INDIAN ASSOCIATION OF PAEDIATRIC ANAESTHESIOLOGISTS
IAPA
Founded in 2006

IAPA NEWSLETTER

by Indian Association of Paediatric Anaesthesiologists

February 2017

IAPA Fellowships for students

Accredited Institutions are GKNM Hospital, Coimbatore, Rainbow Hospitals, Hyderabad and Bangalore

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FROM THE SECRETARY'S DESK

Dr. M Subrahmanyam
Secretary, IAPA
Hyderabad

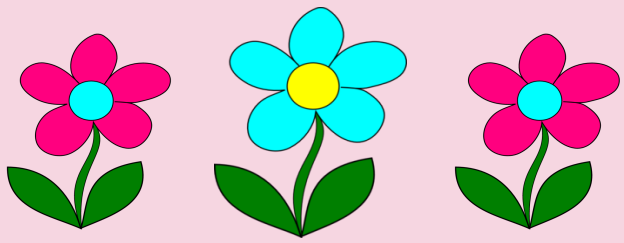
The current office bearers of the IAPA assumed office after the Chandigarh conference in February 2015. One of the initial challenges for me and Dr. Vibha our Treasurer, was to sort out financial issues mainly, opening a bank account and transferring funds from Bangalore! With great difficulty, an account was opened in Yes Bank, Hyderabad, in which we get 6% interest. We have also successfully filed income tax returns up to date till March 31st 2016. We shall now file tax returns on a regular basis.

The new executive committee decided that we should meet more often than at the annual conference and thus the 'Mid-term meetings' were started. The first was held in Hyderabad in August 2015 and the next in Mumbai in August 2016. Some of the achievements of the current executive are:

- We have completely revamped the IAPA web site. All relevant material is placed online, including the constitution of the IAPA. The members list is also online. There is now an integrated payment gateway for those wanting to register online.
- A newsletter was started under the leadership of: Dr. Elsa and Dr. Vibha. The first newsletter was released at the Vellore conference, the next in Mumbai at the mid-term meeting with CME and this third is due to be released in Lucknow in February 2017. The soft copies of each are also available online.
- Our memberships have increased from 277 in March 2015 to 352 as on January 2017. All addresses and contact details of members have been updated and ID cards issued. A constant communication is being maintained with all members.
- Fellowships have been started in Paediatric Anaesthesia under the IAPA. There are guidelines for institutions wanting to offer these fellowships and also recruitment norms and procedures, available online. Two batches have successfully completed fellowships from Rainbow Hospitals, Hyderabad and GKNM Hospitals, Coimbatore. A new branch of 'Rainbow Hospital' has started the programme this year at Marathalli, Bangalore.
- A Guidelines sub-committee, under the leadership of Prof Dr. Neerja Bhardwaj, has brought out two guidelines: a) Preoperative fasting guidelines in paediatric patients and b) Guidelines for minimal mandatory monitoring in paediatric anaesthesia. These are being released at the IAPA Lucknow Conference.
- The executive has taken a decision that seniors already with experience shall be awarded a 'Fellowship in Paediatric Anaesthesia', subject to fulfilling the norms laid down by the sub-committee headed by the President Dr. Pradnya Sawant. This award of fellowships is only till the end of this calendar year, to enable the teachers to have a fellowship.
- At the start of our tenure in March 2015, the bank balance of IAPA was Rs. 12,75,000 (money transferred from Bangalore) and it is now Rs. 21,75,000 (which includes the monies received from the Goa and Vellore Conferences of the IAPA).
- Rules were framed for the conduct of conferences and are available on the web site.

We finally invite you all to the 10th annual conference of IAPA in Hyderabad on 10th and 11th February 2018.

Warm Regards
Dr. M Subrahmanyam



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SPECIAL ARTICLE

Anaesthesia for Day Care Surgery in the Paediatric Patient

Dr. Snehalata Dhayagude
Bombay Hospital, Mumbai

Introduction

The popularity of day care surgery under anaesthesia in children can be attributed to the minimal morbidity due to advances in the field of anaesthesia and surgical techniques. However, it is essential to adhere to strict selection criteria for patients and surgical procedures as safety should never be compromised in the name of "Fast tracking and cost containment".

Dr. James H. Nicoll, a surgeon from Glasgow first presented and published his 10 years experience of 8988 operations as day care procedures in 1909.[1] Although it has been in practice from the days of Crawford Long, who used open ether technique in 1842 for short procedures in his clinic,[2] the last three decades have seen an increasing number of surgical procedures under anaesthesia being carried out on a day care basis. The success of these is mainly contributed by availability of safe, short acting anaesthetic drugs, monitoring devices and the knowledge of physiology and pharmacodynamics, pharmacokinetics of anaesthetic agents in children.

Selection of patient

It is advisable to operate on children with physical status of ASA grade I and II. ASA physical status III may be considered only if the child is stable and well controlled for any pre-existing medical condition for at least 3 months prior to surgery.[3] The morbidly obese child (BMI >40 kg/m^2) may be considered if adequate precautions are taken and if appropriate facilities exist.[4]

Special risk factors and exclusion criteria

Upper respiratory infection (URI) - Children with URI are at risk for perioperative respiratory adverse events. Children with constant runny nose, wet cough, wheezing, rales, malaise and high fever should be excluded for planned surgery under anaesthesia. Waiting for 4 weeks after URI, provides an adequate clinical safety margin.[5] Peri-operative respiratory adverse events are more likely in the presence of underlying respiratory problems such as asthma, prematurity associated chronic lung disease and passive smoking.[6] Preoperative medication with salbutamol in children with recent URI has decreased the incidence of laryngospasm, bronchospasm, oxygen desaturation and severe coughing.

Previous studies have shown:

- Children less than one year of age have increased risk of respiratory adverse events intra and post- operative period
- Symptomatic infants with URI have decreased time to desaturation during apnoea
- Endotracheal intubation has been major risk factor for hypoxemia, bronchospasm, atelectasis in children with URI[7]
- Temporary airway hyper reactivity is known to exist for 6 weeks after viral infection
- High incidence of adverse events in children undergoing airway surgery- *e.g.* tonsillectomy, adenoidectomy, laryngoscopy, bronchoscopy
- Risk for bronchospasm is 10-fold higher in children exposed to tobacco smoke

Advantages of Day Care Procedures

- Minimal separation of child from parents
- Early return of child to comfortable and familiar surroundings
- Diminished risk of nosocomial infections
- Financial benefits for the family
- Shorter surgical waiting lists with increased turnover of patients
- Cost reductions for the hospital
- More beds and personnel available for hospitalized patients
- Anaesthesia for day care surgery demands the highest standard of professional skill and organization. Appropriate patient selection is critical to the success of day care surgery.

Crossword answers

ACROSS
7. Paracetamol
9. Anaphylaxis
11. Hereditary
13. Sunset
14. Sevoflurane
15. Dantrolene
16. Syndactyly
19. Atropine

DOWN
1. Ketamine
2. Fracture
3. Sodium
4. Caudal
5. Croup
6. Cyanosis
8. Craniosynostosis
10. Wheeze
12. PDA
17. Cole
20. Omega

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Asthma - Children with poorly controlled asthma, or with URI or lower respiratory infection are not for day care surgery. Children with well controlled asthma without any symptoms can be considered however, their routine medication should be continued.

Apnoea risk in infants - Premature infants are at increased risk of respiratory and cardiovascular complications.[8] Associated factors which increase the risk of apnoea in premature infants include gestational age <55-60 weeks, growth and development, anaemia, bronchopulmonary dysplasia, subglottic stenosis, residual lung disease, heart disease, endocrine or metabolic diseases. Peri-operative complications such as hypoxia, hypoglycaemia, hypocalcaemia, hypothermia, sepsis also increase the risk of apnoea.[9]

Sudden infant death syndrome (SIDS) - The history of SIDS in the family or other siblings is a contraindication to day care surgery in the infant <60 weeks post conceptual age (PCA).

Sleep apnoea and tonsillectomy - Overnight admission is advisable for monitoring after tonsillectomy in children <3 years of age with obstructive sleep apnoea. They have increased sensitivity to opiods.[10]

Heart condition - Children with heart murmurs should be investigated prior to surgery. Functional murmurs require no special precautions. Children with asymptomatic congenital heart disease (*e.g.*, small ventricular septal defect) or full anatomic repair with good cardiac function can be considered for day care surgery. Prophylactic antibiotic therapy should be given as per guidelines.[11]

Seizures - Children with history of seizures can be considered for day care surgery as long as their condition is well controlled and stable and medication is continued in the peri-operative period.

Mentally challenged children - *e.g.,* Autism. Stable autistic children without any associated pathological condition are eligible for day care surgery.

Diabetes Mellitus - Children with diabetes are not suitable for outpatient surgery.

Sickle cell disease - Children with sickle cell disease under a hematologist's care should be treated as inpatients. Children with only sickle cell trait carry a smaller risk as long as meticulous attention is given to their hydration, oxygenation, and temperature control. The use of surgical tourniquet is controversial, but should probably be avoided.[12]

Syndromic babies - They are excluded from day care surgery as they may have metabolic disorders and a difficult airway.

Undiagnosed hypotonia - These children need special peri-operative care, so they are excluded. A trigger free anaesthetic technique is necessary when anaesthetising these patients. These children are at risk of developing malignant hyperthermia.[13] Peri-operative hyperkalaemic cardiac arrest and rhabdomyolysis is a recognized risk of succinylcholine administration in patients with muscular dystrophy.

Malignant hyperthermia (MH) - With the advent of improved and short acting intravenous anaesthetic drugs, the MH susceptible patients are suitable candidates for day care surgery. However, it is important to avoid the triggering factors.[14]

Procedures commonly performed as day care-

General surgery - Circumcision, hernia repair, orchidopexy, excision of lumps, incision and drainage of abscesses, tongue tie release, distal hypospadias repair, cystoscopy

Ear, Nose, Throat - Tonsillectomy, adenoidectomy, myringotomy, tube insertion, closed reduction of nasal bone fracture

Dental - Extraction of teeth, restoration

Ophthalmology - Examination under anaesthesia, lacrimal duct probing, strabismus repair, trabeculectomy, excision of chalazion or cyst

Plastic surgery - Otoplasty, cleft lip repair, tissue expander placement, scar revision, surgery for syndactyly, polydactyly

Diagnostic and therapeutic procedures - Laryngoscopy, tracheo-bronchoscopy, oesophagoscopy, gastroscopy, colonoscopy, imaging studies (CT, MRI), radiation therapy, cardiac catheterization

Orthopaedic procedures - Closed reduction of fractures, arthroscopy, cast changes, removal of pins and plates

Above mentioned surgical and diagnostic procedures involve minimal or no physiological disturbances such as major fluid shifts or blood loss. There is minimal risk of anaesthetic and surgical complications and simple nursing care required can be taken by parents. There is no major restriction on child's activities and the child may require only oral analgesics and antibiotics.

Preoperative Evaluation

These children are often under the care of a paediatrician and undergo screening by the surgeon. However, a detailed check up by the anaesthesiologist on the day of surgery is imperative. Fasting guidelines should be clearly explained (***Table 1***). The basic screening laboratory investigations include complete

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Table 1 Fasting guidelines

Ingested material	Minimum fasting period
Clear liquids: water, fruit juices without pulp	2 hours
Breast milk	3-4 hours
Infant formula milk, non-human milk	6 hours
Light meal: toast, cereal, liquids	6 hours
Full meal with fried food	Minimum 8 hours

blood count, Prothrombin time, PTT, INR (for suspected bleeding disorders). In addition, HIV and HbsAg testing may be asked for as per hospital protocols. Routine urine analysis need not be performed on healthy children.[15]

Premedication

Sedative premedication helps in reducing preoperative anxiety, postoperative recall, and easier separation from parents. Oral midazolam in the dose of 0.5 mg/kg is commonly administered at least 15-20 minutes before planned induction.[16] Other medication which can be used in conjunction with midazolam or alone is ketamine. It can be given orally in the dose of 5-6 mg/kg alone or in reduced dose 3 mg/kg with midazolam. The combination is useful in exceptionally anxious, uncooperative child.[17] Painless venepuncture can be facilitated by prior application of EMLA cream. Non-pharmacological anxiolysis can be achieved to some extent by parental presence during induction, music, video game, humor and distraction.

Important guidelines:

- Day care surgical procedures in any child require the same basic equipment as inpatient procedures for delivery of anaesthetic drugs, monitoring and resuscitation. Perioperative standard monitoring should include an ECG, non-invasive blood pressure, pulse oximeter and capnograph.
- Inhalational induction is widely used in children and the most suitable agents being sevoflurane and halothane (if sevoflurane unavailable).[18] Sevoflurane is preferred for haemodynamic stability and quicker recovery. Halothane at higher concentration may produce bradycardia and myocardial depression which can be avoided by administering atropine. Isoflurane is not tolerated due to its pungent smell and desflurane is not preferred for its irritant property.
- Intravenous (IV) induction is the ideal choice in children with an IV cannula in situ. Intravenous propofol is the preferred induction agent over thiopentone for its rapid action, quicker smooth recovery due to shorter half-life and antiemetic property.[19] The pain on injection with propofol can be minimized by giving lignocaine 1 mg/kg IV prior or mixing with propofol.[20]
- Maintenance of anaesthesia can be carried out by using a short acting IV or inhalational agents in titrated concentration, analgesics and muscle relaxants when appropriate. For total IV anaesthesia, propofol can be used as an infusion with the rate of 300-500 µg/kg/min. Propofol when used for imaging procedures or other painless procedures, a dose of 100 µg/kg/min effectively prevents children from moving.[21] Analgesics, commonly used include fentanyl or remifentanil. Intermediate acting muscle relaxant (NMB) such as atracurium is more popular as its elimination does not depend on the function of liver or kidney. Mivacurium or cisatracurium can also be used. Whenever muscle relaxant is used, the adequacy of reversal must be ensured before shifting the patient to recovery area.
- Airway management- there are numerous options which include conventional mask for short procedures, supraglottic airway device (SGD), or endotracheal tube (ETT) for longer procedures. ETT or SGD can be introduced under deep anaesthesia with propofol or sevoflurane and fentanyl without the use of NMB, but requires skillful judgement of anaesthetic depth. This eliminates the need for reversal of NMB. SGD causes less laryngeal irritation than ETT and can be placed without visualization of airway.[22]
- Regional anaesthesia (RA) is almost always carried out in combination with general anaesthesia or adequate sedation. RA provides intraoperative and postoperative analgesia and also helps in reducing the depth of anaesthesia, thus speeding recovery.
- Commonly performed nerve blocks are, caudal block for surgery below umbilicus, penile block for circumcision, ilioinguinal and iliohypogastric nerve blocks for herniotomy, brachial plexus block for surgery on upper limb, sciatic and femoral or three in one blocks for lower limb surgery. Strict attention to the aseptic technique and limits of local anaesthetic (LA) dose must be observed with any block and intermittent aspiration and injection of injection of LA to avoid intravascular injection. Additional margin of safety may be gained by using less toxic levo-bupivacaine or ropivacaine instead of regular

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bupivacaine.[23] Field block or local infiltration of incision site with LA alleviates postoperative pain.

- Fluids - It is essential to provide adequate IV hydration not only to correct fluid deficit as a result of fasting, but also fluid for maintenance, intraoperative loss and cushion for postoperative period. Isotonic fluid such as Ringer's lactate with the addition of dextrose 25% 25-50 mL should be administered and IV catheter retained till the child can take oral feeds.
- Postoperative analgesia is often achieved by a non-opioid drug regimen. Keterolac, a parenterally administered NSAID has been shown to have advantages over opioids. Most of the children receive RA and analgesia provided by RA gets continued in the immediate postoperative period. As multimodal therapy for pain, rectal medication with diclofenac 1-2 mg/kg or paracetamol 20-40 mg/kg suppositories are excellent options. Paracetamol can be given orally in the dose of 10-15mg/kg every 4-6 hours after child starts oral feed and it can be continued for 3-4 days after discharge.
- Emergence delirium may be decreased with a single IV dose of dexmedetomidine 0.5 µg/kg given slowly, 5 minutes before the end of surgery. This facilitates smoother transition to recovery area.[24]

Complications

Major complications are rare in children after day care surgery under anaesthesia. Minor complications if any, are transient and can be managed before discharge.

- If inadequately treated, pain can have long-lasting psychological disturbances in children.
- Postoperative nausea and vomiting (PONV) can be very distressing to the child and parents. The use of volatile agents, opioids, nitrous oxide and cholinergic drugs for the reversal of NMB increase the risk of PONV. This complication can even warrant hospitalization again.[25] Ondansetron in the dose of 0.1 mg/kg IV is the commonly administered prophylactic antiemetic. Dexamethasone in the dose of 0.15 mg/kg IV during anaesthesia markedly decreases vomiting in children after tonsillectomy.[26] Croup or laryngeal spasm begins usually immediately after extubation or within 2-3 hours after extubation. Humidified oxygen is often sufficient as treatment. For more severe cases, racemic epinephrine (0.5 mL diluted in saline 4.5 mL) is nebulized via a face mask.
- Excessive somnolence can be due to sedative or opioid drug errors, or unusual sensitivity to inhaled anaesthetics and drug interactions.

Discharge criteria (Table 2)

Following surgery and emergence from anaesthesia patients are shifted to recovery area. Monitoring of vital parameters is continued in the recovery area till the time patients are awake or in light sleep but comfortable. Later patients are shifted to day care ward. They are discharged home only when patients can ambulate appropriate for their age, drink fluids and void urine.

Post discharge instructions

The child should be accompanied home by the parents or a responsible person. Written instructions should be given about medication for pain, antibiotics, nursing care and what to expect. Parents should be provided with telephone numbers of the surgeon, anaesthesiologist and hospital for any emergency.

Summary

To achieve efficiency and safety in day care surgery and other procedures in children, a systematic approach to organization and offering appropriate facilities, proper communication between surgeon, anaesthesiologist and hospital staff involved are required. Careful case selection, both on the basis of child's clinical condition and type of surgical procedure is critical in ensuring the success of day care surgery and parents' satisfaction.

Table 2. Post anaesthesia discharge scoring [27]

Vital signs	
• Within 20% of preoperative baseline	2
• 20-40% of preoperative baseline	1
• 40% of preoperative baseline	0
Activity level	
• Steady gait, no dizziness, consistent with preoperative level	2
• Requires assistance	1
• Unable to ambulate / assess	0
Nausea and vomiting	
• Minimal or mild: no treatment needed	2
• Moderate: treatment effective	1
• Severe: treatment not effective	0
Pain	
• VAS= 0-3 minimal or no pain prior to discharge	2
• VAS= 4-6 moderate pain	1
• VAS= 7-10 severe pain	0
Surgical bleeding	
• Minimal: does not require change of dressing	2
• Moderate: required up to 2 dressing changes, no further bleeding	1
• Severe: even after 3 or more dressing changes bleeding continues	0

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References:

1. Nicoll J H. The surgery of infancy. Br Med J.1909; 2: 753-4
2. Urman R D, Desai S P. History of anaesthesia for ambulatory surgery. Curr Opin Anaesthesiol. 2012; 25(6): 641-7
3. Bruno Bissonnette. Textbook of Paediatric Anaesthesia: Basic principles- State of the art - Future USA: People's Medical Publishing House. 2011; pp. 873-85
4. Helfaer M A, McColley S, Pyzik P, et al. Polysomnography after adenotonsillectomy in mild obstructive sleep apnoea. Crit Care Med. 1996; 24: 1323-34
5. Rachel Homer J, Elwood T, Peterson D, et al. Risk factors for adverse events in children with colds emerging from anaesthesia; a logistic regression. Pediatr Anaesth 2007; 17: 154-61
6. Tait A R, Malviya S, Voepel-Lewis T, et al. Risk factors for perioperative adverse respiratory events in children with upper respiratory tract infections. Anesthesiology 2001; 95: 299-306
7. Rolf N, Cote C J. Frequency and severity of desaturation events during general anaesthesia in children with and without upper respiratory infection. J Clin Anesth 1992; 4: 200-3
8. Steward D J. Preterm infants are more prone to complications following minor surgery than are term infants. Anesthesiology 1982; 56: 304
9. Welborn L G. Postoperative apnoea in the former preterm infants: A review. Paediatr Anaesth 1992: 2, 37
10. Brown K A, Laferriere A, Lakheeram I, et al. Recurrent hypoxia in children is associated with increased analgesic sensitivity to opioids. Anesthesiology 2006; 105: 665-9
11. Dajani A S, et al. Prevention of bacterial endocarditis, recommendations by American Heart Association. JAMA 1997; 277: 1794
12. Adu-Gyamfi Y, Sankaran Kutty M, Marwas. Use of tourniquet in patients with sickle cell disease. Can J Anesth. 1993; 40: 24-27
13. Flick R P, Gleich S J, Herr M M et al. The risk of malignant hyperthermia in children undergoing muscle biopsy for suspected neuromuscular disorder. Pediatr Anaesth 2007; 17: 22-7
14. Yentis S M, Levine M F, Hartley E J. Should all children with suspected or confirmed malignant hyperthermia susceptibility be admitted after surgery? A 10 year review. Anesth Analg. 1992; 75: 345-350
15. O'Conner M E, Drasner K: Preoperative laboratory testing of children undergoing elective surgery. Anesth Analg. 1990;70: 176-180
16. Levine M F, Spahr-schopfer I A, et al. Oral midazolam premedication in children: the minimum time interval for separation from parents. Can J Anaesth 1993; 40: 726-9
17. Funk W, Jacob W, Riedl T, et al. Oral preanaesthetic medication for children: Double blind randomized study of combination of midazolam and ketamine VS midazolam or ketamine alone. Br J Anaesth. 2000; 84: 335-340
18. Piat V, Dubios M-C, Johanet S, et al. Induction and recovery characteristics and hemodynamic responses to sevoflurane and halothane in children. Anesth Analg 1994; 79: 840-4
19. Hannallah R S, Britton J T, Shafer P G, et al. Propofol anesthesia in pediatric ambulatory patients: a comparison with thiopentone and halothane. Can J Anaesth 1994; 41: 12-8
20. Cameron E, Johnston G, et al. The minimum effective dose of lignocaine to prevent injection pain due to propofol in children. Anesthesia. 1992; 47: 854-9
21. Frankville D D, Spear R M, Dyke J B. The dose of propofol required to prevent children from moving during magnetic resonance imaging. Anesthesiology 1993; 79: 953
22. Brimacombe J. The advantages of the LMA over the tracheal tube or facemask: A meta-analysis. Can J Anesth 42; 1017-1023, 1995
23. Gunter J B, Gregg T, Varughese A M, et al. Levobupivacaine for ilioinguinal/iliohypogastric nerve block in children. Anesth Analg. 1999; 89: 647-649
24. Guler G, Atkin A, Tosun Z, et al. Single dose dexmedetomidine reduces agitation and provides smooth extubation after paediatric adenotonsillectomy. Pediatr Anesth 2005; 15: 726-6
25. Rose J B, Watcha M F. Postoperative nausea and vomiting in paediatric patients. Br J Anaesth. 1999; 83: 104-117
26. Splinter W M, Roberts D J. Dexamethasone decreases vomiting in children after tonsillectomy. Anesth Analg. 1996; 83: 193
27. Chung F et al. A Post-anesthetic discharge scoring system for home readiness after ambulatory surgery. J Clin Anaesth. 1995; 7(6): 500-6

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IAPA GUIDELINES

Preoperative Fasting Guidelines in Paediatric Patients

Introduction

Practice guidelines are recommendations based on evidence, that will help the clinician in making certain decisions. They may be regarded as standard practice, though their use cannot guarantee any specific outcome. They may be modified as per the clinician's judgement or local practices. In addition, they need to be revised periodically in view of the continuous evolution and research in medical science. These guidelines can be applied to healthy paediatric patients including neonates for elective surgery. They are intended to be used by anaesthesiologists before procedures under general anaesthesia, regional anaesthesia or sedation (monitored anaesthesia care).

These guidelines may not apply to or may need to be modified[1] for: patients with coexisting diseases that can affect gastric motility or gastric volume *e.g.,* congenital hypertrophic pyloric stenosis, bowel obstruction, paralytic ileus and children with trauma.[1,2] Patients with difficult airway should be treated as full stomach and appropriate judgement may be used. These conditions can increase the chances of regurgitation and pulmonary aspiration. Additional preventive measures need to be taken in such patients.

During preoperative evaluation, history, physical examination and investigations should be reviewed to rule out increased risk of regurgitation and pulmonary aspiration. The patient and parents or caregivers should be clearly informed of the fasting requirements and reasons behind their strict adherence. It should be verified again in the immediate preoperative period whether the patient has complied with the fasting guidelines.

Definition of Preoperative Fasting

It is defined as a prescribed period of time before a procedure, when patients are not allowed oral intake of liquids or solids.

Purpose of Guidelines

In spite of the presence of various recommendations for preoperative fasting it is commonly observed that children are fasted for much longer than necessary. Long term fasting can lead to dehydration, hypoglycaemia and distress. In an audit conducted at a tertiary care hospital, the actual time that children were fasted was 11.25 hours for solids and 9.25 hours for water.[3] Simple steps such as education of ward nurses and better coordination between the anaesthesiologists, surgeons and the nurses greatly reduced the actual fasting time.

The purpose of formulating the guidelines is:

1. To improve the quality and efficiency of anaesthesia which results in
   a) Increased patient satisfaction and safety.
   b) Avoidance of delay and cancellations.
   c) Decreased risk of dehydration or hypoglycaemia.
   d) Reduced preoperative morbidity.
2. To promote good clinical practices and formation of protocols.
3. To reduce the severity of complications related to pulmonary aspiration of gastric contents.
4. Cost effective use of drugs to reduce gastric volume and acidity.

Preoperative Fasting for Clear Liquids

Recommendation:

Children should be encouraged to drink clear fluids for up to 2 hours prior to elective procedures requiring general anaesthesia, regional anaesthesia or sedation.

Clear non-particulate fluids include water, glucose water, coconut water, clear apple juice and carbonated beverages. The volume of liquid is less important than the type of liquid.[4]

Scientific Evidence

There is a clear and level 1 evidence to show that the oral intake of clear fluids up to 2 hours before an elective operation is safe.[4-6] Meta-analysis of many randomised controlled trials report higher gastric pH values and comparable gastric volumes in children given clear liquids 2 to 4 hours before a procedure versus those given clear fluids more than 4 hours prior.[7-12] Ingested volume of clear liquids by children varied from 2 $mL.kg^{-1}$ to unrestricted amount.

In one study in healthy school children, the median t1/2 of gastric emptying after ingestion of 7 $mL.kg^{-1}$ of clear fluid was <30 minutes as measured by MRI.[13] But the values had a lot of inter individual variation. Another study found comparable gastric fluid pH and volume after 1 hour and 2 hours of fasting for clear fluids.[14]

Allowing clear fluid before surgery improves the comfort of child and reduces anxiety of parents, decreases thirst and the risk of dehydration in young infants.[15] Clear liquids (sucrose solution) up to 2 hours prior to anaesthesia may maintain electrolyte balance and can provide sugar to replete glycogen stores especially in neonates as they have impaired gluconeogenesis.[16]

According to the European Society of Anaesthesiology fasting guidelines, if small amount (up to $1/5^{th}$) of milk is added to tea or coffee, it is considered as clear liquid.[17]

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IAPA GUIDELINES

Preoperative Fasting for Breast Milk

Recommendation

Children including healthy neonates, should be allowed to breast feed at least 4 hours before elective procedures requiring general anaesthesia, regional anaesthesia or sedation.

Scientific evidence

Fasting time for breast milk is controversial, Billeaud C et al. demonstrated that the gastric emptying of 110-200 mL of human milk was 82±11% after 2 hours in neonates and infants, 84±21% after whey-hydrosylated formula, 74±19% after whey- predominant formula, 61±17% after casein predominant formula and 45±19% after cow's milk.[18] Gastric emptying of human milk and whey-predominant formula was significantly faster than casein predominant formula and cow's milk.

Although some studies have demonstrated that human breast milk (HBM) empties within 2-3 hrs gastric emptying time of human breast milk varies from infant to infant and fat content of HBM is not consistent.[19-22,23] That is why most of the guidelines including the American[1] and the European Society guidelines recommended a fasting of 4 hour for human milk.

Non-nutritive sucking on a pacifier has been shown to comfort the infant and also reduce the gastric volumes in premature infants.[24] Non-nutritive sucking on mother's breast (in a pre-pumped Breast) should not be allowed within 4 hours as even small amount of breast milk in infant's stomach can have serious consequences if aspirated.

Preoperative Fasting for Infant Formula

Recommendation

It is recommended to fast from intake of infant formula for at least 6 hours before an elective procedure requiring general anaesthesia, regional anaesthesia or sedation (Monitored Anaesthesia Care i.e., MAC)

Scientific evidence

Some studies indicate that acidified formula and casein formula empty from the stomach over 3-4 hours. But some formulas may take up to 6 hours to empty from the stomach.[19,25] The literature is insufficient at present to evaluate the timing of ingestion of infant formula and its effect on preoperative incidence of pulmonary aspiration.

Scandinavian guidelines recommend a 4 hour fast for formula feeds in infants less than 6 months.[5] All others including the American Society of Anesthesiology guidelines, the European Society and the Royal College of Nursing recommend a fast time of 6 hours for infant formula.[1,17,26] This is because of insufficient evidence to change the contemporary best practice. (*i.e.,* infant formula for up to 6 hours)

Preoperative Fasting for Non-human Milk and Solid Food

Recommendation

It is recommended to fast from intake of non-human milk as solid food (light meal) for 6 hours or more before elective procedure requiring general anaesthesia, regional anaesthesia or sedation (MAC). Additional fasting time (8 hours or more) may be required for fatty, fried food or meat containing food. Both the amount and type of food consumed must be considered before determining appropriate fasting interval.

Scientific Evidence

Miller M et al. compared a light breakfast of tea and buttered toast consumed less than 4 hours before elective surgery to that of an overnight fast and found equivocal gastric volume and pH levels.[27]

Sethi AK et al. found that children given non-human milk 4 hours or less before surgery had higher gastric volumes but equivocal pH when compared to those children who fasted for more than 4 hours.[20]

It is widely accepted that fasting for a large meal containing fried food or meat should be 8 hours or more.

Preoperative Chewing Gum

Recommendation

Patients should not have their operation cancelled or delayed just because they are chewing a gum. This recommendation is given by European Society Guidelines and it is solely based on effects of chewing gum on gastric emptying and any gum chewing should be discouraged before elective surgery.[17]

Scientific Evidence

There is an ongoing debate on how to deal with patients chewing gum in the preoperative period. In one study, they found that chewing sugarless gum before surgery did not alter gastric fluid volume or acidity.[28] Another study found that both sugared and sugar free gum chewers had significantly increased gastric volume and pH than non-gum chewers.[29]

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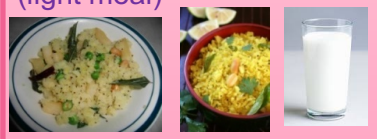
Conclusion

The recommended guidelines are summarised below. The ideal guidelines for preoperative fasting should minimise the risk of regurgitation and pulmonary aspiration of residual gastric contents yet allow patient comfort with little risk of dehydration and hypoglycaemia. Most of the studies have examined the change in residual gastric volume and pH of gastric contents at various fasting intervals. It has been assumed that the pH and residual gastric volume are directly proportional to the risk of regurgitation and aspiration.[8,30]

In actual practice it is unlikely that the entire gastric content would be aspirated into the lungs. Therefore, studies using gastric volume as a predictor of risk for aspiration pneumonia may be misleading. It will probably be more useful to conduct audits in patients who have suffered from aspiration. After reviewing the results of such audits we can eventually formulate the guidelines regarding optimum fasting time with increased patient comfort without increasing the risk of morbidity.[31]

Summary of Fasting Guidelines in Pediatric Patients

Fasting Interval	Type of Food	Examples
2 hours	Clear Liquids 	Water, Glucose or Sucrose Solution, Clear Apple Juice, Carbonated Beverages, Coconut water
4 hours	Breast Milk 	Breast Milk
6 hours	Infant Formula / Non-Human Milk /Solid Food (light meal) 	Formula Feeds, Powdered Milk, Cow, Buffalo Milk, Light meal, a bowl of Khichadi, Poha, Upama
8 hours	Solid Food (Heavy Meal) 	Chapati, , Vegetables, Fried Food, Nonveg Food Cheese, Ice-cream

References

1. Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures. Anesthesiology 2011; 114: 495-511.
2. Bricker SR, McLuckie A, Nightingale DA. Gastric aspirates after trauma in children. Anaesthesia 1989; 44:721–724.
3. Arun BG, Korula G. Preoperative fasting in children: An audit and its implications in a tertiary care hospital. JOACP 2013; 29: 88 – 91.
4. Brady M, Kinn S, Ness V, et al. Preoperative fasting for preventing perioperative complications in children [review]. Cochrane Database Systematic Rev 2009: CD005285.
5. Søreide E, Eriksson LI, Hirlekar G, et al. Preoperative fasting guidelines: an update [review]. Acta Anaesthesiol Scand 2005; 49:1041–1047.
6. Phillips S, Hutchinson S, Davidson T. Preoperative drinking does not affect gastric contents. Br J Anaesth 1993; 70:6–9.
7. Gombar S, Dureja J, Kiran S, Gombar K, Chhabra B: The effect of pre-operative intake of oral water and ranitidine on gastric fluid volume and pH in children undergoing elective surgery. J Indian Med Assoc 1997; 95:166–8.
8. Maekawa N, Mikawa K, Yaku H, Nishina K, Obara H: Effects of 2, 4 and 12 hour fasting intervals on preoperative gastric fluid pH and volume, and plasma glucose and lipid homeostasis in children. Acta Anaesthesiol Scand 1993; 37:783–7.
9. Miller BR, Tharp JA, Issacs WB: Gastric residual volume in infants and children following a 3-hour fast. J Clin Anesth 1990; 2:301–5.
10. Nicolson SC, Dorsey AT, Schreiner MS: Shortened preanesthetic fasting interval in pediatric cardiac surgical patients. Anesth Analg 1992; 74:694–7.
11. Splinter WM, Stewart JA, Muir JG: Large volumes of apple juice preoperatively do not affect gastric pH and volume in children. Can J Anaesth 1990; 37:36–9.
12. Splinter WM, Stewart JA, Muir JG: The effect of preoperative apple juice on gastric contents, thirst, and hunger in children. Can J Anaesth 1989; 36:55–8.
13. Schmitz A, Kellenberger CJ, Liamlahi R, Studhalter M, Weiss M. Gastric emptying after overnight fasting and clear fluid intake: a prospective investigation using serial magnetic resonance imaging in healthy children. Br J Anaesth 2011; 107: 425–9.

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References

14. Schmidt AR, Buehler P, Seglias L, Stark T, Brotschi B, Renner T, Sabandal C, Klaghofer R, Weiss M, Schmitz A. Gastric pH and residual volume after 1 and 2 h fasting time for clear fluids in children. Br J Anaesth 2015; 114: 477–82.
15. Nicolson SC, Schreiner MS. Feed the babies [editorial]. Anesth Analg 1994; 79:407–409.
16. Van der Walt JH, Foate JA, Murrell D, et al. A study of preoperative fasting in infants aged less than three months. Anaesth Intensive Care 1990; 18:527–531.
17. Perioperative fasting in adults and children: guidelines from the European Society of Anaesthesiology Eur J Anaesthesiol 2011; 28:556-569.
18. Billeaud C, Guillet J, Sandler B. Gastric emptying in infants with or without gastro-oesophageal reflux according to the type of milk. Eur J Clin Nutr 1990; 44:577–583.
19. Van Den Driessche M, Peeters K, Marien P, et al. Gastric emptying in formula-fed and breast-fed infants measures with the 13C-octanoic acid breath test. J Pediatr Gastronenterol Nutr 1999; 29:46–51.
20. Sethi AK, Chatterji C, Bhargava SK, et al. Safe pre-operative fasting times after milk or clear fluid in children—A preliminary study using real-time ultrasound. Anaesthesia 1999; 54:51–59.
21. Litman RS, Wu CL, Quinlivan JK. Gastric volume and pH in infants fed clear liquids and breast milk prior to surgery. Anesth Analg 1994;79:482–485.
22. Cook-Sather SD, Litman RS. Modern fasting guidelines in children. Best Pract Res Clin Anaesthesiol 2006; 20:471–481.
23. Splinter WM, Schreiner MS. Preoperative fasting in children. Anesth Analg 1999; 89:80–89.
24. Widstro¨m AM, Marchini G, Matthiesen AS. Non-nutritive sucking in tube-fed preterm infants: Effects on gastric motility and gastric contents of somatostatin. J Pediatr Gastroenterol Nutr 1988;7:517–523.
25. Lauro HV. Counterpoint: Formula before surgery: Is there evidence for a new consensus on pediatric NPO guidelines? Soc Pediatr Anesth Newslett 2003;16 (3). www.pedsanesthesia .org/newsletters/2003summer/counterpoint.iphtml (accessed May 3, 2012).
26. Royal College of Nursing. Perioperative fasting in adults and children: an RCN guideline for the multidisciplinary team. London: Royal College of Nursing; 2005.
27. Miller M, Wishart HY, Nimmo WS: Gastric contents at induction of anaesthesia. Is a 4-hour fast necessary? Br J Anaesth 1983; 55:1185–8.
28. Dubin SA, Jense HG, McCranie JM, Zubar V. Sugarless gum chewing before surgery does not increase gastric fluid volume or acidity. Can J Anaesth 1994; 41:603–606.
29. Schoenfelder RC, Ponnamma CM, Freyle D, et al. Residual gastric fluid volume and chewing gum before surgery. Anesth Analg 2006; 102: 415 – 7.
30. Crawford M, Lerman J, Christensen S, Farrow-Gillespie A. Effects of duration of fasting on gastric fluid pH and volume in healthy children. Anesth Analg 1990; 71: 400–3.
31. Emerson BM, Wrigley SR, Newton M. Pre-operative fasting for paediatric anaesthesia. A survey of current practice. Anaesthesia, 1998; 53: 326–30.

QUIZ SECTION

Dr Rakesh Garg
New Delhi

1. Which of the following statements in not correct with regards to perioperative cardiac arrest in children?
   a. Cardiac arrest is less common in infants as compared to neonates.
   b. Perioperative cardiac arrest is more common in children with congenital heart disease.
   c. Cardiac arrest is commoner during emergency surgery as compared to planned surgical interventions.
   d. Equipment related causes occur in more than 25% of cardiac arrests.

2. Retinopathy of prematurity (ROP) is at an increased risk until what postconceptual age?
   a. 36 weeks
   b. 38 weeks
   c. 42 weeks
   d. 44 weeks

3. The following events occurs more frequently in children with Down syndrome (trisomy 21) except:
   a. Malignant hyperthermia
   b. Congenital heart disease
   c. Smaller trachea
   d. Occipito-atlantoaxial instability

4. Repeated doses of suxamethonium in children is associated with:
   a. Hyperthermia
   b. Bradycardia
   c. Tachyphylaxis
   d. Bronchodilatation

5. Which of the following statement is not true for Mapleson E breathing system (Ayres T piece)?
   a. During spontaneous ventilation the fresh gas flow should be 2.5–3.0 times the patient's minute volume
   b. The volume of the corrugated tube must exceed the patient's tidal volume
   c. Jackson-Rees modified the system by adding a closed bag to the end of the corrugated tube
   d. Preferred in children with weight ≤ 20 kg.

(Answers on page 12)

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AN ESSAY....

The dilemmas and apprehensions of an 'occasional' paediatric anaesthesiologist

Dr. Sangeeta Khanna, Dr. Jyotirmoy Das, Dr. Yatin Mehta
Medanta, Gurgaon

As I was wrapping up for the day, the phone bell rang, it was our chief pediatric surgeon. *"I need to do an exploratory laparotomy on the 2 months old infant from the pediatric ICU",* he said. *"You know!",* he continued, *"am not very sure about the diagnosis…. let's see…He is not doing really well since last 2 days and we need to do something real fast….."* Before I could hang up he said,*"… And yes, his parents are very apprehensive about the entire development. Please take a look and wheel in the kid ASAP"*

This is a common scenario in our anaesthetic practice. But, the alarm bells should start ringing when the anaesthetist becomes more apprehensive than the parents. The prospect of an emergency surgery in a sick child whose diagnosis is not yet clear with a high probability of intraoperative haemodynamic instability, fluid shifts and anaesthetic morbidity is a recipe of disaster in the face of clinical inexperience. This can happen when the concerned anaesthesiologist works primarily in an adult unit and only occasionally encounters a child.

Well, when was the last time I anaesthetised a sick infant? I thought. Now, the exercise of patient evaluation and operating room (OR) preparation begins. The first part is not so difficult for a trained mind. The problem arises in the second part, the logistical aspect. As the OR was utilized for adult patients for the last couple of days, to switch the theatre for a pediatric surgery sets a chain of events well known to us. The questions coming to the mind are, Is it the right fluid in the right dose with the right concentration of glucose and electrolytes? Is it the correct and safe paediatric dose of the drug? Will the infant's liver and kidney handle this drug dose? What is the calculation for electrolyte correction? What is the normal blood pressure for this infant I have on my table? What level of end tidal CO_2 we should accept and to what extent can minute ventilation be increased without causing adverse lung injury?

These dilemmas can be settled to a reasonable degree by experience and clinical understanding backed by knowledge. These fine tunings come naturally if we deal with such patients frequently in a high volume setup. But, in an 'occasional scenario' like in an adult surgery set up or a rural and not so well equipped setting, the chances of committing a mistake or a vital omission is quite high which may have long term consequences on the child.

All of us, who work in a primarily adult anaesthesia set up, should not take 'occasional pediatric practice' lightly. The outcome is shown to be related to the experience of the clinician involved.[1,2] Till further guidelines are drawn related to the credentialing of anaesthesiologists in paediatric services, as is prevalent in more developed countries of the world, we can improve our expertise by continuous upgradation of knowledge and skills. This can be achieved by periodic training/ observership in high volume paediatric set ups and attendance of CMEs/ workshops from time to time. Regular audit should be considered to promote positive changes and improvements in practice.[3] At an institutional level, one or two ORs should be marked for paediatric surgeries specifically and the logistic support should be available round the clock in these ORs. It may be a good idea to prepare 'Paediatric boxes' containing the pediatric airway equipment, circuits, monitoring lines, etc. This box can be moved to any adult surgery OR when necessary. At our Institute we follow this practice for some time now.

A Japanese study analyzing critical incidents in OR [4] showed that adequate preparation of the operating environment for routine paediatric anaesthesia was undertaken at most centers that provide specialized pediatric care and the outcome of cardiac arrest was also better in these hospitals. Similarly, lower patient age and anaesthetic management factors were mainly implicated for adverse respiratory events in children undergoing elective surgery.[5] The French postal survey on self-reporting of paediatric anaesthesia complications showed that in spite of a uniform certification or qualifying examination, the rate of paediatric anaesthesia related complications were inversely proportional to the number of cases performed per year. A significantly ($P < 0.05$) higher incidence of complications was found in the groups that performed 1 to 100 (7.0 +/- 24.8 per 1000 anesthetics) and 100 to 200 pediatric

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anesthetics (2.8 +/- 10.1 per 1000 anesthetics) than in the group that administered more than 200 pediatric anesthetics/year (1.3 +/- 4.3 per 1000 anesthetics).[6] Similar reports are also available from Japan. In a study of the outcome of paediatric anaesthesia from 1999 to 2003 it was observed that, although low volume set ups did not have higher mortality rates for children, but when it comes to newborns, the mortality risk was 2.63 times than high volume pediatric hospitals.[4] Adverse events are definitely less in the hands of experienced paediatric anaesthesiologists.[7] The 1989 National Confidential Enquiry into the Peri-Operative Deaths (NCEPOD) recommends that surgeons and anaesthetists should not undertake occasional pediatric practice.[8] The American Academy of Pediatrics (AAP) Section on Anesthesiology has set guidelines for the paediatric anaesthesia environment and suggests that each facility should define the nature of surgery it will provide and the number of such cases per year needed to maintain competence. Such recommendations are reiterated by American Society of Anesthesiology.

In the current era, patient safety is considered a fundamental right.[9] The specialty of anaesthesiology has been looked upon as the model for patient safety initiatives.[10] The aforementioned literature review clearly shows the importance of adequate training, credentialing and continuous updating of knowledge for the 'occasional' paediatric anaesthesiologist, who comprises a bigger chunk in our country. For that we need more of paediatric anaesthesia workshops and CMEs organised throughout the country on a regular basis. IAPA can also take initiative in preparing a 'paediatric anaesthesia' training module, which can be made compulsory in line of ACLS and BLS training.

References:

1. Keenan RL, Boyan CP. Cardiac arrest due to anesthesia: a study of incidence and causes. JAMA 1985;253:2373-7.
2. Keenan RL, Shapiro JH and Dawson K. Frequency of anesthetic cardiac arrests in infants: effect of pediatric anesthesiologists J Clin Anesth 1991; 3: 433-37.
3. Stoddart PA, Brennan L, Hatch DJ, Bingham R. Postal survey of paediatric practice and training among consultant anaesthetists in the UK. Br J Anaesth 1994; 73: 559-563.
4. Irita K, Tsuzaki K, Sawa T, et al. The state of pediatric anesthesia in Japan: an analysis of the Japanese society of anesthesiologists survey of critical incidents in the operating room. Masui 2007; 56: 93-102.
5. Mamie C, habre W, Delhumeau C, et al. Incidence and risk factors of perioperative respiratory adverse events in children undergoing elective surgery. Pediatr Anesth 2004; 14: 218-224.
6. Auroy Y, Ecoffey C, Messiah A, Rouvier B. Relationship Between Complications of Pediatric Anesthesia and Volume of Pediatric Anesthetics. Anesth Analg 1997; 84(1): 234-235.
7. Brennan LJ: Modern day- case anaesthesia for children. Br J Anaesth 1999; 83: 91-103.
8. Campling EA, Devlin HB, Lunn JN: The report of the National Confidential Enquiry into perioperative deaths 1989. London: Her Majesty's Stationary Office,1989].
9. Barach P and Moss F. Delivering safe health care. Br Med J 2001; 323: 585-86.
10. Barach P and Small Sd: reporting and preventing medical mishaps: lessons from non-medical near miss reporting systems. Br Med J 2000; 320: 759-763.

Answers to the Quiz Section on page 10 — Dr Rakesh Garg

Answers 1: d: Various causes of cardiac arrest include medications, cardiorespiratory causes and equipment related. Equipment-related causes are observed in around 4% of cases of cardiac arrest inchildren.

Answer 2: d: ROP development is negligible after 44 weeks postconceptional age.

Answer 3: a: Trisomy 21 or Down syndrome is associated with congenital heart disease, smaller tracheas and occipito-atlantoaxial instability, but not malignant hyperthermia.

Answer 4: b: Repeat doses of Suxamethonium may lead to bradycardia and is often more severe after the second dose. This effect is more commoner and more pronounced in children.

Answer 5: c: Jackson-Rees modification which has an open bag (not a closed bag) attached to the expiratory limb (classified as a Mapleson F system although it was not included in the original description by Professor Mapleson).

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Guidelines for Minimal Mandatory Monitoring for Paediatric Anaesthesia

INTRODUCTION

According to the United Nations Convention on the Rights of the Child (UNCRC) a child is a human being below the age of eighteen years. According to the Census of India a child is any person below the age of fourteen years and 39% of India's population is below fourteen years. The 0 – 18 year-old population is 472 million out of the total population 1.21 billion.[1] India's ratio of child to adult is much higher than developed countries (Europe – 20%, India >39%) therefore there is a need for proper planning of their perioperative care during surgeries and anaesthesia.

In the light of sufficient evidence, highlighting that the use of monitors like the pulse oximeter (SpO_2) and end tidal carbon dioxide ($EtCO_2$) level, has resulted in the reduction in anaesthesia related morbidity and mortality, the Indian Association of Paediatric Anaesthesiologists (IAPA) considers it essential and extremely important to continuously monitor paediatric patients undergoing anaesthesia. [3,4] Since the incidence of mortality and morbidity is much higher for neonates and children, it becomes essential to emphasize the need of minimum mandatory monitoring in this age group. [5]

The IAPA highlights that it is vital to continuously monitor the patient throughout a procedure requiring anaesthesia or sedation by an experienced anaesthesiologist.[6,7] In addition, it is recommended that a for special circumstances *e.g.,* major surgery in infants or a sick child should be performed under the supervision of a paediatric anaesthesiologist.[8] The presence of a vigilant anesthetist is the most vital minimal monitoring in the step towards elimination of the anaesthesia related morbidity and mortality.[9]

The IAPA proposes the following guidelines for the paediatric perioperative anaesthesia environment. Vital and desired monitoring are differentiated and identified so as to give safe anaesthesia and perioperative care to children especially newborn and infants within the practical limitations we face in our country. These guidelines are a guide and the decisions for the individual patients are to be finally taken by the anesthesiologist in the patient's best interest.

AIM

To ensure safe and optimum anaesthesia management for every child in our country, with the aim of reducing anaesthesia related morbidity and mortality.

DEFINITIONS

Mandatory Monitoring:[1] Crucial; high priority; mandatory monitoring which must be established for safe anaesthesia practice.

Desirable Monitoring:[3] Monitors which leads to improved outcomes by fine tuning the anaesthesia management.

Experienced Anaesthesiologist:[4] An anaesthesiologist with at least 3 years of post-degree experience in anaesthesia and who are keeping them selves updated by regular reading and paediatric anesthesia practice.

Paediatric Anaesthesiologist:[5] Specialists in paediatric anaesthesia are defined as anaesthesiologists who have an extra training of at least one year experience in a specialized paediatric center and who care for different age groups in the paediatric population, at least 30 cases/month or the equivalent to 2.5 days/week. They usually work in specialized centres. These paediatric anaesthesiologists are expected to keep up to date and ensure competence in resuscitation, anaesthesia, pain management, emergency paediatric medicine and initial stabilization of the children requiring intensive care.

GUIDELINES

A. Anaesthesiologist

The presence of an appropriately trained and experienced anaesthesiologist is the main determinant of patient safety during anaesthesia.[1] Most of the critical incidents happen due to human error and therefore it is essential to compliment clinical information with the help of monitors.[2,3]

An anaesthesiologist of appropriate experience as defined earlier should be available at all times while the patient is anaesthetized. The same standard should be maintained for sedation, local or regional anaesthesia. The anaesthesiologist must ensure that all appropriate equipment has been checked before use. Monitoring for MRI or imaging should also be continuous, either across a glass door or from a place where the child can be observed at the same time as the monitoring is going on. It is essential for an anaesthesiologist to reverse the anaesthesia, wake the child up and then shift the patient to recovery for observation and monitoring. If a shift system is in place, a hand over of all the information related to patient verbally apart from documentation should be given to the next anaesthesiologist. The hand over should include information about medications, events and special issues related to the patient. The child should be monitored by the anaesthesiologist continuously till transfer to the recovery room and handed over to a recovery nurse and doctor available to handle emergencies. All patients should be discharged to the ward or home from the recovery room by a doctor.

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Documentation

Legible, clear data documentation of all perioperative events including vital signs at 5 minutes intervals during the intraoperative period should be maintained.

B. Equipment

It is essential to use the devices to the best of their abilities and all the information given by the devices are looked at and documented. The alarms should be adjusted to the individual case. The alarms should have both visual and audible alert. Ventilators should have alarms set for peak airway pressure, disconnections and leaks for different age groups.

Monitoring Devices

Monitoring devices are used to compliment the clinical observations and help in reducing undesirable events. The following monitoring devices are needed for safe conduct of anaesthesia for children.

Mandatory (monitoring required for safe anaesthesia, lack of which may lead to morbidity and mortality)

- Heart rate (HR)
- Non-invasive blood pressure (NIBP)
- Electrocardiogram (ECG)
- Pulse oximeter (SpO_2)
- Precordial stethoscope
- End tidal carbon dioxide monitoring ($EtCO_2$)
- Temperature monitoring

Desirable Monitoring (required for the better outcome but lack of which will not compromise the safety of the child)

- Airway gases: oxygen, carbon dioxide and anaesthetic gases
- Plateau pressure
- Mean airway pressure
- Pressure Volume loops
- Peripheral nerve stimulator (if neuro muscular blocking agent is used)

Mandatory Monitoring for Regional Blocks and Sedation Procedures

- HR
- NIBP
- ECG
- SpO_2
- Precordial stethoscope
- Temperature monitoring
- Respiratory rate

Special Cases

Depending on the type of surgery and individual child's need, special monitoring like intracranial pressure monitoring, cardiac output monitoring, invasive blood pressure monitoring, central venous pressure monitoring, thromboelastogram (TEG), transesophageal echocardiography (TEE), biochemical markers etc. should be established.

Major surgeries should be conducted in hospitals with the provision of expertise and availability of intensive care monitoring for sick children, for better outcomes.

When to place the monitors?

It is desirable to establish complete minimal mandatory monitoring if possible, prior to induction of anaesthesia. If not possible, it is essential to at least have a pulse oximeter prior to inhalational induction and establish the rest of the monitors. However, for sick patients and neonates, it is vital to establish all the monitors prior to induction.

C. Monitoring in the PACU[1]

All patients should be monitored clinically for level of consciousness and vital signs by a trained nurse with the help of monitors including a SpO_2, NIBP and temperature. If required, ECG, $EtCO_2$ and provision for invasive monitoring should be available. Resuscitation equipments must be available in recovery. A defibrillator should be available in OR complex as well as the PACU.

In an otherwise stable patient, monitoring can be repeated after 15 minutes and documentation maintained by the PACU staff.[2] The child should be transferred out of the PACU only when he/she is hemodynamically stable, awake and pain free. Sign out by anaesthesiologist should be mandatory once the patient is ready for discharge from the PACU.

D. Anaesthesia in Remote Locations

The same standards of monitoring should be maintained in terms of anaesthesiologist, equipment and documentation.

E. Transfer within the operating room (OR), within the hospital, out of the hospital

From OR to post anaesthesia care unit (PACU): Once the child is stable, the child should be monitored clinically during transfer from the OR to the PACU by an anaesthesiologist and handed over to a recovery nurse. Instructions regarding the intraoperative events, drugs which need to be continued in the ward should also be given. The transfer trolley should have provision for oxygen supplementation.

From OR to intensive care unit (ICU) / imaging area / within the hospital[1]

The child should be stable.

Vital signs to be monitored throughout the transfer. Use of invasive monitoring only if required.

An anaesthesiologist with appropriate knowledge of the patient's condition should accompany the child.

If the child is on a ventilator, the endotracheal tube (ETT) should be carefully secured and tidal volume, airway pressure, SpO_2 and RR monitored when possible.

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F. The safety line for age group (Lakshman Rekha)

It is essential to define the lowest age at which a child can be anaesthetized by a general anaesthesiologist safely. This is essential since the physiology and pharmacology of children differ significantly from adults. In addition, anaesthetic morbidity and mortality is higher in neonates and infants.[1-3] For better outcomes the physiology, pharmacology and psychology of the child should be better understood. Therefore, the IAPA strongly recommends that children below the age of 3 years scheduled for minor or major surgery should be anaesthetized by a paediatric anaesthesiologist.[4]

References

1. Census India 2010 – 2011.
2. McKay WP, Noble WH. Critical incidents detected by pulse oximetry during anaesthesia. Can J Anaesth 1988; 35: 265 – 9.
3. Webb RK, Van der Walt JH, Runciman WB, Williamson JA, Cockings J, Russell WJ, et al. Which monitor? An analysis of 2000 incident reports. Anaesth Intensive Care 1993; 21: 529 – 42.
4. Cullen DJ, Nemaskal JR, Cooper JB, Zaslavsky A, Dwyer MJ. Effect of pulse oximetry, age, and ASA physical status on the frequency of patients admitted unexpectedly to a post-operative intensive care unit. Anesth Analg 1992; 74: 181 – 8.
5. Catréa D, Lopesb MF, Vianad JS, Cabritab AS. Perioperative morbidity and mortality in the first year of life: a systematic review (1997---2012). Rev Bras Anestesiol 2015; 65: 384 – 94.
6. European guidelines for training in paediatric anaesthesia.
7. Indian Society of Anaesthesia. Monitoring standards for providing anaesthesia.
8. Wilkinson KA, Brennan LJ, Rollin AM. Guidelines for the provision of anaesthetic services. Paediatric anaesthesia services 2015. www.rcoa.ac.uk/gpas2015 gpas@rcoa.ac.uk
9. Buck N, Devlin HB, Lunn JN. Report on the confidential enquiry into perioperative deaths. London: Nuffield Provincial Hospitals Trust, The Kings Fund Publishing House, 1987.
10. Recommendations for the Safe Transfer of Patients with Brain Injury. Neuroanaesthesia Society of Great Britain and Ireland & Association of Anaesthetists of Great Britain and Ireland, London, 2006; Transfer of the Critically Ill Patient. Wallace PGM, in Intensive Care Medicine (Bion J ed), London, BMJ Books, 1999: 404 – 13.
11. Immediate Post Anaesthetic Recovery. Association of Anaesthetists of Great Britain and Ireland, London, 2002.
12. Bharti N, Batra YK, Kaur H. Paediatric perioperative cardiac arrest and its mortality: database of a 60-month period from a tertiary care paediatric centre. Eur J Anaesthesiol 2009; 26: 490 – 5.
13. Curriculum for a CCT in anaesthetics. RCoA, London 2010 (www.rcoa.ac.uk/node/230).
14. Paterson N, Waterhouse P. Risk in pediatric anesthesia. Pediatr Anesth 2011; 21: 848 – 57.
15. Cote´ CJ, Wilson S. Guidelines for Monitoring and Management of Pediatric Patients During and After Sedation for Diagnostic and Therapeutic Procedures: An Update. Pediatrics 2006; 118: 2587 – 2601.
16. Recommendations for standards of monitoring during anaesthesia and recovery 4th edition. Published by The Association of Anaesthetists of Great Britain and Ireland.

HELPFUL WEBSITE LINKS

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1 . Pediatric Anesthesia and Critical Care Journal (PACCJ) – an open access journal on topics relevant to paediatric anaesthesiologist as well as intensivist. To read free articles,
Click http://www.paccjournal.com/

2. Read up the guidelines of Association of Paediatric Anaesthetists of Great Britain and Ireland.
Click http://www.apagbi.org.uk/publications/apa-guidelines

3. TOTW from WFSA on ‘Enteric typhoid fever in children and anaesthesia’ – part 1&2, 2016. A quick run through the clinical presentation of enteric fever and its relevance to paediatric anaesthesia.
Click http://www.wfsahq.org/resources/anaesthesia-tutorial-of-the-week
A simple sign up may be required for those not already registered with WFSA to view the TOTW

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by Indian Association of Paediatric Anaesthesiologists

February 2017

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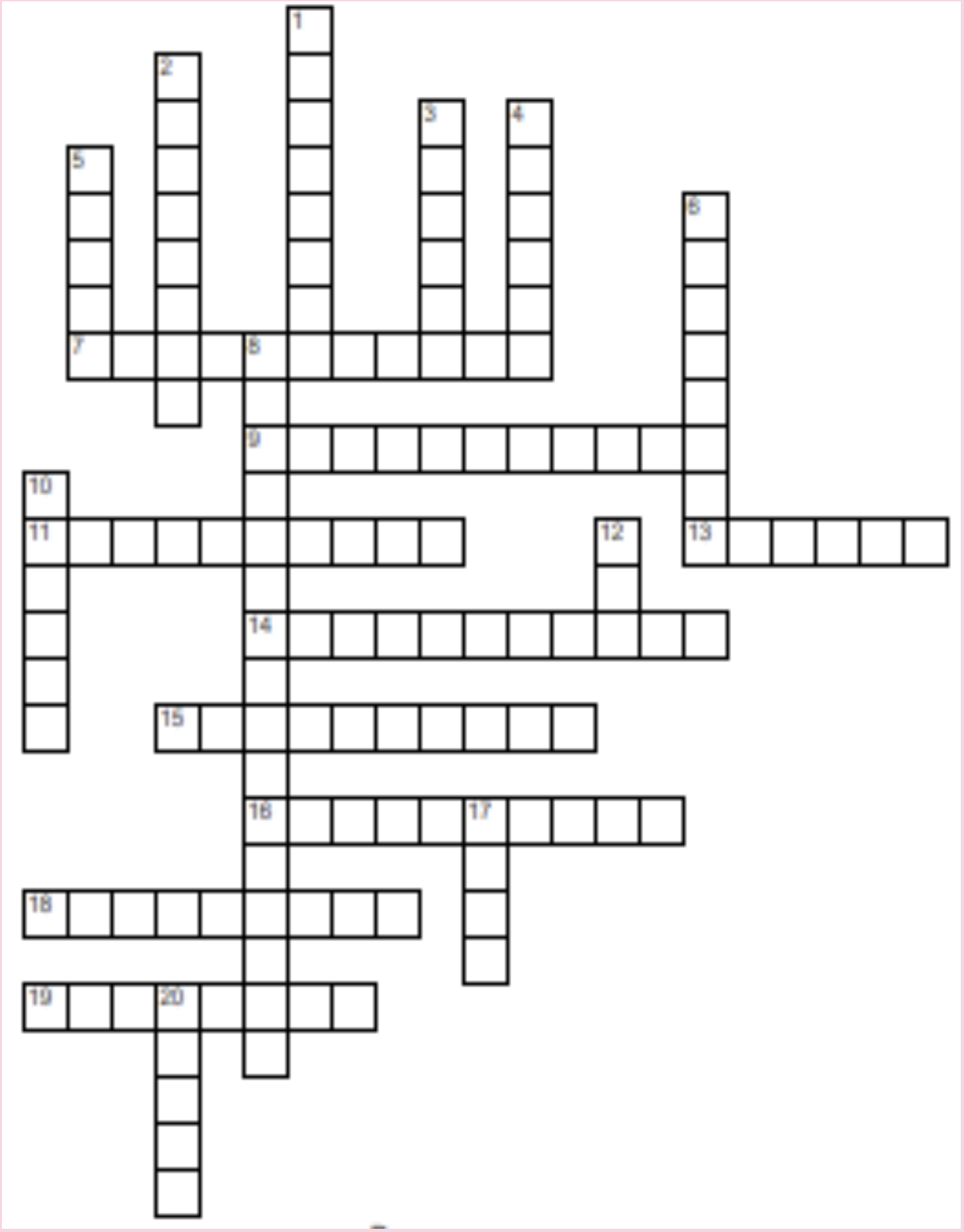

Crossword clues

ACROSS

7. The preferred analgesic
9. Severe form of drug allergy
11. Genetically transmitted from parents to offsprings
13. Eye sign in hydrocephalus
15. Drug to treat malignant hyperthermia
16. Webbed fingers
18. Metabolic abnormality in pyloric stenosis
19. Used in the dose of 20 µg/kg

DOWN

1. Dissociative anaesthesia
2. Contraindication for intraosseous access
3. Major extracellular cation
4. Type of epidural
5. Barking cough
6. Bluish discolouration
8. Fused cranial bones
10. Breath sounds in asthmatics
12. Connects aorta and pulmonary artery
17. Formula for ET tube size calculation
20. Epiglottis shape in infants