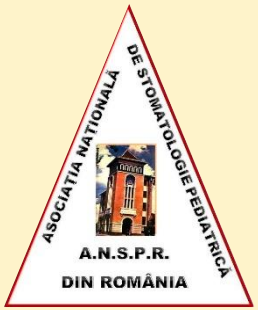
Dental General Anaesthesia: Good to Know



General anesthesia – EAPD definition

A medically controlled state of unconsciousness accompanied by a loss of protective reflexes, including the inability to maintain a patent airway independently and respond purposefully to physical stimulation or verbal command.

https://www.eapd.eu/uploads/5CF03741_file.pdf

General anesthesia - AAPD definition

- drug-induced loss of consciousness
- patients are not arousable, even by painful stimulation
- the ability to independently maintain ventilatory function is often impaired
- cardiovascular function may be impaired.

https://www.aapd.org/globalassets/media/policies_guidelines/bp_monitoringsedation.pdf

Dental treatment under GA for SN children

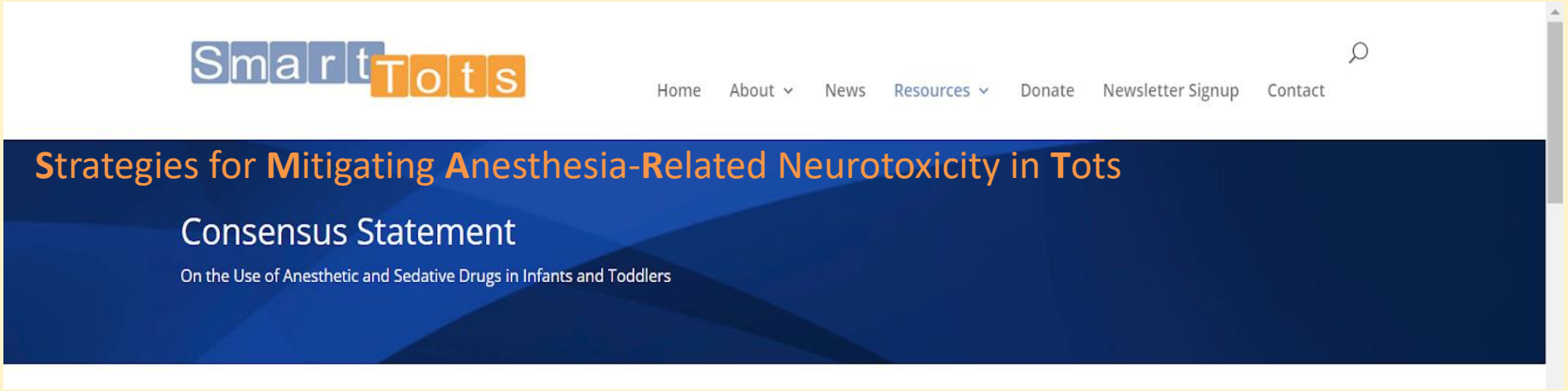
- is often indicated to provide quality medical services.
- for the safety of the patient, this intervention is possible only in a properly equipped **hospital unit**.
- the need for medical treatment, often interdisciplinary, have to fully justify the use of GA.

Indications

1. Multiple tooth extractions
2. Extensive dental caries in a very young child
3. Major surgical procedures (oro-facial trauma)
4. Ineffective local anesthesia
5. Extreme uncooperative behavior
6. Failure of sedation
7. Dental treatment for patients with special healthcare needs

Indications

- Patients with special healthcare needs:
  - Medically compromised patients:
    - congenital cardiac abnormalities
    - blood dyscrasias
    - allergic reactions to local anesthetics
    - uncontrollable epilepsy
  - Motor deficits
  - Mild/severe intellectual disability ; psychosocial disabilities



2014: International Anesthesia Research Society + US FDA
- experts in anesthesia, pediatric medicine, neuroscience and patient safety consider the evidence and what it means for health care providers and parents . The SmartTots ***Consensus Statement on the Use of Anesthetic and Sedative Drugs in Infants and Toddlers***

surgical procedures performed under anaesthesia in children less than 3 years old should be postponed unless the situation is urgent.

Bodolea C. Anaesthesia in early childhood - is the development of the immature brain in danger?. *Rom J Anaesth Intensive Care*. 2016;23(1):33-40.

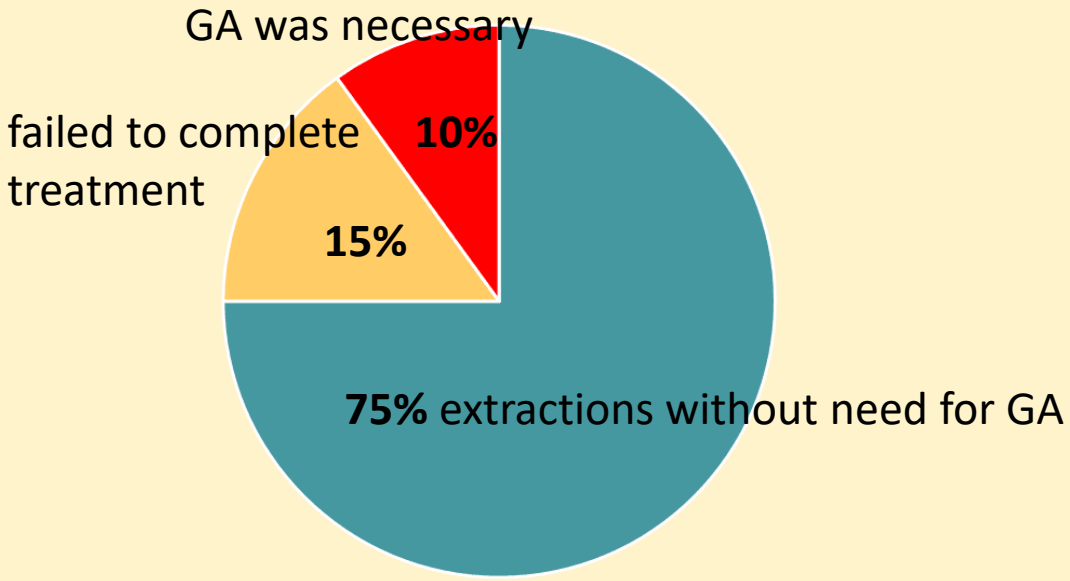
Contraindications

- A healthy, cooperative patient with minimal dental needs
- Orthodontic extractions in clinically healthy children
- Carious, asymptomatic teeth with no clinical/radiological signs of infection/discomfort
- Patient/carer preference
- Alternative methods of pain control haven’t been tried

Contraindications

- Non-valid consent for GA procedure
- Lack of appropriate facilities/properly trained staff
- History of severe side effects related to sedatives (anaphylactic reaction)
- Predisposing medical conditions which would make GA inadvisable : malignant hyperthermia, acetylcoline esterase metabolism disorder, sickle cell anaemia

How many really need GA?



- Young age
- Treatment required in more than one sextant
- Pain as a presenting symptom

RELATIVE predictors for need of GA

Did NOT exclude satisfactory treatment without GA

(*)Tyrer GL: Anaesthesia: Referrals for dental general anaesthetics — how many really need GA? *BDJ* **187**, 440 - 444 (1999).
N=82 normal subj, age 3-14y, for extractions under GA; pre-anaesthetic visit – alternative offer LA (*)

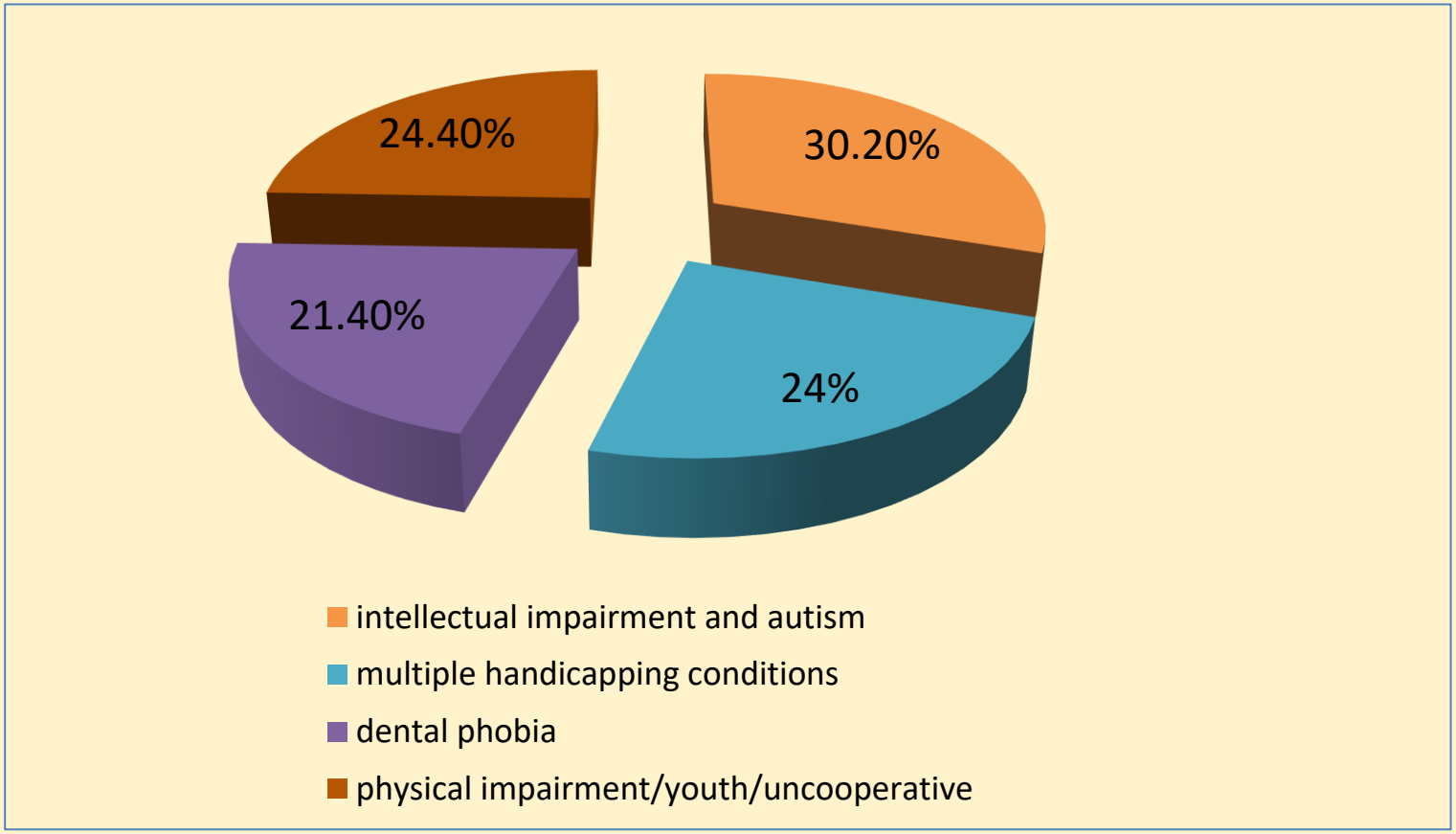
How many really need GA?

N = 85 patients initially referred for GA (Oldham Community Dental Service, UK)

- only 25% of them were subsequently referred for GA
- the rest of the patients accepted dental treatment with routine local anaesthesia (35%) or required inhalation sedation (25%)

Shepherd AR, Ali H, 2015: A care pathway for children unable to accept dental care within the general dental services involving the use of inhalation sedation and general anaesthesia. Prim Dent J. 2015;**4**(2):29-34

Reasons for requesting GA



Nunn JH, Davidson G, Gordon PH, Storss J. A comprehensive review of a service to provide comprehensive dental care under general anesthesia. Spec Care Dent 1995; 15: 97-101.

GA: advantages

- Secured airway control
- Constant monitoring
- Planned dental treatment
- Suitable for uncooperative patients with special needs
- Sometimes, GA is the only available option to prevent further odontogenic complications and health consequences – e.g. before cardiac surgery

GA: disadvantages

- **High cost**
  - In USA, the cost for oral rehabilitation under GA was estimated at greater than $ 450 million per year (*)
  - the mean cost of dental care under GA is three times higher than for sedation (**).

(*) Bruen BK et al. Potentially preventable dental care in operating rooms for children enrolled in Medicaid. J Am Dent Assoc 2016; 147(9):702-8
(**) Prabhu NT, Nunn JH, Evans DJ. A comparison of costs in providing dental care for special needs patients under sedation or general anaesthesia in the North East of England. Prim Dent Care. 2006;13(4):125-8.

Disadvantages

- **Needs hospital setting → limited availability**
- Waiting time for DGA:
  - NW England: **4.5 months** (137 days)
    - N=456 children, mean age 6.78 years (1.50 to 16.42)
    - During wait: 67% had pain, 26% missed schools days, 38% sleepless nights
  - Casablanca, Morocco**: 7.6 months** [SD = 4.2 months]
    - N=127 children received DGA, age 9.2y [SD = 3.4].
    - Reason for referral: Decay (48%), Pain (32%).
  - Toronto, Canada: **4 months** (122 ± 125 days)
    - N=378 children, mean age 4.95 ± 3.68 y
    - 76.2% had comorbid conditions
    - During wait - 9.8% emergency for: dental pain (75.7%), swelling (16.2%), trauma (5.4%) or exfoliating teeth (2.7%).

Goodwin, M., Sanders, C., Davies, G. *et al.* Issues arising following a referral and subsequent wait for extraction under general anaesthetic: impact on children. *BMC Oral Health* **15,** 3 (2015). https://doi.org/10.1186/1472-6831-15-3
Bouchra Badre et al. The Pan African Medical Journal 2014; 17:298 doi:10.11604/pamj.2014.17.298.2714
Chung et al. Clinical Relevance of Access Targets for Elective Dental Treatment under General Anesthesia in Pediatrics ***J Can Dent Assoc 2010;76:a116***

Disadvantages

- More ‘dangerous’ than other options for patiens with medical co-morbidities
- Children should not attend school a day after
- Potentially traumatic for very young patients

The American Society of Anesthesiologists Physical Status Classification System (2014)

ASA PS	Definition	Examples
ASA – I	Normal, healthy patient	
ASA – II	Patient with mild systemic disease	obesity (body mass index [BMI] 31–39), well-controlled diabetes mellitus or hypertension, mild lung disease
ASA – III	Patient with severe systemic disease	poorly controlled diabetes mellitus or hypertension, chronic obstructive pulmonary disease, morbid obesity (BMI > 40), active hepatitis, pacemaker, premature infant PCA < 60 weeks, history (> 3 months) of myocardial infarction (MI), cerebrovascular accident (CVA), or transient ischemic attack (TIA)
ASA – IV	A patient with severe systemic disease that is a constant threat to life	recent (< 3 months prior) MI, CVA, or TIA, ongoing cardiac ischemia, sepsis
ASA – V	A moribund patient who is not expected to survive without the operative	ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, multiple organ/system dysfunction
ASA - VI	A declared brain-dead patient whose organs are being removed for donor purposes	

https://www.asahq.org/standards-and-guidelines/asa-physical-status-classification-system

Recommendations

- Patients with ASA class III - should be evaluated by the anesthesiologist responsible for the decision.
- Patients with ASA class IV and V - are not recommended for sedation /GA .

Special precautions

- BMI score > 40 (severely bariatric patient)
- Chronic severe respiratory conditions (idiopathic sarcoidosis)
- Polyaddiction to drugs
- Previous adverse reactions to analgesis/anaesthetics
- Anticoagulation medication
- Congenital heart dysfunction
- Transplants
- Multiple allergies

Medically compromised patients

- No specific restrictions/precautions for medications prescribed for common medical conditions
- Anti-hypertensive drugs, bronchodilators, antiepileptic drugs, medications for cardiovascular diseases→ no alteration
- Special attention: anxiolytic drugs, tranquilisers→ may interact with medications used for pre-anaesthesia sedation
- Diabetes drugs, corticosteroids→ consult with physician/specialist

Pre-operative assesment

- Possible need for pre-medication & physical intervention during induction of anaesthesia
- Fasting advice: minimum 6 fasting hours
- Medications that should/shouldn't be administered
- Evaluation of BMI: if increased → risk for airway-associated morbidity

Pre-operative assesment

- General record of underlying disease with complete laboratory blood analysis and electrocardiogram and dental history (including X-rays if available) are mandatory
- Dental treatment plan – ideally before GA
- An informed consent for the type of anesthetic technique and the dental treatment will be obtained.
- In cases in which correct and complete examination is impossible prior the intervention, parents will be informed that treatment plan will be established when patient is asleep.

Induction of anaesthesia

- A familiar person can be present during the induction period→accomodation of the patient

- Anxiolysis:
  - music for visually impaired patient
  - favourite personal articles (e.g. toys) into the anaesthetic room
- Body supports → comfort, good position, protection – especially important for patients with physical disabilities
- Eye protection

Dental treatment under GA require

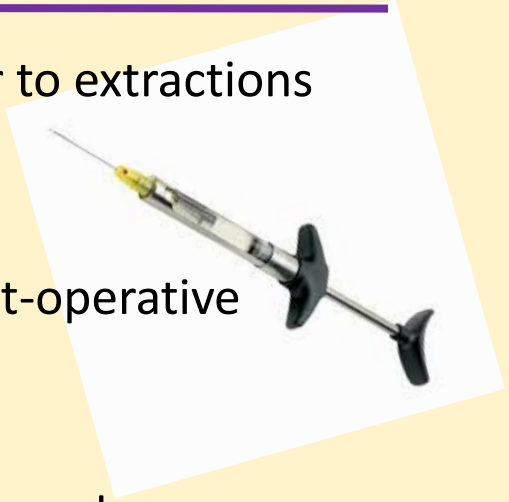
- Naso-tracheal intubation (ideally)
- Closing the pharynx with gauze
- Setting of a mouth opener
- Aspiration of the contents of the oral cavity

General rules

- More radical approach→ dentally fit child, avoid repeated GA in the future
- Ensuring that the child reaches adulthood with a healthy and functional dentition & positive attitude towards dentistry
- Extraction of all teeth with poor/ questionable prognosis

General rules

- Where not contra-indicated, local anesthetic is used prior to extractions and surgical procedures even under GA
  - to reduce pain
  - and, if vasoconstrictor is included, to help control post-operative bleeding



- Whenever possible, nasotracheal intubation is to be preferred over orotracheal intubation

→ better access for dental treatment

→ less operating time

→ allows occlusal adjustments

The usual sequences of the dental treatment

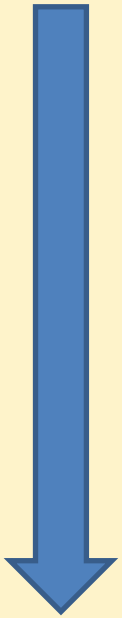
A. Removal of plaque

B. Removal of calculus

C. Restoration of teeth

D. Fissure sealing

E. (Last) surgical interventions



Specific treatment plan

- **In primary dentition**
  - Only teeth with non-complicated caries/pulpitis should be restored
  - Primary teeth with pulp necrosis and with gross crown destruction have to be removed
  - Do not keep primary teeth with pulp necrosis for space maintenance
  - Priority for canines and primary molars

Specific treatment plan

- **In mixed dentition**
  - Absolute priority for permanent teeth
  - Dental care of primary teeth that shall remain longer in the oral cavity
  - Extraction of first permanent molars with poor prognosis

Specific treatment plan

- **In permanent dentition**
  - Restorative treatment of teeth with poor long-term prognosis should not be carried out.

BUT

carefully evaluate risk vs benefit for EACH particular case!

Prognosis of dental treatment under GA in patients with disabilities

Author (year)	Description	Sample	No of teeth	Follow-up period	Survival rate
Chang J et al. (2017)	Endodontic treatment	203	381	6-81 months	92.5%
Chung SH et al. (2019)	Endodontic treatment	241	448	> 1 year	97.4%
Maes MS et al. (2021)	Restorative treatment	101	728	5 years	67.7%

Post-operative care

Especially in very anxious patients

- Persistent nausea and/or vomiting
- Prolonged drowsiness

➢ the incidence of postoperative nausea and vomiting in patients with intellectual disability was 5.6%, higher than that in the general population(*).

(*) Yumura J et al. Risk factors for nausea and vomiting after day care general anesthesia in mentally challenged patients undergoing dental treatment. Bull Tokyo Dent Coll 2011;52:113–118.

Discharge of the patient

- After intervention, patient remains and under hospital supervision for about four hours.

- The patient is ready for discharge when:
  - Consciousness and mobility are at a pre-operative level
  - Physiological monitoring = stable state
  - Pain, nausea and vomiting = minimal and controlled
  - No haemorrhage from the operative site

Discharge of the patient

- All patients should receive on discharge:
  - Verbal and written post operative instructions, including a 24 hours emergency contact telephone number
  - Prescriptions of suitable post-operative medication (e.g. antibiotics, analgesics) and clear instructions for their administration
  - Information on future appointments

Benefits

- Psychological comfort and amnesia of the moment
- Complete control on the patient's vital functions
- Deeper than other types of sedation → permanent monitoring
- Quick administration
- Completely reversible

Benefits

- Treatment of all severe dental disorders in a single session (2-3 hours)
- Allows single-visit endodontics and restorative treatment of teeth with pulp involvement

Benefits

- Immediate effect
- Minimize psychological trauma
- Alternative for patients with allergies for local anesthetics

Disadvantage

- Does not necessarily open possibilities for acceptance of subsequent in-office treatment sessions.

Risks

- Nausea and / or vomiting
- Agitation
- Persistent sedation
- Arrhythmias
- Allergies or anaphylactic shock
- Neurotoxicity
- Fall in blood pressure/hypertension

Risks

- GA without intubation - risk of pulmonary aspiration, laryngospasm and bronchospasm, difficulties in maintaining a clear airway.
- GA with intubation – risk of lesions of the nasal and laryngeal structures due to the endotracheal tube
- Oropharyngeal suction devices → trismus

Dental injuries associated with GA

- Enamel fractures
- Loosened or sub-luxated teeth
- Tooth avulsion
- Crown or root fracture

Dental injuries associated with GA - causes

- Incorrect use of the laryngoscope
- Large forces applied to release oro-pharyngeal pathways
- Insertion/removal of dental props/mouth gags
- Jaw clamps:↑pressure on the teeth.

Long-term outcomes

- A relapse rate of 37% was found for new caries lesions at 6 months post dental surgery (Chase et al., 2004)
- Majority of GA patients experience diseases recurrence within 24 months (Almeida et al., 2000; Eidelman et al., 2000; Amin et al, 2010)
- About 9% of these patients require a repeat dental GA visit (Kakaounaki et al., 2011)

Recurrent DGA

100% caries involvement of **maxillary central incisors** at time of initial treatment; majority of central incisors - non-restorable:

- still using **nursing bottle** at the time of GA;
- **child responsible for brushing** own teeth;
- **poor cooperation** in the medical and dental setting;
- **difficult personality** as described by parent;
- dysfunctional **social** situation

- **lack of follow-up** dental care

ShellerB et al. Repeat treatment under general anesthesia Pediatric Dentistry – 25:6, 2003: 546-552

Conclusions

- For special needs patients, GA is considered case-by-case based on the level of cooperation difficulties.
- Alternative behavior management techniques should be considered prior to the decision to utilize GA → treatment under GA is carried out only as a last resort.
- General anesthesia for patients with disabilities can be performed safely and successfully.
- Patients need to be followed up every 2–6 months during the postoperative period to maintain oral hygiene – to avoid repeated GA.