to submit abstracts.

Long Live ISA Delhi,

Dr Amit Kohli
Honorary Secretary
ISA Delhi

Honorary Treasurer (ISA Delhi Branch message)

Dear ISA Delhi members,

Greetings from the treasurer's desk.

On behalf of ISA Delhi branch, my heartfelt gratitude goes out to all those who have attended the ISA monthly clinical meets with tremendous enthusiasm.

The stage is being set for the annual conclave of ISA Delhi branch, ISACON Delhi 2024. A three-day conference which commences from 27th September 2024 shall comprise of eight interactive hands-on workshops and an immersive academic design. The maiden brochure of ISACON Delhi 2024 has already been circulated and the full details of the scientific feast shall follow shortly. Please keep the spirits high and participate wholeheartedly in the forthcoming ISACON Delhi 2024 at Hyatt Centric, Janakpuri, New Delhi.

Before I conclude, I would like to remind you that ISA Delhi branch has its own YouTube channel, X and Instagram handle where you can update yourself with the current events and revisit the recorded version of newly launched academic series. You can find the names of social media handles on the cover page of this newsletter. Please subscribe and maximize your engagement there as well.

Thank you all for being valuable members of ISA Delhi.

Long live ISA.
Jai Hind.
With regards,

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 7th issue of our monthly newsletter.

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.

Long Live ISA! Long Live ISA Delhi!

Dr. Puneet Khanna
Additional Professor
Department of Anaesthesiology, Pain Medicine and Critical Care
AIIMS, New Delhi

LIST OF HOD

NAME	HOSPITAL	MOBILE	EMAIL
Dr. A Tilak	Forits Vasant Kunj	9810234015	
Dr CGS Prasad	ESI Basaidarapur	94806 16548	
Dr. Aparna Sinha	Max Institute of Laparoscopic Endoscopic and Bariatric Surgery, Max Saket, New Delhi	9810035503	aspin@hotmail.com
Dr. Arun Puri	Max Superspeciality Hospital, Patparganj, Delhi	9811074379	dr.arunpuri7@gmail.com
Dr. Arvind Arya	IHBAS Institute	9868396825	drarvindarya@gmail.com
Dr. Arvind Chaturvedi	AIIMS, Department of Neuro anaesthesiology & Critical Care, New Delhi	9871045824	c.arvind61@yahoo.in
Dr. Arvind Prakash	National Heart Insititute East of Kailash	9811650846	Prakash_arvind1(@rediffmail.com
Dr. Beena Haridas	Manipal Hospital.Dwarka	9871110983	
Dr. Binod Kumar Lal	Swami Dayanand Hospital	9810476209	binodkumarll66@gmail.com
Dr. Daljeet Kaur	Dr. N C Joshi Memorial Hospital	9958938488	daljeetkak@gmail.com
Dr. G S Popli	CK Birla Hospital	9871557556	popligurpreet@gmail.com
Dr. Geeta Kamal	Chacha Nehru Bal Chiktsalya	9643308229	kmlgeeta@rediffmail.com
Dr. A K Jain	Sir Ganga Ram Hospital New Delhi	98110 05826	akfeb55jain@gmail.com
Dr. Kharat Mohd.Butt	Hamdard Institute of Medical Science & Research, New Delhi	9622457554	khairatm@gmail.com
Dr. Ganga Prasad	AIIMS New Delhi	9868397813	drgpd@aiims.edu
Dr. Mahesh Kumar Arora	Institute of Liver and Billiary Sciences, Vasant Kunj	9811365293	mkarora442@gmail.com
Dr. Maitree Pandey	Lady Hardinge Medical Collage and Assosiated Hospital New Delhi	9810570515	maitreepandey@gmail.com
Dr. Mangwana	Chanan Devi hospital	9810956411	
Dr. Medha Mohta	UCMS	98683 99626	medhamohta@gmail.com
Dr. Meera Kharbandal	Indraprastha Apollo Hospital New Delhi	9810063988	meera.kharbanda@yahoo.com
Dr. Monika tandon	GB Pant Hospital, New Delhi	97185 99408	
Dr. Munisha Agarwal	Maulana Azad Medical college, Delhi	9968604216	munisha.agarwal@gmail.com
Dr. Namita Sharma	Akash Hospital,Dwarka	9899521048	
Dr. Navdeep Sethi	Yashoda Superspeciality & Cancer Hospital Ghaziabad (NCR)	9873029832	drnavdeepsethi@gmail.com

LIST OF HOD

Dr. Neerja Banerjee	Dr. RML Hoispital	9810517575	neerja.banerjee@gmail.com
Dr. Neeta Taneja	Sir Balaji Action Medical Institute	9811032535	Taneja57@gmail.com
Dr. Nidhi mathur	Sardar Vallabh Bhai Patel Hospital	9873143460	Dr. idhimathur67@gmail.com
Dr. Nymphia Kaul	Sanjay Gandhi Memorial Hospital	847734430	Dr. aul99@gmail.com
Dr. Pavan gurha	Batra Hospital & Medical Research Delh-110062	9811088632	pavan_gurha@yahoo.com
Dr. Pradeep sharma	Goyal Hospital	9999009114	pradeepsharma2982@gmail.com
Dr. Puneet Sharma	Max Shalimar Bagh	8368696269	
Dr. Ragi Jain	Rajeev Gandhi Super Speciality Hospital	9811820246	
Dr. Raj Tobin	Head, Max Super-Speciality Hospital, Saket	9810507165	rajtobin@gmail.com
Dr. Rajiv Gupta	Maharaja Agrasen Hospital	9810101445	Rajiv_rita@yahoo.com
Dr. Reeta Chawla	Sita Ram Bhartia Insititute	9818836084	Reeta.chawla30@gmail.com
Dr. Sameer Mehta	Venkateshwar Hospital,Dwarka	9810763074	
Dr. Sandeep Chauhan	Department of Cradicia Anaesthesia AllMS New Delhi	9873729366	
Dr. Sanjeev Kumar	LBS Hospital	9582500336	drsankumar@gmail.com
Dr. Sarika	Bhagwan Mahavir Hospital	9818987995	
Dr. Seema Kalra	ESI Hospital Jhilmil, Delhi	9810960596	Kalraseema1965@gmail.com
Dr. SL Bakshi	Metro Hospital		
Dr. Slinand	Jagpravesh Hospital		
Dr. Sujata choudhary	VMMC & SJH	99990 51546	
Dr. Sunil Gupta	Sant Parmanand Hospital	9810156812	
Dr. Sunita Bhatt	Hedgewar Hospital		
Dr. Surendra K Arora	Delhi State Cancer Institute	8800190660	surendra_arora@yahoo.com
Dr. Sushma Bhatnagar	Institute Rotary Cancer Hospital, All India Institute of Medical Science |New Delhi	9811326453	Sushmabhatnagar1 @gmail.com
Dr. Sushmita Sarangi	DDU Hospital -	9718990113	

LIST OF HOD

Dr. U K Valecha	BLK Superspeciality Hospital	9810001903	
Dr. Umesh Deshmukh	Fortis Shalimar Bagh	981010445	
Dr. Vandana Chugh	Ambedkar Hospital , Rohini	7290095540	
Dr. Vickky Jaiswal	Max Superspeciality Hospital, Vaishali	9582265897	Vikkyjaiswal34@gmail.com
Dr. Vivek Gupta	Saroj Hospital	9810020953	vivekg117@gmail.com

In case of any discrepancy in names or credentials please inform ISA Delhi Secreteriat at isadelhisecretariat@gmail.com/ dramitkohli@yahoo.com/9818073402

SEVENTH MONTHLY CLINICAL MEET

The Monthly Clinical Meeting of Indian Society of Anaesthesiologists (ISA Delhi Chapter) hosted by Institute of Anaesthesiology, Pain and Perioperative Medicine, Sir Ganga Ram Hospital was conducted on 20th June, 2024 at Hotel Jaypee Siddharth, New Delhi. The meeting commenced at 4.30pm with Dr Anil Kumar Jain, Chairperson of the department, welcoming all attendees and outlining the program of the meeting. Dr Amit Kohli, Hony.Secretary ISA Delhi presented the minutes of the last meeting followed by address by Dr Arvind Arya, Vice President and Dr Lokesh Kashyap, President, ISA Delhi Branch.

Before the scientific session, the Lamp lighting ceremony was done by the office bearers and the seniors like Dr Jayashree Sood, Dr Bimla Sharma, Dr Chand Sahai, Dr Usha Saha and Dr Munisha Aggarwal.

The meeting was attended by approximately 150 participants including faculty from all the major Government and Private hospitals of Delhi & NCR.

The five presentations were as follows:

- New Frontiers in pain control – Dr Mithilesh Kumar, Dr Pradeep Jain
- Effect of propofol total intravenous vs sevoflurane inhalational general anaesthesia on arterial oxygenation during one-lung ventilation in patients undergoing open thoracic surgery: A randomized study – Dr Priyanka Mallya, Dr Akhil Kumar
- Predictive ability of lung comet count for successful tracheal extubation in renal allograft recipients – A prospective observational study – Dr Abhishek Singha, Dr Rashmi Jain
- Evaluation of quality of recovery with quality of recovery-15score after closed-loop anaesthesia delivery system – guided propofol vs desflurane general anaesthesia in patients undergoing transabdominal robotic surgery: a randomized controlled study – Dr Nitin Sethi
- Post dural puncture headache with spontaneous intracranial hypotension – An enigmatic presentation – Dr Randheer Kumar, Dr Naresh Dua

Dr. Mithilesh Kumar's presentation provided an in-depth look at the latest developments in pain management. He extensively covered new diagnostic and therapeutic advancements, including definitions, pharmaceutical treatments, pain assessment scales, and various interventions aimed at achieving pain relief. His thorough exploration of these topics underscores the significant progress being made in the field of pain management, enhancing our understanding and

treatment options for patients experiencing pain.

Hypoxic pulmonary vasoconstriction plays an important role in maintaining oxygenation during one lung ventilation. The debate whether inhalation or total intravenous anaesthesia is helpful during one lung ventilation has given contrary results. Dr Akhil Kumar's study in the Indian population shows that either of the methods can be used in clinical anaesthesia without causing any deleterious effects.

Dr Abhishek Singha presented his thesis study. Lung comets are a radiological indicator of extravascular lung water which can be detected by a simple bedside USG examination. They detect fluid overload in the pre-clinical stage and can be a useful marker to augment other clinical parameters in aiding successful extubation.

Robotic technique of surgery allows surgeons to perform complex procedures in difficult-to-access areas of the abdominal/pelvic cavity (eg. radical prostatectomy and radi-cal hysterectomy) with improved access and precision approach. At the same time, automated techniques efficiently deliver propofol total intravenous Anaesthesia (TIVA) with lower anesthetic consumption. As both above are likely to bring benefit to the patients, it is imperative to explore their effect on postAnaesthesia recovery. Quality of Recovery-15 (QoR-15) is a comprehensive patient-reported measure of the quality of postAnaesthesia recovery and assesses compendious patients' experiences (physical and mental well-being). The randomized study presented by Dr Nitin Sethi assessed the effect of automated propofol TIVA versus inhaled desflurane Anaesthesia on postoperative qual-ity of recovery using the QoR-15 questionnaire in patients undergoing elective robotic surgery. Automated propofol TIVA administered by CLADS is superior to desflurane inhalation GA with respect to early postoperative recovery as comprehensively assessed on the QoR-15 scoring system.

Dr Randheer presented the case study of 27 year old female patient diagnosed to have multiple dural rents at Cervical, Upper Thoracic and Lumbar areas on CT Myelography (hence the enigma) post spinal anaesthesia for LSCS two years ago. Patient was misdiagnosed and the acute PDPH transitioned into Chronic PDPH and patient presented now with left lateral rectus palsy. This study highlighted that Chronic PDPH needs high index of suspicion, immediate multimodal treatment and Epidural blood patch is gold standard of treatment whether the

SEVENTH MONTHLY CLINICAL MEET

dural leak is iatrogenic or spontaneous. There was an overwhelming response from participants and it was very well appreciated. Vote of thanks was delivered by Dr Pradeep Jain, Co-Chairperson of the department.

Honorary Secretary ISA Delhi, Dr Amit Kohli briefed the attendees about various activities being conducted under the banner of the society. He also invited all the attendees to the annual conference ISACON 2024 (Delhi Chapter). The scientific session was concluded at 6.15pm followed by high-tea and socializing.





Compiled by
Dr. Anjali Gera
Sir Gangaram Hospital, New Delhi

Essential statistical methods for post graduates of Anaesthesia

Epidemiological studies are mainly categorized into descriptive studies that aim at study of distribution of disease and analytical studies that is focussed on the causal factors and other determinants of the disease. Analytic studies can be observational or experimental (interventional). In observational studies, the researchers record participants' exposures and outcomes. An experimental study (clinical trial) involves assigning one group of patients to one treatment and another group of patients to a different or no treatment.

Null hypothesis, p value and power of the study

Research question is the main question that the proposed study aims to answer. Null hypothesis denotes no statistical significance relationship between two variables. Investigator aims to reject the null hypothesis and prove the alternate hypothesis, which states that the relationship between two variables is statistically significant.

Type I error is the probability of rejecting the null hypothesis when the hypothesis is true (i.e., saying that two groups are different when in reality they are not). The probability of Type 1 error (α error) is better known as the p-value. The P value (or the calculated probability) is the probability of the event occurring by chance if the null hypothesis is true (traditional default value of α = 0.05).

Type II error (β error) is the probability of not rejecting the null hypothesis when the null hypothesis is false (i.e., saying that two groups are similar when in fact they are different). Statistical power of the study is the ability to detect a clinically important difference if one truly exists and is calculated as 1—beta.

Types of data

1. Qualitative data- Qualitative or categorical data contains non-numerical information that can be categorized. This type of data includes nominal data (categories without any specific order) like colour of the eyes or ordinal data (categories with specific order) like socioeconomic status.

2. Quantitative data- Quantitative data involves numerical values and measurements. Discrete data gives a distinct value like size of family and continuous data represents values that have a range like heart rate and blood pressure and can be measured infinite number of times.

Types of statistics

Descriptive statistics is summarization and meaningful presentation of the data using graphs, charts and tables. Inferential statistics is used to draw conclusion whether observations on small sample can be generalized to whole population. Following tests are used for inferential statistics:-

Parametric tests – Numerical data (quantitative variables) that are normally distributed are analysed with parametric tests. Kolmogorov–Smirnov test is commonly used to test normality of data. A bell shaped curve on drawing histogram indicates normal distribution of data. Examples of parametric tests include Student's t-test, analysis of variance (ANOVA), linear regression and Pearson rank corelation.

Non-Parametric tests- Non-parametric tests are used to analyse ordinal and categorical data as well as numerical data which is skewed towards one side or of unknown distribution. Examples include Chi square test, Fisher's exact test, Wilcoxon's signed rank test (Mann-Whitney U-test) , Kruskal-Wallis test.

Table: Overview of statistical tests

Description	Parametric Methods	Nonparametric Methods
Descriptive statistics	Mean, Standard deviation	Median, Interquartile range
Sample with population (or hypothetical value)	One sample *t*-test (n <30) and One sample *Z*-test (n ≥30)	One sample Wilcoxon signed rank test
Two unpaired groups	Independent samples *t*-test (Unpaired samples *t*-test)	Mann Whitney U test/Wilcoxon rank sum test
Two paired groups	Paired samples *t*-test	Related samples Wilcoxon signed-rank test
Three or more unpaired groups	One-way ANOVA	Kruskal-Wallis H test
Three or more paired groups	Repeated measures ANOVA	Friedman Test
Degree of linear relationship between two variables	Pearson's correlation coefficient	Spearman rank correlation coefficient

Student's t-test

Student's t-test is used to test the null hypothesis that there is no difference between the means of the two groups. One sample t-test is performed when comparison is being made between a sample mean and a given population mean. Two sample t-test (independent/unpaired t-test) is performed to compare means of two independent samples. A paired t-test is used to compare means of paired samples before or after experimental treatment.

Analysis of variance (ANOVA)

The purpose of ANOVA is to test if there is any significant difference between the means of two or more groups. One way ANOVA uses one independent variables and two way ANOVA uses two independent variables. The independent variable should have at least three different categories. ANOVA determines whether dependent variable changes according to independent variable.

Repeated measures analysis of variance

As with ANOVA, repeated measures ANOVA analyses the equality of means of three or more groups. However, a repeated measure ANOVA is used when all variables of a sample are measured under different conditions or at different points in time.

Pearson's corelation coefficient

It measures strength of the linear relationship between two continuous variables.

Pearson's Chi Squared test

Chi squared test of Independence is a non-parametric test used to determine whether the difference between two categorical variables is due to chance or a relationship between them.

Fisher's exact probability test

It tests relationship between two categorical variables using two way contingency table in relatively small samples.

Mann-Whitney U test

Also known as Wilcoxon's signed rank sum test, it is used to determine the statistical significance of difference between medians of two groups. It involves ranking of sample data from low to high and sums the ranks for both groups. For statistical significance one group tends to have higher ranking than the other. To find any difference in the median values of three or more independent samples Kruskal–Wallis test is used.

A quote from Light, Singer and Willet (1990) says "You can't fix by analysis what you bungled by design." It is important to have pertinent research question, a solid hypothesis, a flawless study design supported by appropriate statistical analysis to draw the right conclusion.

Suggested Reading :

1. Ali Z, Bhaskar SB. Basic statistical tools in research and data analysis. Indian J Anaesth. 2016 Sep;60(9):662-9.
2. Mishra P, Pandey CM, Singh U, Keshri A, Sabaretnam M. Selection of appropriate statistical methods for data analysis. Ann Card Anaesth. 2019 Jul-Sep;22(3):297-301.
3. Krousel-Wood MA, Chambers RB, Muntner P. Clinicians' guide to statistics for medical practice and research: part I. Ochsner J. 2006 Winter;6(2):68-83. PMID: 21765796; PMCID: PMC3121570.
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Author
Dr. Anjali Kochhar
VMMC and Safdarjung Hospital, New Delhi

EVOLUTION OF FLUID THERAPY IN THE LAST 50 YEARS: FROM ART TO SCIENCE

Fluid therapy, a cornerstone of modern medicine, has undergone significant evolution over the past five decades. From its early beginnings as a somewhat intuitive practice to the highly sophisticated and evidence-based protocols used today, the journey of fluid therapy reflects broader advancements in medical science and patient care.

1970s-1980s: Colloids vs. Crystalloids Debate Begins!

In the 1970s, the foundation of modern fluid therapy was laid with the development and widespread use of intravenous solutions. Normal saline and Ringer's lactate became staples in clinical settings. These isotonic crystalloids were primarily used for volume resuscitation, electrolyte balance, and as vehicles for drug delivery.

Fluid therapy was largely guided by clinical judgment and empirical observation rather than rigorous scientific evidence. Clinicians relied heavily on basic principles such as replacing fluid losses and maintaining adequate blood pressure. The prevailing belief was that aggressive fluid administration could improve organ perfusion and patient outcomes. Consequently, large volumes of fluids were often administered without rigorous assessment of individual patient needs or consideration of potential risks such as fluid overload.

The physiological principles guiding fluid therapy were being established during this decade. Concepts like maintaining adequate intravascular volume to ensure tissue perfusion and oxygen delivery were emphasized. However, the understanding of fluid dynamics, such as the distribution and movement of fluids between different compartments of the body, was still developing.

The 1980s saw the introduction and increased use of colloid solutions, such as albumin and synthetic colloids like dextran and hydroxyethyl starch. Colloids were believed to be superior to crystalloids due to their ability to remain in the vascular space longer and provide better volume expansion with smaller volumes. This period marked the beginning of the colloid versus crystalloid debate, which would persist for decades.

Advancements in hemodynamic monitoring technologies, including the Swan-Ganz catheter, enabled more precise assessment of a patient's volume status and cardiac output. This allowed for more tailored fluid management, particularly in critically ill patients, and laid the groundwork for future developments in goal-directed therapy.

EVOLUTION OF FLUID THERAPY IN THE LAST 50 YEARS: FROM ART TO SCIENCE

1990s-2000s: Shifting Paradigms and Evidence-Based Medicine
The 1990s marked a turning point with the rise of evidence-based medicine. Clinical trials began to scrutinize traditional fluid management practices, leading to a re-evaluation of fluid types, volumes, and timing of administration. Researchers focused on outcomes such as mortality, organ function, and complications related to fluid overload.

Key studies during this era challenged long-held beliefs. For instance, the SAFE study (Saline versus Albumin Fluid Evaluation) in 2004 compared saline and albumin solutions in critically ill patients, questioning the benefits of colloids over crystalloids. Similarly, the early goal-directed therapy (EGDT) protocol introduced by Rivers et al. in 2001 highlighted the importance of aggressive fluid resuscitation and early intervention in sepsis management.

The introduction of balanced crystalloids, such as Plasma-Lyte and Ringer's acetate, addressed concerns associated with normal saline, particularly the risk of hyperchloremic acidosis. Studies began to suggest that these solutions might be associated with better outcomes in terms of kidney function and acid-base balance.

The concept of 'fluid creep' emerged as a result of these trials and clinical observations, gaining recognition around the early 2000s. It refers to the tendency to administer excessive fluids beyond physiologic requirements, often driven by fear of hypoperfusion or under-resuscitation. 'Fluid creep' can lead to complications such as pulmonary oedema, tissue oedema, impaired oxygenation, and delayed recovery.

Clinicians increasingly recognized that more is not always better in fluid therapy. Instead, a nuanced approach focusing on individualized fluid management and avoiding fluid overload gained prominence.

Against this backdrop, the concept of achieving 'zero balance' gained traction around the same period, roughly in the early to mid-2000s. Rather than aiming for positive fluid balance, which was traditionally thought to support organ perfusion, the focus shifted towards maintaining a neutral or slightly negative fluid balance. This approach aims to prevent the complications associated with fluid overload while ensuring adequate tissue perfusion.

Achieving 'zero balance' involves careful monitoring of fluid input and output, dynamic assessment of hemodynamic status, and adjusting fluid therapy based on patient response and clinical trajectory. It acknowledges that fluid therapy should be tailored to individual patient needs, considering factors such as

underlying pathology, comorbidities, and response to treatment.
Technological advancements also played a crucial role. Hemodynamic monitoring devices, such as pulmonary artery catheters and non-invasive cardiac output monitors, provided clinicians with real-time data to guide fluid administration more precisely. These tools aimed to optimize cardiac output and tissue perfusion while minimizing the risk of fluid overload.

2010s: Precision Medicine and Individualized Therapy

The 2010s witnessed a shift towards personalized medicine in fluid therapy. Recognizing that one size does not fit all, clinicians began to tailor fluid regimens based on patient-specific factors, disease states, and evolving pathophysiology. This era saw the emergence of dynamic indices (e.g., stroke volume variation, pulse pressure variation) to guide fluid responsiveness in critically ill patients.

Several large-scale studies and meta-analyses further refined the understanding of fluid therapy. The CRISTAL and CHEST trials, for example, provided critical insights into the safety and efficacy of colloids versus crystalloids. The SPLIT trial highlighted potential benefits of balanced solutions over normal saline. These studies collectively shaped evolving guidelines and practices.

Fluid stewardship, emphasizing careful selection, dosing, timing, and de-escalation of fluids to optimize patient outcomes and minimize complications, emerged in the mid-2010s.

The concept of restrictive fluid strategies gained momentum, particularly in patients at risk of fluid overload such as those with acute respiratory distress syndrome (ARDS) and sepsis. Studies like the CLASSIC trial (Crystalloid Liberal or Vasopressor Early Resuscitation in Sepsis) in 2016 challenged the traditional liberal fluid approach by demonstrating improved outcomes with early vasopressor use and conservative fluid administration.

Furthermore, research focused on the role of balanced crystalloids versus saline in preventing renal complications and metabolic disturbances. The SMART trial (Isotonic Solutions and Major Adverse Renal Events Trial) in 2018 provided compelling evidence favouring balanced solutions over saline in reducing the incidence of acute kidney injury.

2020s: Current Trends and Future Directions

As we enter the 2020s, the landscape of fluid therapy continues to evolve with advancements in technology, pharmacology, and understanding of disease mechanisms. Clinicians are increasingly integrating biomarkers, genetic data, and artificial intelligence algorithms to optimize fluid management strategies further. There is a growing emphasis on integrating hemodynamic monitoring with other clinical parameters to develop more sophisticated algorithms for fluid responsiveness. Point-of-care ultrasound has become instrumental in assessing fluid status and guiding interventions in real time, particularly in emergency and critical care settings.

Moreover, the COVID-19 pandemic highlighted the complexities of fluid management in acute respiratory distress and sepsis, prompting renewed interest in personalized approaches and the potential role of immunomodulatory agents alongside fluid therapy.

Key Developments and Innovations:

Sepsis management has been a focal point of fluid therapy innovation. The Surviving Sepsis Campaign guidelines have evolved significantly, incorporating insights from recent research. Current recommendations emphasize the importance of early, adequate fluid resuscitation while also recognizing the risks of fluid overload. The balance between aggressive resuscitation and careful monitoring is critical in sepsis care.

The management of trauma and haemorrhagic shock has also seen important advances. The concept of permissive hypotension, which involves limiting fluid resuscitation to maintain a lower-than-normal blood pressure until bleeding is controlled, has gained acceptance. This approach aims to prevent the dislodgement of blood clots and reduce the risk of exacerbating haemorrhage.

In surgical settings, fluid management has shifted towards more individualized approaches. Enhanced Recovery After Surgery (ERAS) protocols advocate for judicious fluid use to promote faster recovery and reduce complications. The use of goal-directed therapy during major surgeries has been associated with improved outcomes, including reduced hospital stays and complications.

Challenges and Controversies:

Despite these advancements, several challenges and controversies persist in fluid therapy. The optimal type and volume of fluids remain debated, especially in

specific patient populations such as those with traumatic brain injury or chronic kidney disease. Concerns over fluid overload leading to complications continue to shape clinical practice.

The use of albumin and synthetic colloids continues to spark debate. While albumin may have benefits in specific populations, such as patients with liver cirrhosis or hypoalbuminemia, its high cost and potential risks necessitate careful consideration. Synthetic colloids, particularly HES, have fallen out of favour due to safety concerns highlighted in studies like the CHEST trial.

Additionally, the economic burden of fluid therapy, including the cost of monitoring devices and specialized fluids, poses challenges in resource-limited settings. Balancing the benefits of aggressive fluid resuscitation with the risks of iatrogenic harm remains a delicate clinical decision.

Conclusion

Fluid therapy has evolved from an art guided by clinical intuition to a science grounded in evidence-based medicine and personalized care. Over the past 50 years, advancements in research, technology, and clinical practice have transformed fluid management from a one-size-fits-all approach to a nuanced, patient-centred strategy.

Looking ahead, ongoing research into biomarkers, innovative monitoring techniques, and tailored pharmacological interventions promises to further refine fluid therapy protocols and improve patient outcomes. As the field continues to evolve, collaboration between clinicians, researchers, and industry stakeholders will be essential in navigating the complexities of fluid therapy and translating scientific discoveries into clinical practice.

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Author

Dr. Siri P H

AIIMS, New Delhi

HAVE MEDICAL ENTRANCE EXAM TESTS (MEET) FOUND THEIR मीत IN NEET?

I am one of the last few batches to enter medical college prior to the NEET era, which was introduced over a decade ago. This exam was heralded as a step forward, promising a more streamlined and centralized gateway for entry into the medical profession, thereby eliminating regional irregularities and disparities. The concept soon expanded to encompass all aspects of medical entrance examinations, including the PG and superspecialty exams. For some, NEET was seen as the medical equivalent of the IIT JEE, promising a more rigorous and charismatic selection process.

But has it lived up to these expectations?

The last few months have uncovered the shoddy state of the medical exam systems in India, affecting UG, PG, and SS levels alike. This ongoing crisis can be traced back to the pandemic four years ago, which disrupted academic schedules across universities, extended current batch timelines, and introduced erratic eligibility criteria for exams. These issues have culminated in a perpetual workforce crisis and disturbed exam timelines, from which we are still reeling.

The NEET UG Dilemma

Starting with NEET UG, although many of you reading this may not have faced it, it is the ultimate goal for every biology student. Since its inception, NEET UG has been marred by controversies, including paper leaks and what we mockingly call 'back door entries.' Leaving technicalities to more powerful authorities and the Hon'ble Supreme Court, one glaring issue is the fallacy of conducting an offline exam in this digital age. An offline MCQ paper is prone to numerous errors, and it invariably fails to meet the standards. When the political dust settles, a transition to a Computer-Based Test (CBT) for UG seems imperative, albeit late.

Moreover, the sheer scale of NEET UG is daunting. In 2024, over 2.3 million candidates registered for the exam, competing for approximately 90000 MBBS seats. This intense competition has fueled a burgeoning coaching industry, making access to quality preparation resources a privilege not afforded by all. The pressure on students is immense, often leading to extreme stress and mental health issues.

The NEET PG Saga

NEET PG, the linchpin of various resident doctors' associations across the country, resembles a soap opera, with calls and petitions for postponement recurring annually. For the past three years, these petitions have been met with fierce governmental resistance, citing the need to maintain the academic calendar. However, this year, just 12 hours before the scheduled exam, the ministry suddenly postponed NEET PG, causing dismay among lakhs of aspirants and their families. Despite meeting with the Hon'ble Health Minister, the rationale behind this unexpected decision remains elusive. As of writing this article, two weeks have passed without any official communication, leaving us in limbo regarding NEET PG and the induction of the new batch.

The ramifications of such uncertainty are profound. Residents and junior doctors form the backbone of the healthcare system, and any delay in their training directly impacts patient care. Furthermore, the constant postponements and policy changes disrupt the academic and professional timelines of thousands of doctors, causing a cascading effect on their careers and the healthcare infrastructure.

The NEET SS Conundrum

If this wasn't enough, NEET SS 2024 adds a small but significant cherry on top of this debacle. The government has decided not to conduct the superspecialty entrance exam this year! Digest this for a moment. No new MD batch is passing out this year, but not conducting the exam altogether is unprecedented. They could have easily accommodated it in December, similar to the preponed university exams for the 2021 PG batch.

This decision is baffling and raises several questions about the future of superspecialty training in India. The absence of an entrance exam means that highly qualified doctors aspiring for advanced training in fields such as cardiology, neurosurgery, and oncology will face an uncertain future. This move could potentially lead to a shortage of specialists, further straining an already overburdened healthcare system.

The Broader Implications

The current state of medical entrance examinations in India reflects broader systemic issues within the country's education and healthcare sectors. The pandemic has exacerbated existing challenges, but it has also highlighted the need for robust, adaptive, and transparent processes.

One critical issue is the digital divide. While transitioning to online exams like CBTs could mitigate some problems associated with offline exams, it also necessitates widespread access to reliable internet and digital devices. In a country as diverse and vast as India, this is a significant hurdle. Rural and underprivileged students might find themselves at a disadvantage, further entrenching educational inequalities.

Moreover, the mental health of medical aspirants is a growing concern. The intense pressure to succeed in entrance exams, coupled with the uncertainty and frequent changes in exam schedules, takes a toll on students' well-being. There is an urgent need for a more supportive and predictable system that prioritizes students' mental health alongside academic excellence.

The Way Forward

To address these challenges, several steps can be taken. Firstly, a thorough review and overhaul of the NEET examination process is needed. This includes transitioning to a secure and reliable CBT format for all levels of medical entrance exams. Ensuring the

integrity of the examination process through robust security measures is crucial to restoring trust in the system.

Secondly, there needs to be a clear and consistent communication strategy from the authorities. Aspirants and their families deserve timely and transparent updates regarding exam schedules and policies. This will help alleviate the uncertainty and anxiety that currently pervades the medical entrance examination landscape.

Thirdly, support systems for students should be strengthened. This includes providing accessible mental health resources and counseling services to help students cope with the pressures of the examination process. Additionally, bridging the digital divide through targeted initiatives can ensure that all students have equal access to the resources needed for online exams.

Lastly, policymakers must engage with all stakeholders, including students, educators, and healthcare professionals, to develop a comprehensive and sustainable approach to medical education and entrance examinations. Collaborative efforts and continuous feedback loops can help create a system that is both equitable and efficient.

Conclusion

If you've read this far, you likely have a personal stake in this matter—be it a child, a relative, or yourself facing the perils of the current state of medical entrance examinations in India. The word limit compels me to ask one critical question for all generations of doctors, especially the upcoming ones: Have Medical Entrance Exam Tests (MEET) found their मीत (friend) in NEET?

NEET, introduced with the noble aim of unifying and streamlining the medical entrance process, has undeniably faced numerous challenges and controversies. The necessity for a more efficient and transparent system is clear. While the exam was intended to level the playing field, the implementation has been fraught with difficulties, highlighting the need for continual evaluation and reform.

The future of medical entrance examinations in India hangs in the balance, requiring a concerted effort from all stakeholders to ensure that the dreams and aspirations of countless medical aspirants are not thwarted by systemic inefficiencies and irregularities. Only through collective action and sustained commitment to improvement can we hope to create a medical education system that truly serves the needs of our society.

Dr AVIRAL MATHUR
- Senior Resident Anesthesiology MAMC & LOK Nayak Hospital
- President FORDA
- President MAMC RDA

CLASH OF THE TITANS: REGIONAL VERSUS GENERAL ANAESTHESIA IN ORTHO OTs OR OPARATIONS

Hi readers! Last week, I was posted in the Orthopedic Operating Theater (OT), where, as always, the surgeons had put together a marathon list of cases. Ortho surgeons, it seems, never miss a chance to cram as many surgeries as humanly possible into a single day, as if they're trying to break some secret world record... Ahem! One particular case involved a middle-aged patient scheduled for knee surgery. My residents planned neuraxial Anaesthesia for this procedure, and I was quite pleased with their decision. However, the orthopedic surgeons specifically requested general Anaesthesia (GA), arguing that since the patient was a day care case, they didn't want to deal with the lingering effects of regional Anaesthesia (RA).

You have to admire the patience of surgeons in general these days—one might even say it's as huge as the size of Mycoplasma genitalium... Ahem! It's a common scene: whenever regional Anaesthesia (epidural, nerve blocks, etc) is mentioned for the first case in the routine list, the surgeon's face shifts from a jolly pink to a pale white, much like their patients' conjunctiva when they enthusiastically operate on their long bones... Ahem! Their usual argument is that regional Anaesthesia will delay OT time and that GA is quicker and just as effective. Despite our best efforts to highlight the benefits of regional Anaesthesia, it often feels like trying to explain quantum physics to a brick wall.

Being the wise and reflective anesthesiologists that we are, this got me thinking about what has changed and what the evidence says. During an online search, I came across a classic editorial published three decades ago. Anesthesiologists were asked whether they would prefer regional or general Anaesthesia for themselves if both methods were administered by equally competent professionals. The majority favored regional Anaesthesia, citing its ease of administration, lower incidence of major complications, excellent operating conditions, and fewer problems during recovery. This preference was also echoed by patients who had undergone upper extremity surgeries. In fact, 24 out of 25 patients who had experienced both types of Anaesthesia opted for regional Anaesthesia for future procedures. [1]

An informal survey of surgeons further supported this trend, noting that their patients seemed to have superior immediate postoperative recovery under regional Anaesthesia. These patients were more likely to ambulate, eat, and drink shortly after surgery and exhibited a higher state of alertness. Recovery room nurses in both ambulatory surgical centers and main hospitals overwhelmingly preferred regional Anaesthesia for similar reasons.[2] These insights highlight the perceived advantages of regional Anaesthesia over general Anaesthesia, but do they hold up across various types of orthopedic surgeries in present times?

(Image generated using creative prompts on Microsoft Copilot)

The choice between regional Anaesthesia (RA) and general Anaesthesia (GA) has long been a subject of debate among anesthesiologists, surgeons, and patients. The decision is not merely a matter of clinical protocol but one that can significantly impact postoperative outcomes, patient comfort, and overall recovery experience.

This article aims to delve deeper into this question, exploring the comparative benefits and drawbacks of RA and GA in a range of orthopedic procedures. From upper limb to lower limb surgeries, spine surgeries, and more, we examined recent studies and meta-analyses to determine which Anaesthesia method truly offers the best outcomes. Understanding these differences is crucial for tailoring Anaesthesia to patient needs,

improving postoperative recovery, and enhancing overall surgical success. Join us as we uncover whether regional or general Anaesthesia holds the upper hand in the world of orthopedic surgery.

Distal Radius Fracture Surgery

In distal radius fracture surgeries, RA has been shown to reduce postoperative pain scores in the early period following surgery. However, after 12 hours, pain levels between patients who received RA and those who received GA were similar. Notably, opioid consumption was higher in the GA group immediately post-surgery but increased in the RA group on the first day after discharge, likely due to rebound pain. These findings suggest that while RA may offer immediate postoperative pain relief, careful management is necessary to mitigate delayed pain . [3]

Hip Fracture Surgery

Long-term outcomes in hip fracture surgery were found to be similar for both spinal Anaesthesia (a type of RA) and GA. A study with 1,600 patients showed no significant difference in survival rates, ambulation recovery, or other major outcomes at one year post-surgery. Interestingly, severe pain during the first 24 hours post-surgery was reported to be slightly higher with spinal Anaesthesia, and patients in this group also showed higher prescription analgesic use at 60 days compared to those who received GA. [4, 5]

Outpatient Total Hip and Knee Arthroplasty

For outpatient total hip and knee arthroplasty, RA (spinal Anaesthesia) facilitated same-day discharge with comparable 90-day complication rates to GA. Patients who received GA experienced higher pain levels and nausea shortly after surgery. However, those under GA were discharged faster from the ambulatory surgery center compared to patients who received bupivacaine spinal Anaesthesia. This highlights the trade-off between immediate postoperative comfort and discharge times. [6] [Table 1]

Table 1: Comparison of Ambulatory total joint arthroplasty outcomes by Anaesthesia type. [7]

Outcome/ Complication	Evidence favours GA	Favours RA/SA	Equivocal
Overall complication rate			X
Early postoperative pain		X	
Late postoperative pain	X		
Postoperative nausea and vomiting		X	
Urinary retention	X		
Early postoperative ambulation			X
Same-day discharge readiness		X	

Lumbar Spine Surgery

In lumbar spine surgery, RA was associated with a lower incidence of postoperative nausea and vomiting, reduced length of hospital stay, and less intraoperative blood loss compared to GA. However, there were no significant differences in pain scores, incidence of urinary retention, or analgesic requirements post-surgery. These findings support the use of RA for potentially reducing certain postoperative complications . [8]

Elderly Patients Undergoing Hip Fracture Surgery

A systematic review and meta-analysis involving elderly patients with hip fractures indicated that RA reduced the duration of surgery, hospital stay, and intraoperative blood loss compared to GA. There were no significant differences in blood transfusion rates, duration of Anaesthesia, 30-day mortality, or postoperative delirium. Therefore, RA may be preferable for elderly patients due to these intraoperative and postoperative benefits. [9]

Wrist Surgery

Functional recovery following wrist surgery did not differ significantly between RA and GA. A study of 76 patients found similar outcomes in terms of pain, range of motion, and patient satisfaction between the two groups. Right-hand grip strength was notably higher in patients who received GA, suggesting that Anaesthesia type might not significantly impact functional recovery but could influence specific physical metrics. [10]

Knee or Hip Arthroplasty and Surgical Site Infections (SSIs)

A meta-analysis revealed a significantly lower incidence of surgical site infections following knee or hip arthroplasty under spinal Anaesthesia compared to GA. This suggests a potential advantage of RA in reducing the risk of SSIs in orthopedic surgeries. [11]

Cost Comparison in Hand and Forearm Surgery

In hand and forearm surgeries, RA was found to be more cost-effective than GA. The total intraoperative cost, as well as Anaesthesia control time, total Anaesthesia time, and postoperative recovery time, were significantly shorter for RA. This indicates that RA not only offers clinical benefits but also economic advantages in specific orthopedic procedures .[12]

Conclusion

The choice between regional and general Anaesthesia in orthopedic surgeries should be tailored to individual patient characteristics and specific surgical contexts. While RA often provides benefits such as reduced postoperative pain, lower incidence of certain complications, and cost-effectiveness, GA may be preferable in cases requiring faster

discharge and immediate postoperative management. Both Anaesthesia types have their unique advantages, making it essential for anesthesiologists to consider all factors when determining the most appropriate method for their patients.

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Author
Dr. Prakash Gondode
Dr. Puneet Khanna
AIIMS, New Delhi

POINT OF CARE TESTING: THE NICK IN TIME

The changing scenario of present day medicine not only encourages evidence based practice but also a timely and optimal management in the best interest of the patients. The emphasis is not only over the correct and accurate management to prevent under or over treatment which might harm the patient prognosis but also on optimum utilization to prevent the wastage of precious hospital resources. An important aspect of this timely treatment is offering to decrease the therapeutic turnaround time, i.e. the time between ordering the tests to the implementation of the actions generated by the results. Thus, we now fall in the era of Point Of Care Testing (POCT), the trend of performing of diagnostic tests at or near the patient, outside the confines of clinical laboratories in a health care facility, truly validating the age old saying “Time is money”.

What is Point of Care testing?

The term Point-Of-Care Testing (POCT), also known as near-patient testing or bedside testing, refers to medical diagnostic tests performed outside of a traditional laboratory setting. These rapid tests, conducted at the time and place of patient care, offer a significant advantage over conventional methods by providing results within minutes. This quicker turnaround time is particularly valuable in situations where timely diagnosis and treatment are crucial. Many descriptive titles have been used for POCT, including Point-of-care diagnostics, Alternate site testing, Bedside testing, Ancillary laboratory testing, near and patient side testing, and Decentralized and Distributed testing, all confirming to the common goal of faster testing, which in turn leads to faster treatment protocols. Point-of-care testing has turned tables by transforming traditional labs, thus bringing diagnostics closer to patients. User-friendly devices, located near the bedside or in dedicated mini-labs within intensive care units and operating rooms, enable immediate testing of whole blood upon request. These advancements, characterized by miniaturized technology, microchip processing, and the ability to perform non-invasive tests, have revolutionized the way healthcare delivers diagnostic results.

But Why Point Of Care Testing??

Conventional laboratory testing presented a significant hurdle in effectively managing patients in critical areas like operating rooms (ORs) and intensive care units (ICUs), where early detection of derangements in patient’s physiology can play wonders in optimal management. Some of the aspects making point of care testing worth the ordeal as compared to the traditional labs include:

- **Time Delays:** Tests often took a considerable amount of time due to sample collection, transportation to the central lab, analysis, and report generation. This multi-step process created a lag between ordering a test and receiving the results, potentially delaying critical treatment decisions.

- **Dynamic Needs, Static Results:** Laboratory results reflected a patient's past state, not their rapidly evolving condition in the ICU or OR. This mismatch between real-time needs and static data limited its effectiveness.

- **Repetitive Testing:** Errors in sample collection, labelling, or inadequate volume necessitated repeat tests, further exacerbating delays.

- **Advancements in surgeries:** The rise of transplant surgeries, particularly liver and cardiac, further highlighted this need for immediate test results. With a patient's well-being depending on precise monitoring of factors like ionized calcium during liver transplants, faster testing became a necessity.

- **Money matters:** Beyond clinical needs, economic factors also played a role. The pressure to shorten hospital stays and optimize resource utilization pushed healthcare providers to explore faster alternatives.

This need for immediate diagnostics at the patient's bedside or within the OR/ICU paved the way for POCT, revolutionizing how fast the time changes.

Types of Point Of Care Testing:

The concept of POCT has emerged as a game-changer, providing immediate results directly at the patient's bedside, thus opening an array of bedside testing for many overlapping patient profiles and critical areas. Some of the prospects of POCT commonly used in clinical practice are as follows:

- **Blood Sugar Controls:** Perioperative and critically ill patients with diabetes or stress hyperglycemia often require frequent blood glucose monitoring. Traditional methods involve frequent blood draws, contributing to iatrogenic blood loss and anaemia along with the time lag in test results. POC blood glucose testing eliminates this need using glucometers allows for rapid real-time monitoring, enabling healthcare professionals to maintain adequate blood glucose levels.

- **Electrolyte Imbalances:** Critically ill patients and those undergoing major surgeries are prone to electrolyte imbalances, owing to large fluid shifts, varied fluid management protocols ranging from liberal to conservative strategies and availability of a myriad of intravenous fluid compositions, particularly leading to fluctuations in sodium, potassium and calcium levels. These imbalances can be

pre-existing or iatrogenic (caused by medical interventions). POC testing for electrolytes allows for immediate monitoring and intervention, thus ensuring optimal electrolyte levels, and preventing complications

- **Hypoxia Detection:** Lactate levels in the blood indicate inadequate oxygen delivery to tissues. POC lactate testing provides a rapid means to identify hypoxia. This allows healthcare professionals to initiate appropriate treatment measures without delay.

- **Blood Gas Analysis:** Blood gas analysis and hematocrit are essential for monitoring oxygenation and the blood's capacity to carry oxygen. POC devices deliver these results quickly, enabling timely interventions like adjustments to ventilation or blood transfusions.

- **Coagulation Monitoring:** Patients on blood thinners or undergoing major surgery are at increased risk of bleeding. Certain surgeries like transplant and cardiac surgeries also demand accurate analysis of coagulation factors in order to ensure timely replacement and prevent any intraoperative or postoperative coagulopathy. POC coagulation tests offer a faster and more targeted approach over the Traditional coagulation tests are often time-consuming and require expertise. These tests help healthcare professionals make informed decisions regarding blood product administration, minimizing bleeding risks. An array of point of care coagulation tests are available, which include Thromboelastography (TEG), Rotational thromboelastometry (Rotem), platelet function tests , clotting factor assays and heparin test like the Activated clotting time.

- **Cardiac markers:** The bedside analysis of cardiac markers like troponin T provides a rapid assessment tool for bedside analysis that can guide further management of life threatening events like acute myocardial ischemia

- **Bed side urine analysis:** A dipstick test for urine proteins, and ketones has long been used for quick recognition of preeclampsia, or diabetic ketoacidosis where early initiation of treatment holds paramount importance in successful management of these serious pathologies

The yin and yang of POCT: merits and demerits

The benefits of POC testing extend beyond increased efficiency. By enabling real-time monitoring and faster treatment adjustments, POC testing contributes to improved patient outcomes in critical care settings. Here's how:

- **Reduced Treatment Delays:** Timely diagnosis and intervention based on immediate test results lead to faster improvement in a patient's condition.

- **Improved Resource Utilization:** POC testing can minimize unnecessary blood draws and lab tests, reducing costs and optimizing resource allocation.
- **Enhanced Patient Care:** POC testing empowers healthcare professionals to make informed decisions at the bedside, leading to better patient care and potentially improved long-term outcomes.

While POCT offers significant advantages, there are also some drawbacks to consider:

- **Accuracy and Reliability:** POCT devices may not always match the accuracy and precision of traditional laboratory testing. This can lead to misdiagnosis or delayed treatment if incorrect results are obtained. Factors like user error, device calibration, and test limitations can all contribute to potential inaccuracies.
- **Cost:** POCT devices and test cartridges can be expensive. While the upfront cost may be offset by reduced turnaround time and improved resource utilization, the overall cost-effectiveness needs to be carefully evaluated for each application.
- **Complexity and Training:** Operating some POCT devices may require specific training for healthcare professionals. Improper use can lead to inaccurate results or pose safety risks.
- **Limited Test Menu:** POCT devices typically offer a smaller range of tests compared to traditional laboratories. This may limit their utility in situations requiring a broader diagnostic workup.
- **Quality Control:** Maintaining proper quality control measures for POCT devices is crucial. This includes regular calibration, following established protocols, and proper storage of test cartridges.
- **Connectivity and Data Management:** Integrating POCT results with electronic medical records can be challenging. This can lead to potential issues with data accuracy, completeness, and accessibility for different healthcare providers involved in a patient's care.

The Future of POC Testing

The field of POC testing is constantly evolving, with new tests and devices emerging. As technology advancements continue, we can expect even more sophisticated and user-friendly POC options in the future. This will further revolutionize clinical practice especially in acute care settings like the ORs and

ICUs by providing a wider range of immediate diagnostic capabilities at the point of care, ultimately leading to even better patient outcomes.

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Author
Dr. Sakshi Duggal
AIIMS, New Delhi

ANESTHETIC IMPLICATIONS OF SEMAGLUTIDE: THE POPULAR "WAISTLINE SHAPING" DRUG

Semaglutide is a Glucagon like peptide-1 receptor analogue (GLP-1 RA) which is used for management of Type 2 Diabetes Mellitus (DM2). In the United States (US) it is available by the brand names "Ozempic" and "Wegovy". Recently, the US Food and Drug Administration (FDA) department has approved "Wegovy" injections for weight loss in obesity associated with one of the obesity related conditions-DM2, hypertension or high cholesterol. However,

Ozempic is not approved for weight loss. 1 The drug achieved a celebrity status after a few celebrities in the western countries disclosed it as their weight loss secret on social media. This has come up as a boon for people trying to lose weight, and Semaglutide is being increasingly used over the counter as a "waistline shaping" drug. The dose of Semaglutide varies between 0.25mg to 2.4mg subcutaneous injection administered once weekly. Lower doses are recommended for glycemic control and the doses higher up on the spectrum are recommended for weight loss. It has a half-life of around 1 week. 2

Neither Ozempic, nor Wegovy are approved for weight loss in India. However, Semaglutide prescribed for DM2 as once daily tablets (Rybelsus) are increasingly being used over the counter at higher doses for weight loss in India. Even subcutaneous injections are available for off-label use in India. The drug is roaring in news and social media as a weight reduction agent. Semaglutide being a GLP-1 receptor agonist, acts on the glucagon receptors, reducing glucagon secretion and in turn increasing insulin secretion leading to decreased blood sugar levels. Its mechanism for weight loss is either by its central action on hunger centres of the brain or by delaying gastric emptying.2 This delay in gastric emptying can be a serious concern for an anesthesiologist. Despite the standard pre-operative fasting, semaglutide has been found to increase gastric residual volume on gastric endoscopy. 3 There are various case reports where patients taking Semaglutide for weight loss in the perioperative period have been found to have delayed gastric emptying leading to regurgitation and aspiration of gastric contents during general anaesthesia, despite adequate fasting.4 Sherwin et al in their prospective observational study used gastric ultrasound to show that there were substantial residual gastric contents in fasted patients on semaglutide.5

Till date there are no high quality studies proving high risk of pulmonary aspiration under general anaesthesia in patients on Semaglutide preoperatively. But due to the potential risk of regurgitation and pulmonary aspiration documented by various case reports and retrospective studies (Table 1), The American Society of

Anesthesiology,6 has recommended to stop Semaglutide 1 day prior to surgery in patients on once daily tablet, and to stop 1 week prior in patients on once weekly subcutaneous injection. Jones et al,5 through their editorial have given some recommendations regarding precautions during perioperative period for patients using GLP-1 receptor agonists . They have suggested to omit Semaglutide 3 half-lives before surgery, which means 3 weeks before surgery in patients taking the drug for obesity. But if patient is taking Semaglutide for DM2, it is advisable to take endocrinologist's opinion on bridging with other glycemic control drugs. If GLP-1 RA cannot be stopped before surgery planned under general anaesthesia, consider rapid sequence induction and intubation (RSII). They have also supported the use of point of care ultrasound for residual gastric volume assessment, wherever required.

Obesity being a major health issue in Indian society and increasing off label use of Semaglutide for weight loss brings a major concern to the anaesthesiologists. Prospective observational studies with large sample size are required to produce evidence and therefore evidence based guidelines for the use of Semaglutide and other GLP-1 RA in the perioperative period.

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Table 1 Summary of literature on use of Semaglutide in perioperative period

S.No	Authors	Type of study	Methodology	Findings
1.	Fujino E et al.[1] 2023	Case Report	31 year old obese female with DM2, on Semaglutide inection 0.25mg once a week, planned for bariatric surgery	Patient presented for oesophagogastroduodenoscopy(EGD) before surgery. After 10 hours fasting, patient was given propofol bolus followed by infusion. EGD showed large volume gastric contents.
2.	Klein SR et al.[4] 2023	Case Report	42 year old patient with Barrett's oesophagus on weekly Semaglutide injection for weight loss. Patient was planned for gastrointestinal(GI) endoscopy and ablation of dysplastic mucosa	After 18 hours of fasting, GI endoscopy showed substantial amount of gastric contents.
3.	Silveira et al.[3] 2023	Retrospective study	Data of 404 patients who underwent oesophagogastroduodenoscopy(EGD) in last 1 year was analysed. 33 had received Semaglutide in last 30 days and 371 had not received the drug.	Semaglutide was associated with increased residual gastric contents on elective EGD
4.	Sherwin et al.[6] 2023	Prospective observational study	The study included 10 non obese volunteers on semaglutide and 10 volunteers as controls, not taking the drug. Gastric ultrasound was used to look for residual solids in fasted patients on semaglutide.	In supine and lateral positions respectively, 70% and 90% of volunteers on Semaglutide vs only 10% and 20% of controls had residual gastric contents on ultrasound after 8 hours of fasting.[7]

Author
Dr. Neha Pangasa
AIIMS, New Delhi

IS SUPERSPECIALITY A MUST AFTER MD ANAESTHESIA IN THE NEW ERA: PROS AND CONS

In the last few decades, anaesthesiology as a specialty has witnessed enormous growth and technical advancements. Anaesthesiologists have expanded their focus from the operating rooms to post anaesthesia care units, nonoperating rooms, intensive care units, and pain medicine. In parallel to these changes, numerous subspecialties in anaesthesiology have come up such as pediatric anaesthesia, obstetric anaesthesia, regional, chronic pain.....etc. The result of these expansions in anaesthesiology is that year after year, exam-going or freshly passed postgraduate students come up with the dilemma of whether to go for super specialisation courses or to continue the practice of general anaesthesia.

Why do residents go for super specialization in anaesthesia?

A survey of recent graduates of anaesthesiologists in the United States regarding the factors influencing the choice of trainee anaesthesiologists to start independent practice immediately after completion of residency or to choose a fellowship was conducted. Competition from non-physician anaesthesia providers (CRNAs or NAs) encroaching the job security and the perceived lack of appreciation for anaesthesiologists were the most cited responses for those opting for fellowship. Another survey of anaesthesiology residents in Saudi Arabia revealed that among those deciding to pursue fellowship training, personal interest, enhancing employability, and income potential were the most common factors influencing this decision.

There is a lack of data on the factors leading to the choice of super-specialization courses by anaesthesia residents in India. Well, my experience of working in a teaching hospitals and interaction with residents over the years has made me understand that the main reason is the gradual increase in the postgraduate seats in anaesthesiology in recent years. With the increased number of general anesthesiologists, many of them fail to get a sense of accomplishment after completion of their course. The residents either pursue any super–specialty course or opt for short–term fellowships to fill this void of non–satisfaction. Similar to the results of surveys of residents from other countries, some opt for fellowship out of their interest and some feel that pursuing a fellowship will enhance their market value, help them earn more, and help them make their name in the field.

IS SUPERSPECIALITY A MUST AFTER MD ANAESTHESIA IN THE NEW ERA: PROS AND CONS

The decision to pursue super specialisation after MD or DNB anaesthesiology has its pros and cons as described below;

Pros

1. Acquisition of specialized skill and competency: For residents, the duration of three years appears to be too short a period for complete training in all the finer aspects of the specialty. It would be expected that after graduation every anesthesiologist should be proficient in managing a patient with heart disease; however, Anaesthesia for major cardiac surgery in an adult with complex congenital cardiac abnormalities would likely only be undertaken by an expert with additional subspecialty training and experience. Likewise, most would be comfortable delivering Anaesthesia to a healthy 10-year-old for a minor procedure such as hernia repair, but the management of meningomyelocele or tracheoesophageal fistula repair in a very low birth weight neonate may necessitate an experienced pediatric anaesthesiologist.

2. Improved patient outcome: Few studies have shown better patient outcomes when subspeciality anaesthesiologists give anaesthesia. Cobb et al reported that patients who were treated by general anaesthesiologists had a 29% increase in the odds of receiving general anaesthesia for a caesarean section. Gerritsen et al found that brain glioblastoma resection under general anaesthesia under the supervision of a dedicated neuro-anaesthesiologist compared to a general anaesthesiologist yielded superior postoperative outcomes in terms of reduced postoperative complications (early=0.002, OR=2.54; late: p=0.003, OR=2.24) and reduced length of stay (p=0.0006). Contrary to these reports Ender et al suggested that the lower rate of perioperative complications is related to years of training rather than to specialty training per se. They reported that fellowship-trained pediatric anaesthesiologists did not have a lower complication rate (1.1%) than "all other department members" ($p<0.7$) while non-fellowship-trained pediatric anaesthesiologists had a significantly lower rate of complications (0.3%) than either fellowship trained ($p<0.006$) pediatric anaesthesiologists or all other department members ($p<0.0008$). Pediatric anaesthesiologists with greater than 1 year of experience as an attending anaesthesiologist (since completion of fellowship or residency), had a significantly lower rate of complications than those with less than 1 year of experience (0.4% vs 1.3%, respectively, $p<0.004$).

3. Better salary & job satisfaction: For those going for super specialization, pay to some extent is better compared to the general anaesthesiologists, especially in the subspeciality such as cardiac anaesthesia and there is a certain degree of glamour

added to the extra degree obtained. Khara et al reported that those who had received Superspeciality training after anaesthesia residency had a better median rate of job and salary satisfaction compared to those who had not received the training. Similarly, a survey of US fellowship-trained obstetric anaesthesiologists perceived a positive impact of fellowship training on career trajectory, job protection and autonomy, quality of life, and job satisfaction.

Cons:

1. Loss of healthcare manpower for national health issues: Super specialty anaesthesia practice in India is confined to tertiary care centres and metro cities whereas the requirement of a general anaesthesiologist is almost universal. India has one of the smallest pools of anaesthesiologists in the world. According to data from the World Federation of Societies of Anaesthesiologists, India has only 1.27 anaesthesiologists for every 100,000 people. India needs anaesthesiologists proficient in managing diverse surgical cases to achieve goals of national health issues such as caesarean section, cataract surgery, surgeries for fractures, etc. No one wants to go to a tier 3 city after doing super specialization and therefore going for super specialisation will further contract the pool of anaesthesiologists available in alignment with national needs.

2. Monotonous professional life: Super specialization in a subspeciality of anaesthesia will make one stuck to that surgical speciality or field throughout a professional career. This will result in a loss of skill needed to manage different types of surgeries or will make one incapable of handling certain types of patient populations.

3. Demand for anaesthesia superspecialists in the Indian health market: As mentioned above the practice of Superspeciality in anaesthesia is mostly available in tertiary care centers or big corporate hospitals. The field of anaesthesiology in India is traditionally viewed as a non-revenue generating and as a service department to surgeons. In many hospitals, surgeons typically decide which anaesthesiologist to call for a surgical procedure. The anaesthesiologists still work silently behind the other side of the curtain in OT and general public largely are unaware of our speciality. This dependence and lack of autonomy might limit their ability to negotiate better remuneration.

Employing Anaesthesiologists with extra degrees means hospital management has to pay them higher salary compared to the general anaesthesiologists. While this is the widely accepted norm for subspeciality like cardiac Anaesthesia, for other

newer subspecialities the acceptance is yet to come. Moreover, the practice of subspeciality of pain medicine and critical care medicine faces stiff challenges from other specialties such as orthopaedics, pulmonologists, and physicians.

4. Work-life balance, salary and job satisfaction: Certain subspecialties such as cardiac anaesthesia and transplant anaesthesia require longer working hours with remuneration received far behind their surgical counterparts. This may adversely affect their work-life balance and result in burnout

Therefore, undoubtedly super specialisation after MD/DNB anaesthesia adds value and distinguishes one from general anaesthesiologists in achieving the skills and competency to handle patients with complex diseases. In the current market, fellowships are not strictly required to find a good job or to earn more money. The average income of a private practicing general anaesthesiologist varies greatly depending on the place of work even in the same city and can range from Rs 2 lakhs per month to more than 10 lakhs per month which is at par or beyond what you get after super specialisation. In reality, majority of anaesthesiologists in India and abroad practice in more than one subspecialty. I feel that if one is passionate about a particular subspecialty, wants to contribute in whatever practice setting he/she chooses, at a greater level of expertise—and provides patients with the best care—then fellowship is the way to go!

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Author:
Dr. Sukhyanti Kerai
MAMC, New Delhi

TELE-PAC: CALL OF THE DAY
(Feasibility in Indian Scenario)

The pandemic of the novel coronavirus diseases (COVID-19) which started in 2019 in Wuhan, China; had created unprecedented challenges for the healthcare systems. The attempt to vanquish such challenges gave birth to or aggrandized many areas which have proved to be a boon in the post covid times as well. It became imperative that it should be ensured that people suffering from other medical or surgical ailments are not deprived of their healthcare needs during such scenarios. Virtual healthcare delivery acts as a boon therein, telemedicine being a part of it.

World Health Organization (WHO) has defined telemedicine as "The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities"

Though the technology of telemedicine is not new to India, it has not been utilized to its maximum potential in India. Telemedicine indeed can prove to be an invaluable tool for healthcare in a populous country like India with a diverse topography. Moreover, it can also help in making both specialised and routine healthcare more accessible to the vast population residing in rural areas.
Telemedicine in Perioperative time

E -PAC (telemedicine based preanesthetic checkups) have the potential to carry forward the legacy of telemedicine. However, in a country like India there are many major questions which needs answers before E-PAC begins its competing journey with physical PACs.

First and foremost, question is, can this be an alternative to personal face-to-face meetings? Other questions to be addressed are: What are its flaws, and are there any legal ramifications? What are the standards for providing appropriate digital anaesthesia informed consent to increase patient safety? Network issues? Sufficiency of outreach of technologies to rural areas?

Pros

Human cognition processes are changing the implementation of novel communication and information technology. The smartphone is a part of our routine lives presently, and it is readily available and handy. Online/telephone

interviews for PAC can be beneficial for patients who live in remote locations. Minimising traveling expenses will reduce overall cost, and patients can be more relaxed and suffer from less anxiety in their homes. The issues around prolonged waiting hours can be avoided. Almost, all information can be obtained if relevant or specific questions are asked which can be done using institution-based questionnaires. Professional pre-recorded videos to explain the anaesthesia technique might be more efficient than a face-to-face meeting. It can be made more user-friendly by adopting certain measures such as a specific appointment (time and date) for the online PAC. Ensuring the security of data-protected online service, to maintain the patient secrecy and autonomy is a must. With the advancement in technology, newer methods for digital communication can be explored in the future such as zoom meetings, informative videos, skype calls. Validated digital consent forms are available and they act as insurance for the doctor. The additional advantage is that then healthcare provider has required information readily accessible at their fingertips.

Another possible application of telemedicine, which has not been explored widely, is virtual prehabilitation before surgery. Telemedicine can be used to educate patients about their individualized needs to increase their functional capacity and optimize their preoperative status. Smoking cessation, breathing exercises etc. can be explained and demonstrated. Remote spirometry can also be explored. At the outset, for rural areas a thorough training for the use of telemedicine for healthcare purposes should be conducted before such facilities can be implemented and successfully function.

Cons

There are always two sides to a coin. E-Pac has its own disadvantages and limitations. Network issues in remote areas is one such problems. Majority of the population is still illiterate and technology naive. Making the population with different levels of education understand the procedure of E-Pac itself can be a Herculean task. Though the newer technologies such as electronic stethoscopes, smartphone applications, wearable sensors etc. can aid the remote physical examination, however the limited availability and technical complexities makes there use tricky. It is also and technically demanding to examine a difficult airway which is of special interest to the anaesthesiologist, on a smartphone.

Digital media also faces some major challenges such as misinformation, lack of guidance, and information leakage. Another important aspect to ponder upon is legality. What are the legal laws of allowing to obtain informed consent from the parent/caregiver via the internet or telephone/smart phone? The digital consent forms must be legally compliant and use digital signatures as per Section 2 (ta) of the Information Technology Act, 2000. Digital consent forms should be tamper-proof; once signed, these forms cannot be changed/modified in any way. Digital privacy is of utmost importance, and digital security must be guaranteed. Internet issues in remote locations, handling multiple patients at a single time, and keeping online meetings confidential will be some of the issues in making E-PAC a success.

Conclusion

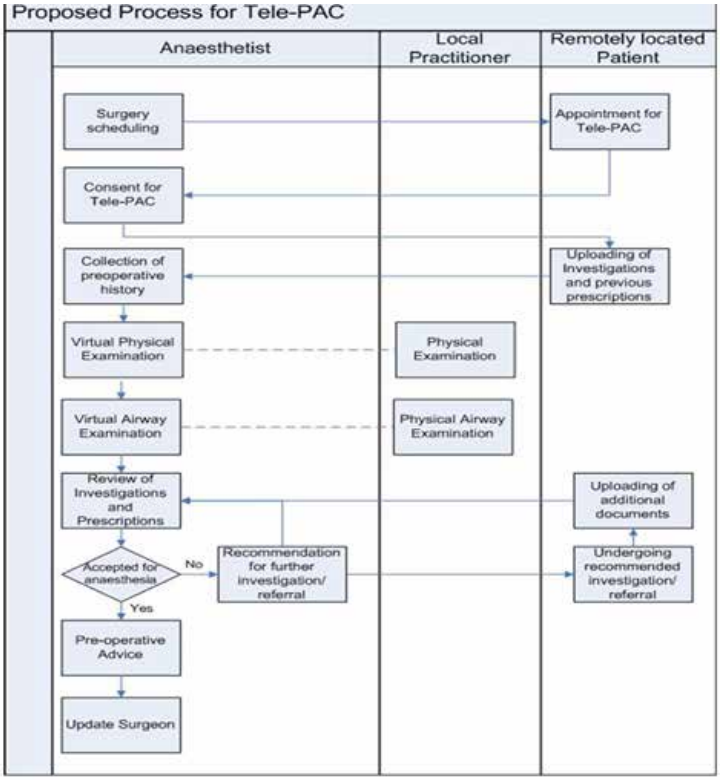
The Covid-19 pandemic has created a huge upheaval in the healthcare system with more focus being placed on infectious diseases which have the potential of causing an epidemic and its related research and has led to a wider acceptance of telemedicine. E-Pac has boomed under such consequences, as a special opportunity was offered to expand the utilization of virtual health systems in anaesthesia. Hence, the learnings during this experience have been very well extended into use during the post-pandemic period also.

However, there is no denying the fact that a lot of clinical trials and research is needed to establish the dominance OF E-PAC over the conventional PAC in the clinics.

Telemedicine Equipment

TELE-PAC: CALL OF THE DAY
(Feasibility in Indian Scenario)

The given diagram depicts the proposed Process of Tele -PAC



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Author
Dr. Samiksha Khanuja
HIMSR

RECENT ADVANCES IN NEUROANAESTHESIOLOGY

NeuroAnaesthesia has seen remarkable advancements in recent years, significantly improving patient outcomes. From the implementation of multimodal neuromonitoring techniques to the growing use of drugs like ketamine and dexmedetomidine, the field is evolving rapidly. This article highlights some of the key developments in recent years, including enhanced recovery after surgery (ERAS) protocols, the increasing application of gamma knife radiosurgery and updates on aneurysmal subarachnoid haemorrhage management (aSAH).

Ketamine Back in the Spotlight: One of the most debated topics in neuroanaesthesia is the effect of ketamine on intracranial pressure (ICP), especially in patients with traumatic brain injury (TBI). It has long been believed that ketamine can cause a rise in ICP through sympathetic stimulation, potentially exacerbating the condition. However, recent evidence suggests that this may not always be the case. When ketamine is used in conjunction with a γ-aminobutyric acid (GABA) agonist under conditions of controlled ventilation, and without nitrous oxide, the feared rise in ICP may not occur.(1) This combination could mitigate the sympathetic stimulation that traditionally raised concerns about ketamine use in neuroanaesthesia. In managing TBI patients, it is crucial to maintain mean arterial pressure, prevent hypoxia and hyperventilation, and control ICP. Ketamine helps achieve these goals by retaining the patient's respiratory drive, not decreasing blood pressure, and offering behavioural control without causing apnoea. These characteristics provide ketamine with a significant advantage over other sedation medications. Recent studies have provided evidence supporting ketamine's role in neuroprotection.(2) This is because, Ketamine inhibits N-methyl-D-aspartate (NMDA) receptor activation and excitotoxic signalling, reduces neuronal apoptosis, attenuates the systemic inflammatory response to tissue injury, and maintains cerebral perfusion pressure as a result of sympathetic nervous system activation. These actions of ketamine may act to offset its detrimental effect on cerebral blood flow and metabolism. Ketamine is also emerging as a valuable adjunct in managing super-refractory status epilepticus (SRSE) due to its NMDA receptor inhibition and neuroprotective properties. Typically, SRSE is treated with a combination of benzodiazepines and specific antiepileptics, quickly escalating to anaesthetic infusions (most commonly propofol). Prolonged SE and SRSE are associated with a downregulation of GABA-A receptors and an upregulation of NMDA receptors, placing ketamine as a therapeutic adjunct.(3)

Dexmedetomidine is highly valued in neurosurgical settings for its neuroprotective effects. Recent research on rodents has focused on dexmedetomidine's potential

role in managing cerebral vasospasm, a serious complication that can occur after subarachnoid haemorrhage.(4) Dexmedetomidine is also commonly used in various neurosurgical procedures and for procedural sedation in neuroradiology suites, enhancing patient comfort and safety. A recent study found that starting dexmedetomidine infusion before surgery stabilises hemodynamic throughout the procedure, effectively reduces cardiovascular responses to intubation, skull pin application and extubation, and also decreases the need for additional anaesthetic agents during the surgery.(5) A prophylactic intraoperative infusion of dexmedetomidine was found to cut the incidence of delirium by 50% during the first 5 days postoperatively in patients who underwent elective brain tumour resection.(6)

Multimodal intraoperative neurophysiological monitoring (IONM) integrates various techniques such as somatosensory evoked potentials (SSEP), motor evoked potentials (MEP), brainstem auditory evoked potentials (BAEP), visual evoked potentials (VEP), electroencephalography (EEG), and electromyography (EMG) to monitor neural pathways during surgery. This comprehensive approach enhances surgical precision, minimises the risk of neurologic injury, and improves patient outcomes. SSEP and MEP are monitored during craniotomies for tumour or aneurysm removal, as well as spine and spinal cord surgeries such as kyphoscoliosis correction, spinal cord decompression or stabilisation, and spinal cord tumour removal. These modalities help identify the primary motor and somatosensory cortices, thereby minimising the risk of neurological damage. For SSEP, peripheral nerves—typically the ulnar, median, and tibial nerves—are stimulated, and the resulting electrical activity in the brain, detected via EEG, helps define the boundaries of the primary somatosensory cortices. In contrast, MEP involves electrical or magnetic stimulation of the brain surface and records muscular responses throughout the body to map the primary motor cortex. The incorporation of multimodal IONM represents a significant advancement in neuroanaesthesia, ensuring safer and more effective neurosurgical procedures.

Emerging monitoring tools, such as Near-Infrared Spectroscopy (NIRS), may revolutionise cerebral blood flow monitoring in the operating room and ICU. NIRS detects changes in photon phases as they pass through tissues and reflect moving blood cells, providing non-invasive, bedside measurements of red blood cell movement. This method can detect changes deep below the skin surface and has been used in early studies to measure intracranial pressure (ICP) and haemoglobin concentrations in non-human subjects. While clinical efficacy

studies are still needed, this approach could simplify neurointensive monitoring of cerebral blood flow and ICP, facilitating quicker clinical decisions for patients with rising ICP or cerebral ischemia.(7)

Enhanced recovery after surgery (ERAS) protocols have become popular among colorectal surgery patients. Recently, there has been increasing interest in applying ERAS protocols to neurosurgical patients as well. The key components of the ERAS protocol include pre-operative counselling, enteral nutrition before surgery, avoiding perioperative fasting, carbohydrate loading up to 2 hours preoperatively, standardised anaesthetic and analgesic regimens, early initiation of enteral nutrition, and early mobilisation. For craniotomy approaches such as scalp blocks and minimally invasive surgery, where feasible, play a crucial role in enhancing recovery. A rapid recovery after anaesthesia for craniotomy allows prompt neurological assessment and diagnosis of intracranial complications at an early stage which can possibly lead to early hospital discharge. In major spine surgery, ERAS is particularly beneficial due to the significant variation in length of stay, postoperative pain, and functional recovery.(8)

The use of hybrid operating rooms (hybrid-ORs) is increasing in neurosurgery due to their pre-, intra-, and post-procedure imaging capabilities, which enhance surgical precision and reduce the need for postoperative imaging and revision surgeries. Advantages include immediate outcome assessment and the ability to perform combined open and endovascular procedures. However, radiation exposure to patients and staff remains a significant concern.(9)

Awake craniotomy is preferred for resecting tumours near eloquent cortical areas and treating intractable epilepsy. This procedure requires anaesthetics, hypnotics, and analgesics that provide balanced sedation, rapid reversal, and minimal respiratory depression while maintaining patient communication. Dexmedetomidine is becoming popular in awake craniotomy due to its favourable pharmacological profile. However, a recent meta-analysis found no statistically significant differences between propofol and dexmedetomidine in terms of intraoperative adverse events, patient satisfaction, or procedure duration.(10)

Gamma-knife radiosurgery (GKRS) has become a primary treatment modality for many neurosurgical conditions. A multidisciplinary team, including a neurosurgeon, radiation oncologists, medical physicists, nursing staff, and radiation technologists, works together to provide comprehensive care.

Occasionally, anaesthesiologists are needed to manage patients requiring sedation or anaesthesia. The primary treatment goals are to ensure painless frame fixation, prevent inadvertent movement during dose delivery, and achieve a fully awake, painless, and smooth recovery post-frame removal. The role of anaesthesia is crucial in maintaining patient immobilisation during image acquisition and radiation delivery while ensuring the patient remains awake and neurologically accessible at the end of the procedure.(11)

In 2023, the American Heart Association/American Stroke Association (AHA/ASA) updated the "Guideline for the Management of Patients with Aneurysmal Subarachnoid Haemorrhage." The new guidelines recommend using multimodal monitoring modalities, such as continuous electroencephalogram (cEEG) monitoring, invasive monitoring of brain tissue oxygenation, and measuring lactate/pyruvate ratio and glutamate, for high-grade patients with aSAH. The guidelines also suggest that for patients with symptomatic vasospasm, it may be reasonable to elevate systolic blood pressure values to reduce the progression and severity of delayed cerebral ischemia (DCI). Both the AHA/ASA and Neurocritical Care Society (NCS) guidelines recommend the early use of nimodipine to prevent DCI and improve functional outcomes.(12) The EARLYDRAIN study (2023) demonstrated that early lumbar drainage significantly reduces the risk of poor prognosis and the occurrence of DCI compared to standard care. The study supports incorporating lumbar drainage into standard care protocols for improved patient outcomes.(13)

Conclusion

The advancements in neuroanaesthesia are transforming neurosurgical practices, leading to improved patient safety, quicker recoveries, and higher satisfaction rates. As research and technology continue to evolve, the future of neuroanaesthesia looks promising, with even more ground-breaking innovations on the horizon.

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Author
Dr. M.S. Mohamed Salih
SR (DM) Neuroanaesthesiology and Critical Care
Dr. Gyanender Pal
Professor Neuroanaesthesia, AIIMS, New Delhi

THE PAEDIATRIC ERECTOR SPINAE PLANE BLOCK – POINTERS

The Erector Spinae Plane block (ESPB) is an efficient, safe and relatively easy technique and is used for wide range of surgeries from the thoracic region to abdominal and inguinal and lower Limb surgeries. ESPB was first described by Forero in 2016 for the treatment of thoracic neuropathic pain and it was applied on the paediatric population for post operative pain management as early as 2017.

Anatomy, technique and diffusion of the anaesthetic solution.

Accurate knowledge of paediatric anatomy and Anatomical differences between adult and paediatric patients are essential for a successful ESPB. The muscles, fascia and connective tissues under the skin are thinner and less rigid in paediatric patients. Thus, neonatal probe, shorter needle, and lower drug volume should be used. Moreover, infants have a C shaped spine and they develop secondary curvatures only when they begin to sit, stand or crawl. A child's spine has three centres of ossification in each vertebra; the distal end of the spinous process and
two transverse processes. The target of this fascial plane block is the erector spinae fascial plane which is a virtual space located under the erector spinae muscles that communicates with the para vertebral space where the dorsal rami of the spinal cord is located.

During sonography the high-frequency 7-13 MHz linear probe is placed at the midline of the spine with a transverse orientation to visualise the spinous process. Moving laterally the transverse process can be located. An out of plane or in plane approach can be used.

Structures are visualised from superficial to the deep locations are as follows; the trapezius, rhomboid and erector spinae muscles and the transverse process of the respective vertebra. The needle must be advanced to the tip of the transverse process at which point the LA is injected to hydro-dissect the plane deep to the erector spinae muscle.

Approaches

The ESP block can be administered either in the prone position, lateral decubitus position or Aksu approach in which an in-plane technique is used in the lateral decubitus position.
The local anaesthesia thus injected spreads through paravertebral space cranially and caudally to reach distant dermatomes.

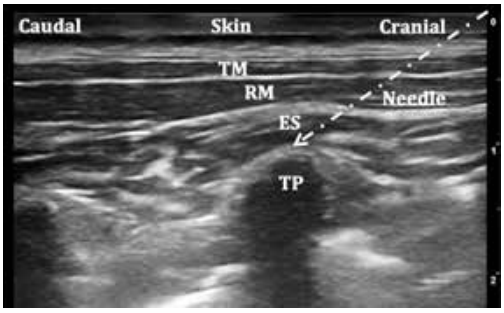

Figure 1: Ultrasound image of the classic approach to erector spinae plane block (ESPB)

TM: Trapezius muscle, RM: Rhomboid muscle, ES: Erector spinae, TP: Transverse process.

The mechanism of action of the ESP block is still not clearly understood. Presumably, the injection of a local anaesthetic agent in the fascial plane between the erector spinae muscle and the tips of the transverse processes anesthetizes neural structures passing within this space. The local anaesthetic agent then presumably spreads out of that space anteriorly and laterally to achieve general anaesthesia of the dorsal rami and ventral rami of the spinal nerves and the lateral cutaneous nerve branches. A single-injection ESP block can spread to at least 3 and maximum 8 spinal nerve territories. Thus, a single injection at the fourth or fifth spine process level is presumably sufficient to produce adequate anaesthesia for the anterior, lateral, and posterior chest wall.

Figure 2 – Aksu approach

ES – Erector Spinae, QL – Quadratus Lumborum, PM – Psoas Major, VB- vertebral Body, TP – Transverse Process

Advantages

Due to the cranio-caudal spread of ESPBs, it can be injected at a remote point from the vertebral level of the incision site and thus may be used when there is an incision site infection or else as an alternative to neuraxial anaesthesia in case of spinal deformities, previous spinal surgery or neuraxial spread of neoplastic disease.

ESPB catheters have also been successfully used when epidural and paravertebral catheters are not possible due to coagulopathy it is a superficial block and has easy compressibility in case of a hematoma formation. The ESPB are much safer than epidural anaesthesia in patients with heart defects due to their negligible hemodynamic impact. Moreover, analgesia in the perioperative period of an emergency laparotomy has been successfully provided by ESPB even in very low birth weight premature infants despite their small size. Reduction in the use of intraoperative and post operative analgesics has been demonstrated with ESPBs. Most of the paediatric ESPB described in literature are performed with 0.25% bupivacaine with volumes ranging from 0.3 to 0.6 millilitres per kg.

Adverse effects

Some minor adverse events such as catheter occlusion, displacement and unintentional removal has been reported. Few cases of bradycardia and LAST have also been reported. The potential complication is a pneumothorax. However, the risk is markedly reduced with the use of USG. More studies are needed to lay down clear protocols for ESPBs in paediatric population.

Auhor
Dr Vandana Saith
Lok Nayak Hospital, New Delhi

THE ENIGMA: WHY Anaesthesia RESIDENTS ARE DRAWN TO CRITICAL CARE!

Trainees, in order to advance their expertise, frequently find themselves deliberating over which path to pursue further amidst a multitude of opportunities. An earlier survey conducted among post graduate anaesthesiology students in India had showed that economic security and the intellectual stimulation/challenge it offered, prompted them to sub specialise in their respective field of interest (1). Recently, many anaesthesiology trainees have shown a strong preference for specializing in critical care medicine.

The polio epidemic of the early 1950s had contributed to the development of the first intensive care unit in the world. By the 1970s, critical care medicine had gained formal recognition as a distinct specialty, driven by advancements in medical technology, multidisciplinary collaboration, and the establishment of professional societies and training programs (2). With the advent of the influenza and SARS-CoV pandemics, the world has come to recognize the true potential of critical care medicine.

Critical care medicine is a comprehensive super-specialty that carries significant responsibility and demands compassion, at the same time immensely rewarding, especially when a sick intubated patient with multiple organ support systems return home. This field requires extensive knowledge, skill, experience, humility, a positive attitude, open-mindedness, clear communication, and a constant state of mental alertness and quick action.

When asked why they chose or would like to choose this field, everyone has a story or personal anecdote to share. When a dear loved one, be it their mother or be it the only earning member of their family end up in the ICU, it impacts not just the patient but also the entire family, affecting them physically, financially and psychologically. Personally, the opportunity to care for the sickest patients in the hospital and to use technology, evidence, and experience to try to save their lives often serves as the motivation to work in ICU. Many are drawn to the profession out of a deep sense of empathy and a desire to support patients and families through one of their most challenging times in their lives. To find ways to support them in all realms- Irrespective of the fact that we could save a patient's life or not , it is definitely a great privilege to care for their families during this incredibly difficult time in their lives.

Working in ICU each day gives a unique opportunity to work in a fun, fast-paced, inspiring and most importantly a collaborative environment, where everything we

do surely makes a difference to the patient outcome. Most importantly knowing when to take action and when to remain still is often the key to success. Sometimes, "masterly inactivity" can be the most effective approach, which very often comes naturally to anaesthesiologists. Individuals who enjoy the dynamic and sometimes unpredictable nature of critical care may find personal satisfaction in rising to the challenges it presents.

Anaesthesia residents are well-trained in procedural skills such as intubation, central line placement, and pain management, which are highly to the critical care settings. Unlike the episodic nature of anaesthesia in the operating room, critical care medicine allows for more continuous patient care and the opportunity to see the results of interventions over time. Each patient experience is different and you are ever evolving.

Critical Care Medicine has garnered growing admiration and awe due to the sophisticated technology and invasive procedures we use to save the lives of our patients. Where else in the hospital can one be introduced to new concepts such as ventilators, electrical impedance tomography, advanced hemodynamic monitoring, Swan Ganz catheters, intra-aortic balloon pumps, parenteral nutrition, extracorporeal support systems such as continuous venovenous haemofiltration (CVVH) and percutaneous tracheostomy. Nowhere else in medicine will you see such vivid demonstrations of the principles of physiology on a daily basis than in the ICU. You will see the extremes of physiology, captured in front of your eyes through the many monitoring modalities.

An intensivist always has the big picture thinking- having to consider the complex interplay between all the organ systems. This represents the pinnacle of patient care, requiring a holistic perspective to fully understand the situation. Life-changing decisions must be made for, and with, patients – often without the ability to ask the patient for their preference. Comprehensive communication and quick-thinking skills are required to manage difficult decisions, and the satisfaction that comes from this process helps enjoy our career. Critical care medicine offers a multidisciplinary approach, combining elements from various specialties, which can be intellectually stimulating and provide a broad scope of practice.

One essential quality for ensuring a good outcome is that of critical observation,

an innate ability that every anaesthesiologist ought to possess. By identifying potential complications before they arise, we can provide timely interventions, leading to smoother recoveries for patients. While the skill of critical observation develops with experience, maintaining a keen eye for detail and spotting potential issues requires curiosity, patience, and profound knowledge.

Critical care medicine offers extensive opportunities for ongoing education, research, and professional development, which can be attractive to those committed to lifelong learning. Even the most routine ICU case will have its challenges, and this means you will never be bored.In intensive care, even the most experienced specialist are often faced with challenges. So,if you are after a job where you need to be constantly chasing higher standards, intensive care medicine is the path for you.

An intensivist witnesses many deaths—almost daily—which can be challenging. Doing the job right means forming connections with patients and their families, and each loss brings a measure of grief. Through this process, you gain deeper self-awareness, learn to empathize, and probably that may even expose a vulnerable side of yourself to colleagues and loved ones. There is no better way to shape your formative years.

Remuneration in critical care may be equivalent or better than working in the OR, but usually at the cost of longer working hours. Although the specialty can be demanding, some critical care settings offer shift-based work, which can allow for more predictable time off compared to other medical fields. To conclude, a career in critical care medicine can be highly rewarding for those who are passionate about complex medical care, continuous learning, and making a significant impact on patient lives. It offers a unique blend of professional challenges and personal fulfilment, attracting individuals who are dedicated, compassionate, and resilient. The branch of critical care medicine is now recognized as a 3-year super-specialty DM course by the NMC and Doctorate of National Board by the Diplomate of National Board in India.

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Author
Dr. Bhavana Kayarat
AIIMS, New Delhi

CRRT (CONTINUOUS RENAL REPLACEMENT THERAPY): BASICS IN A NUTSHELL!

Acute Kidney Injury (AKI) occurs in 35% to 65% of intensive care unit (ICU) admissions and 5% to 20% of general hospital admissions. Increases in the severity of AKI are associated with a stepwise increase in risk of death and need for renal replacement therapy (RRT). The main causes of ARF include shock, sepsis, perfusion disturbances and hypoxia. Continuous renal replacement therapy (CRRT) is a form of renal replacement therapy that is used in modern intensive care units (ICUs) to help manage acute kidney injury (AKI), end stage kidney disease (ESKD), poisonings, and some electrolyte disorders. CRRT is any extracorporeal blood purification therapy that aims to substitute kidney function over an extended period of time. CRRT forms the mainstay of replacement therapy in critically ill patients who often cannot tolerate standard hemodialysis because of hemodynamic instability.

It ensures better hemodynamic stability, lesser transcellular solute shifts, and better tolerance, for fluid removal than intermittent extracorporeal modalities. Prescription is usually reviewed every 24 hour or as frequently as required, depending on patient needs. Among critically ill patients with acute kidney injury being treated with continuous venovenous hemodiafiltration, net ultrafiltration rates greater than 1.75 mL/kg/h were associated with increased mortality. The Kidney Disease Improving Global Outcomes (KDIGO) work group defines acute kidney injury (AKI) as an increase in serum creatinine by 0.3 mg/dL or more (≥26.5 mmol/L) within 48 hours, an increase in serum creatinine to 1.5 times baseline or more, which is known or presumed to have occurred within the prior 7 days, or urine volume less than 0.5 mL/kg/h for 6 hours.

RIFLE (risk, injury, failure, loss, end-stage kidney disease [ESRD]) criteria developed by the acute dialysis quality initiative and acute kidney injury network (AKIN) and developed by an international network of AKI researchers were used to define AKI and its severity. The idea for CRRT was born in 1960 but supplies and technology were not available. In 1970s, Henderson played an important role in the technical groundwork for hemofiltration, isolated ultrafiltration (UF) and use of convection for solute removal. In 1977, first description of an arteriovenous hemofiltration technique was demonstrated by Kramer and colleagues in Göttingen, Germany. In 1979, continuous venous–venous hemofiltration (CVVH) was first used in ARF after cardiac surgery in Cologne, Germany. Solute transport occurs mainly by two phenomena: convection and diffusion. The only mechanism that determines fluid transport across semipermeable membranes is

ultrafiltration. In addition, adsorption influences solute removal and the two former processes. Sieving Coefficient (SC) refers to the ability of a substance to pass through the membrane from the blood to the ultrafiltration compartment. A SC of 1 will allow free passage, while a SC of 0 will not allow a substance to pass.

The following are the mechanisms of solute and fluid transport important in CRRT:

1. Ultrafiltration is the phenomenon of transport of plasma water (solvent) through a semipermeable membrane driven by a pressure gradient between blood and dialysate/ultrafiltrate compartments.
Quantitatively, the ultrafiltration is defined by the ultrafiltration rate:
QUF =KUF TMP, where QUF is Ultrafiltration flow rate, KUF is Filtration Coefficient, and TMP is Transmembrane Pressure.

2. Convection is the process by which solutes pass through the membrane pores dragged by fluid movement (ultrafiltration) caused by a hydrostatic or osmotic transmembrane pressure gradient. Compared with diffusive transport, convective transport permits the removal of higher molecular weight solutes than diffusive transport.

3. Diffusion is a process during which molecules move across a membrane in all directions. Statistically, this movement results in the passage of solutes from a more concentrated to a less concentrated area until equilibrium concentration between the two sites is reached. The concentration gradient (C1 – C2 = dc) is the driving force and follows “Fick’s Law of Diffusion”.

4. Adsorption is an extracorporeal process during which hydrophobic compounds in plasma or blood (in particular, peptides and proteins) bind to the membrane structure or to other adsorbed substances such as charcoal, resins, gels, proteins, or monoclonal antibodies.

The following are the modalities of Extra-Corporeal RRT:

1. Hemodialysis: HD involves the use of a hemodialyzer, in which blood and an appropriate dialysate solution circulate countercurrent or co-current. The main mechanism of solute removal in hemodialysis (HD) is diffusion, which is

especially effective in the removal of small solutes.

2. Hemofiltration: This is an exclusively ultrafiltration/convection treatment during which no dialysis fluid is used. Infusion of a sterile solution into the blood circuit replaces the reduced plasma volume and reduces the solute concentration. Infusion of a sterile solution (replacement fluid) can replace the filtered volume totally or partially.

3. Hemodiafiltration: It combines both HD and hemofiltration whereby the mecha- nisms involved in solute removal are both diffusive and convective. Dialysate flow configuration can be countercurrent or cocurrent.

4. Isolated ultra-filtration: The main goal of ultrafiltration is to remove fluid by convection using highly permeable membranes without volume replacement. Ultrafiltration removes solutes in terms of mass, rather than concentration. As a result of "solvent drag," small solutes are removed minimally, and the concentration of these small solutes in the ultrafiltrate is equal to that of plasma.

5. Hemoperfusion: Blood circulates through a column containing specific sorbents; adsorption is the only removal mechanism. Usually combined with other modalities, hemoperfusion is used to remove specific lipid-soluble substances, toxins, or poisons for which the device is produced to remove, including, for example, certain bacterial toxins or cytokines in sepsis, uremic toxins, mediators of hepatic encephalopathy, or abnormal proteins in dialysis-related amyloidosis.

The following are the major goals of CRRT in the ICU:

1. Maintenance of fluid, solute, electrolyte & acid base homeostasis Prevention of further deterioration renal function
2. Improving hemodynamics
3. Modulation of sepsis mediators
4. Clearance of drugs & toxins Organ recovery
5. Nutrition support

The various techniques of CRRT may differ in terms of vascular access and extracorporeal circuit design, frequency, and intensity of treatment, predominant mechanism of transport used, and type of membrane, including the following:

1. SCUF (slow continuous ultra-filtration): The objective is to achieve volume control in patients with severe, diuretic- resistant volume overload. The ultrafiltrated fluid is not replaced by replacement solution. Ultrafiltration rates typically employed in SCUF (<10 ml/min) are significantly less than those in hemofiltration, which may be 40 ml/min or higher.

2. CVVH (continuous veno-venous hemofiltration): The removal methods used are ultrafiltration, convection and adsorption. It is aimed at the clearance of middle to large molecules. The ultrafiltrated fluid is collected in the effluent bag. Hemofiltration is based on the mechanism of convection, which involves the mass transfer of solutes in association with ultrafiltered plasma water ("solvent drag"). The primary rationale for the use of CVVH is to achieve an extended molecular weight spectrum of solute removal. Replacement fluids play an integral part in the delivery of CVVH (and CVVHDF), which can be delivered to the extracorporeal circuit either before the filter ("pre-dilution") or after the filter ("post-dilution"). Pre-dilution reduces the risk of filter clotting by diluting the blood entering the filter, reducing the haemoconcentration. However, the dilution of blood entering the filter reduces the clearance efficiency. Post-dilution does not dilute the blood entering the filter, so is efficient in solute removal. However, there is an increased risk of filter clotting at higher UF rates, especially when the blood flow rate is low. Adsorption may occur with molecules that would normally be too big to pass through the membrane.

3. CVVHD (continuous veno-venous hemodialyis): CVVHD is characterized by slow counter-current dialysate flow into the ultrafiltrate/dialysate compartment of the dialyzer. The prevalent mechanism of solute transport in this technique is diffusion, with the prescribed ultrafiltration rate targeted to achieve the patient's desired fluid balance (i.e., without requirement of replacement fluids). The process of dialysis removes small molecular-weight solutes such as urea, creatinine and potassium. No replacement solution is required. Although solute removal in CVVHD is limited by slow dialysate-side mass transfer, membrane surface area (filter surface areas of 1m2 or higher) is also important, especially as dialysate flow rate increases.

4. CVVHDF (continuous veno-venous hemodiafiltration): CVVHDF operates combining the principles of hemodialysis and hemofiltration. Dialysate is circulated countercurrent to blood, and ultrafiltration is obtained in excess of the desired net fluid loss from the patient. The ultrafiltrate is replaced to some extent with reinfusion fluid, either in pre-dilution or post-dilution mode. The removal methods used are dialysis, ultrafiltration, convection and adsorption. For a specific solute, the balance between diffusive and convective solute removal is dictated by the specific set of CVVHDF operating conditions, namely blood flow rate, dialysate flow rate, ultrafiltration rate, and filter type.

SUMMARY

	SCUF	CVVH	CVVHD	CVVHDF
Blood Pump	Yes	Yes	Yes	Yes
Effluent Pump	Yes	Yes	Yes	Yes
Dialysate Pump	No	No	Yes	Yes
Replacement Pump	No	Yes	No	Yes
Principle Transport Mechanism	Ultrafiltration	Ultrafiltration Convection Adsorption	Dialysis	Ultrafiltration Convection Adsorption Dialysis

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Author:
Dr Uma Hariharan
ABVIMS & Dr RML Hospital New Delhi

CHILDREN WITH CHD UNDERGOING URETHROPLASTY

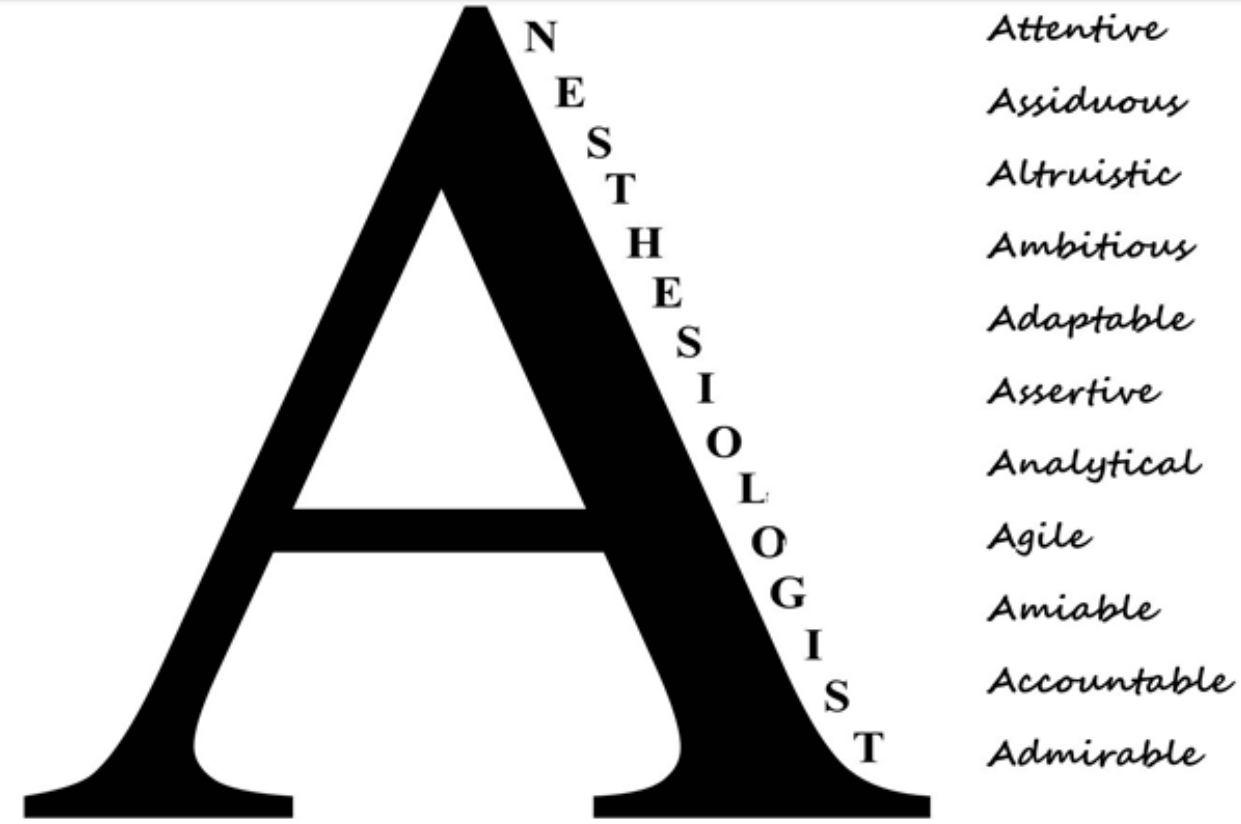
1. How are Congenital heart disease classified using physiologic approach?
2. Risk Stratification of patients with CHD undergoing non cardiac surgeries.
3. How to do children with CHD present clinically and the what is the age of presentation with each CHD?
4. How do you classify ASD and VSD? In what size of defect of each condition warrant surgical closure?
5. In what all condition of CHD is infective endocarditis prophylaxis indicated
6. Effect of IV induction agents and inhalational agents on SVR, PVR, HR and contractility
7. What are the factors affecting pulmonary and systemic vascular resistance?
8. What are long term sequelae of CHD?
9. What are the genetic condition that are associated with CHD?
10. What are the pathophysiological consequence of right to left shunt and left to right shunt?
11. What are the components in tetralogy of fallot and the compensatory mechanism seen in patients with TOF and what is pentology of fallot and pink TOF?
12. What are the non-cardiac complication seen with patients with TOF?
13. What are the palliative shunt surgeries done in patient with TOF?
14. How do you pre-operatively evaluate a patient with palliative shunt with TOF for urethroplasty and what all investigations are required?
15. What are the changes expected in CXR and 12 lead ECG in patient with TOF?
16. What is the indication of beta-blocker in patients with TOF?
17. The role of iron supplementation in children with TOF?
18. What is the role of premedication and pre-op hydration in children with CHD especially in condition with Right -left shunt?
19. What are tet spells and how do you manage intra-op tet spells?
20. What is Eisenmenger syndrome/physiology?
21. How do you induce a child with uncorrected TOF for non-cardiac surgery and why is inhalational induction slower in condition with left –right shunt?
22. What are the cardiac goals (cardiac grid) to be maintained in the intra-op period in children with TOF?
23. How to evaluate a child with ASD/VSD pre-operatively for non-cardiac surgeries?
24. Why is strict bubble precaution or de-airing of fluids required in patients with ASD, VSD or PDA?
25. What are the cardiac goals (cardiac grid) to be maintained in the intra-op period in children with right-left shunt?
26. Peri-operative fluid management in patients with large VSD posted for urethroplasty
27. What are the technique of regional anaesthesia that can be used in urethroplasty?
28. What is the analgesia plan for patients with TOF undergoing urethroplasty?

Author
Dr. Saira Susan Mathew
AIIMS, New Delhi

ANESTHESIOLOGIST:
A PHYSICIAN WITH AN 'A' GAME

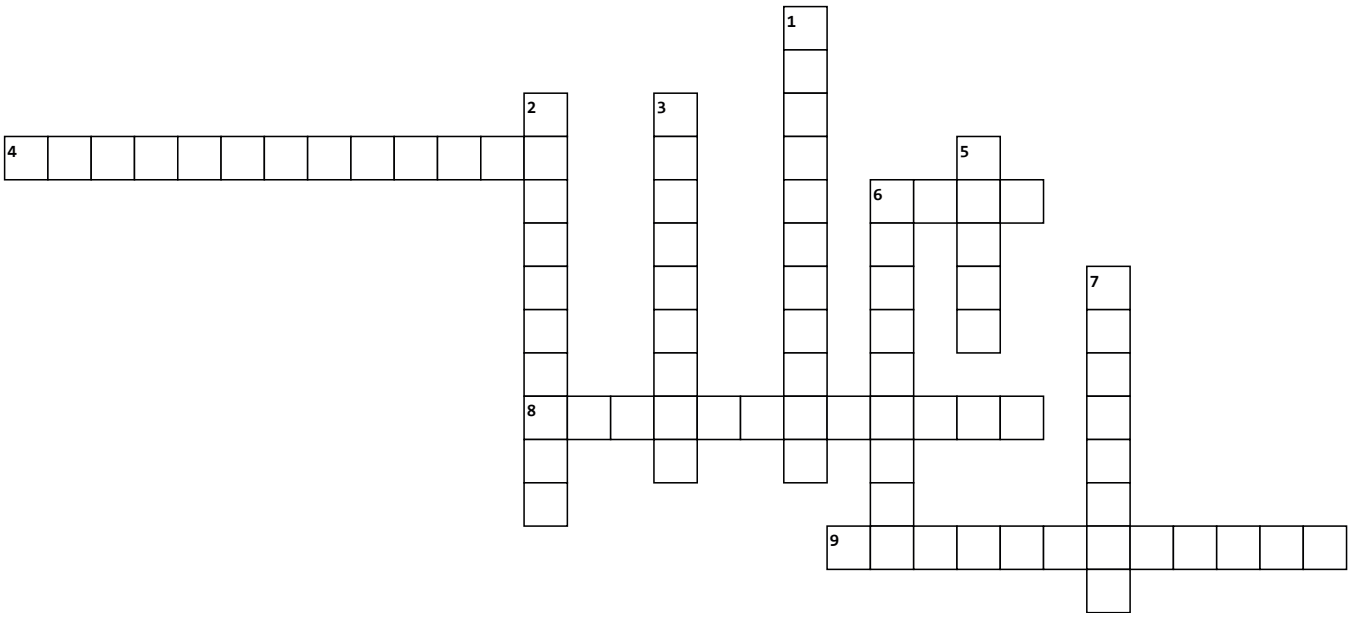
Anesthesiology, or more commonly referred as 'Anaesthesia' by some, pretty much comes a full circle, starting and ending with the alphabet 'A', where an illustration is subsequently presented to impress upon the 'A'ttributes of an anesthesiologist as a physician bestowed with the top notch 'A' listed qualities, working endlessly and tirelessly for ensuring improved perioperative outcomes, thereby contributing significantly to the health care system, at large.

#Proud to be an Anesthesiologist, the Wonderful Clinician!



Author:
Dr Rohan Magoon
ABVIMS and Dr RML Hospital, New Delhi

CROSSWORD



Across

4. semisynthetic derivative of morphine used in management of chronic pain

6. project by RCOA which commonly examines events related to anaesthesia and surgery which affect a large number of patients

8. chemical pacemaker

9. twisting of the point about isoelectric axis

Down

1. devil's breath, treatment of PONV and motion sickness

2. medication used for parkinson's treatment that causes increased risk of hypertensive crisis

3. rate of myocardial relaxation

5. classic approach of sciatic nerve block

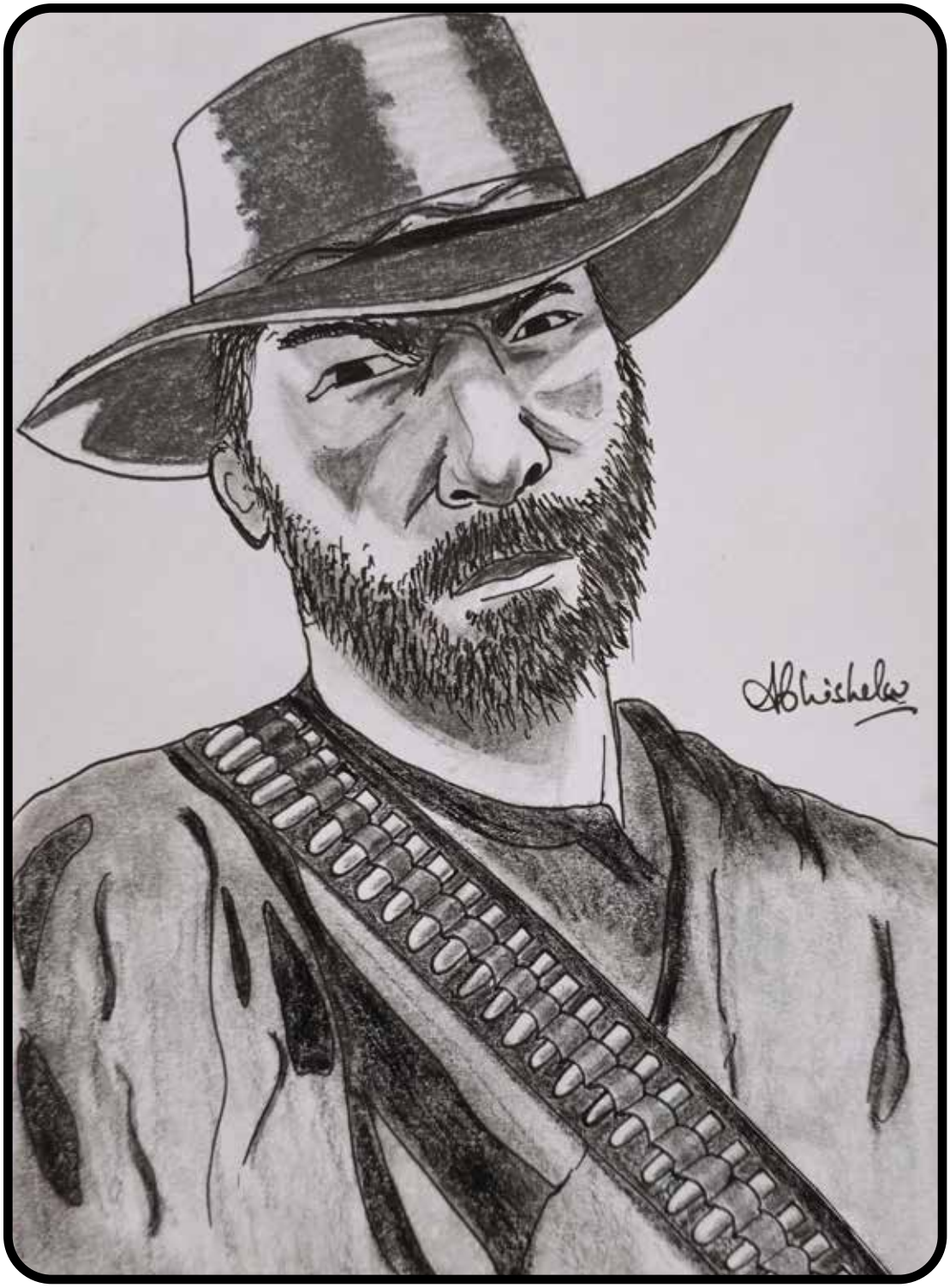
6. common drug for long term treatment of asthma & exercise-induced asthma

7. ester linked local anaesthetic used commonly in dentistry

Author
Dr. Anjalee Krishna
AIIMS Delhi

Entries to be sent at isadelhisecretariat@gmail.com and dramitkohli@yahoo.com by **18th August 2024**

WHEN SURGEON ASKS FOR A SMALL CASE AT 4:45 PM!



Dr. Abhishek Nagarajappa
AIIMS, New Delhi

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)

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Organising Secretary
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Dr. Abhijit Kumar
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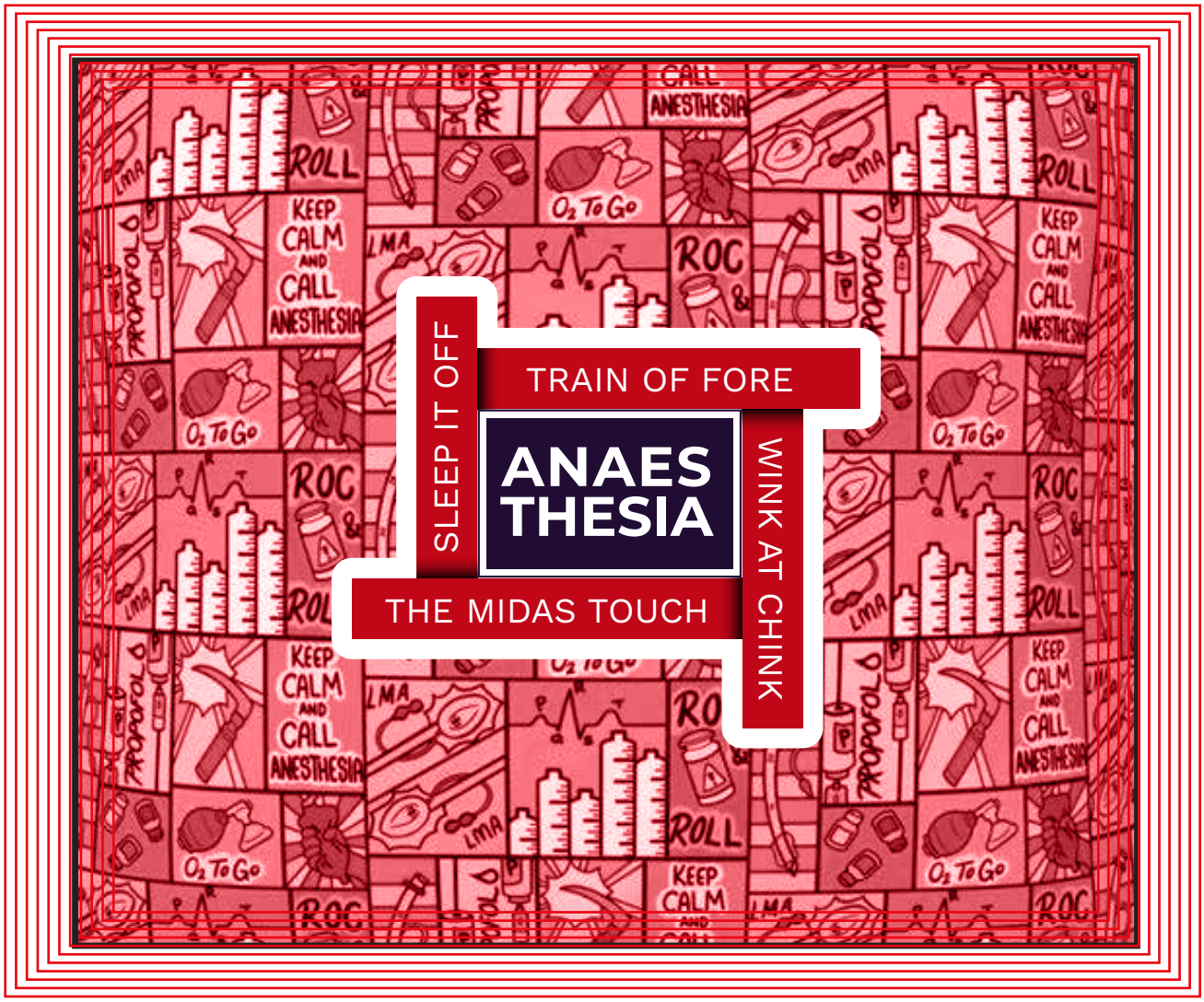

ISA Delhi Secretariat
Room no 415, BL Taneja Block Department of Anaesthesia & Intensive Care,
Maulana Azad Medical College, New Delhi-110002
Email: isadelhisecretariat@gmail.com | **Website:** www.isawebdelhi.in