

## Surgical Technology, Anaesthesia and Pain Medicine, Ambulatory Anaesthesia for Outpatient Surgery

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### Abstract

Owing to burgeoning improvements in surgical technology, anaesthesia and pain medicine, ambulatory anaesthesia for outpatient surgery has become commonplace, with a proportion of 66% in the United States of America, 50% in the United Kingdom, 11%-23% in India and an ambitious 75% in the next decade. Its advent was driven by financial and economic issues which it adequately abates by 25%-75% lesser than an inpatient procedure. Among other benefits to patients, healthcare providers, insurance companies and hospitals, outpatient anaesthesia decreases costs, minimises respiratory failure, enhances early hospital discharge, contributes to the economic growth of the nation, and decreases exposure to nosocomial infections. The growing complexity of surgical methods and number of comorbidities these days have increased the indications for ambulatory anaesthesia. In order for it to be safe and successful, the appropriate selection of patients, surgical and anaesthetic methods as well as postoperative management should be considered simultaneously. Nevertheless, ambulatory anaesthesia is still hindered by limited resources, inadequate expertise, and poor coordination between medical and organisational aspects of care in some countries. This problem can be minimized by providing resources and the training of healthcare providers on better organisation and the use and manipulation of these equipment through seminars and conferences. Furthermore, the global burden of disease study projects an increase in future anaesthesia demands due to the ever rising disease burden worldwide. This can be resolved by adequately managing the challenges of ambulatory anaesthesia and creating more centers either within or without hospitals. By and large, safe and convenient cost-effective methods to ensure patient's quick return to function and recovery are necessary in ambulatory anaesthesia. Still and all, many challenges are being confronted daily, and numerous barriers have to be broken before ambulatory anaesthesia and surgery can make its concrete place and establishment in the clinical society.

**Keywords:** Ambulatory Anaesthesia, uSAFE Anaesthetics, Pain Medications, Fast-Track Recovery

### Introduction

Ambulatory surgery is not just one of the ways to treat a patient, but it is the best way when the indication and patient features have been justified. Ambulatory anaesthesia (AA) is one of the three priorities of public health. Hence, recent advancements in surgical technology, new anaesthesia and pain medicine have made immense progress in ambulatory anaesthesia in this day and age [1,2]. Explicitly, apart from waxing laparoscopic procedures and the emergence of uSAFE (ultrashort-acting fast emergence) anaesthetics with reduced side effects and pain medicines, regional anaesthesia techniques equally make ambulatory anaesthesia widely accepted by surgeons and anaesthesiologists [3]. This is as a result of a fast pace of life, adopting nuclear family structure, the need of early return to work, and resumption of daily routine chores to maintain social and professional competitiveness. Consequently, there is a fast-track recovery from anaesthesia, which is consistent with ambulatory anaesthesia.

The international association for ambulatory surgery (IAAS) defined ambulatory (also called day-care, same day, one day, or day only) surgery as an operation performed for diagnostic or surgical procedures, which permit the patient's return home on the same day of the surgery [2]. Actually, the patient's hospital stay is supposed to be less than 12hours [4].

The ever growing patient population, associated with significant hospital bed shortage and economic constraints were the prime factors for the advent of AA for minimally invasive surgeries [5]. Consequently, small incisions have thrived, and ambulatory surgery therefore, has adequately abated economic issues and hospital bed space management by 25%-75% lesser than an inpatient procedure [1,6,7,8]. The advancements in anaesthesia techniques (local, regional and general anaesthesia; or monitored anaesthesia care with sedation) and the availability of new drugs and surgical technologies have greatly contributed to the progress in AA. Nevertheless, the provision of AA services is quite challenging due to logistics and the effective, efficient and safe organisation of the day-care set up [1]. The 12th International Congress on ambulatory Surgery (IAAS,

2017) summarised a multi-component integrated approach towards ambulatory surgery into two facets: the ambulatory patient is not sick; and the patient is the most important person in their health care team [9].

Historically, some of the first procedures in general anaesthesia fall under what we now call ambulatory surgery. In 1899, James H. Nicoll in Glasgow Royal Hospital for Sick Children operated 460 children for cleft palate and lip using general anaesthesia. These children were discharged on the same day [10]. Though ambulatory surgery went unnoticed initially, it started gaining grounds alongside AA in general hospital in the 1960s. As a result, the Society of Ambulatory Anaesthesia (SAMBA) was founded in 1985, and in 1995, the International Association of Ambulatory Surgery (IAAS) was established by surgeons, anesthesiologists, nurses and hospital managers. The use of AA has rapidly increased ever since; with a current, 65%-70% in the United States of America, 50% in the United Kingdom, 11% to 23% in India, 74% in Denmark, 69% in Sweden, 36% in France, and an ambitious 75% over the next decade [1,6]. Apparently, there will be a projected increase in this treatment type in years to come.

### **The Pros and Cons of Ambulatory Anaesthesia and Surgery**

As a socioeconomically favourable model, the popularity of AA for patients and their families, healthcare providers, hospitals, and healthcare funders is associated with, but not limited to the following potential benefits [1,4,6,8,10,11].

#### **Benefits for Patients and their Families**

- It is associated with low mortality and minimal significant morbidity rates
- Lower overall procedural costs
- Enhancement of early hospital discharge, and facilitates return to daily activities. This therefore decreases the incidence of nosocomial infections
- Decreased incidence of thromboembolic diseases, due to early ambulation
- It shortens patients' separation time from their families, hence decreases perioperative anxiety
- High rates of patient satisfaction
- It permits patient recovery in a familiar environment

#### **Benefits for Hospitals**

- There is a greater flexibility in scheduling surgeries, thus shorter waiting times
- Managing more patients at a time, hence increasing efficiency
- Lack of dependency on available hospital beds
- There is minimal risk of last minute cancellation of surgery, thus elective surgeries can be managed more efficiently.
- It enhances more accurate scheduling and the maximal use of staff, facilities, and hospital resources
- It contributes to the economic growth of the nation

#### **Benefits for Healthcare Funders**

Day surgery allows purchasers a way of containing costs while obtaining high quality, accessible and efficient treatment.

In order for AA to be safe, successful, and provide the aforementioned potential benefits, the appropriate selection of patients, surgical techniques, anaesthetics and pain medicine, as well as postoperative management must be simultaneously considered [6]. Otherwise, it would be concomitant with, though not limited to the following

inconveniences [1]:

- Surgical and anaesthetic complications leading to unplanned hospital readmissions
- Possible chances of negligence in preoperative anaesthetic assessment
- The need for a higher level of expertise
- Lesser compliance to preoperative fasting instructions and preoperative medications
- Higher anxiety levels among patients

### **Ambulatory Surgery Setup and Facility Design**

Ideally, the ambulatory surgical center should be provided in a self-contained unit, that is functionally and structurally different from both the inpatient wards and theatres. It could be hospital integrated, hospital based, freestanding or office based [1,9].

#### **a. Hospital Integrated**

In a hospital integrated ambulatory surgical center, outpatients are managed in the same surgical facility as inpatients. They may have different preoperative preparation and recovery areas.

#### **b. Hospital Based**

The hospital based ambulatory surgical facility is a separate ambulatory facility within a hospital that handles only outpatient surgeries.

#### **c. Freestanding**

Freestanding surgical and diagnostic ambulatory facilities may be associated with a hospital or a medical center, but are contained in separate buildings, without sharing space and patient care functions. Preoperative evaluation, surgical care and recovery take place within these autonomous units. In developing nations, majority of nursing homes and smaller hospitals function in this manner.

#### **d. Office Based**

These operating or diagnostic ambulatory units are managed in conjunction with physician's offices for the convenience of patients and health-care providers.

### **Current Surgical Technology for Ambulatory Surgery**

Day-care surgery can be done in ambulatory centers (affiliated with hospitals or independent from them), outpatient surgical theatres, doctors' offices, and even traditional theatres (as it is more often the case in Cameroon where there are few or no ambulatory centers). Most surgical procedures performed for ambulatory surgery are minimally invasive, thus laparoscopic, though open surgeries are also done. Procedures done in ambulatory surgery are inexhaustive, hence includes the following, among others: dental; general; paediatric; urologic; ear, nose and throat (ENT); gynaecologic; ophthalmologic; and plastic surgeries; not excluding surgeries done in pain clinic patients.

In Cameroon, very few ambulatory surgeries are done due to limited laparoscopic equipment, inadequate expertise to manipulate the few laparoscopic equipment available; limited uSAFE anaesthetics, a poor organisation of the healthcare system, and low socioeconomic status to fund surgical interventions [3]. So far, no prior studies on ambulatory surgery have been done in Cameroon. The few ambulatory surgeries are mostly done in traditional theatres, in doctor's offices, or in diagnostic centers, but very few of them are recorded. These are often done using open surgical procedures, nevertheless, few laparoscopic surgeries are done. Generally, ambulatory surgeries mostly prevail for diagnostic procedures like gastroscopies, magnetic resonance imaging, and endoscopies. However, classical ambulatory surgeries, done in the traditional

operating theatre include:

- Vascular surgeries: the creation of atrio-venous fistulas for long-term dialysis in patients with renal insufficiencies predominate.
- Urologic surgeries: surgical removal of a urethral prosthesis, circumcision, hydrocoelectomy
- Visceral surgeries: uncomplicated hernias (umbilical, epigastric, inguinal) are done on an ambulatory basis or on short-stay basis (where the patient returns home 24hours after the surgical intervention); appendectomy
- Dental surgeries
- Some ophthalmologic surgeries
- Cardiac surgeries: coronarography
- Biopsies are generally done on an ambulatory basis

### Eligibility Criteria and Pre-Requisites for Ambulatory Anaesthesia

Patient screening and selection is one of the primary important pre-requisites for ambulatory surgery and anaesthesia. It depends on patient, surgical, social, medical, and anaesthetic factors [1,4,12].

#### i. Patient Factors

- ✓ They must be sound to understand the delicate intricacies of ambulatory procedures
- ✓ They must be ASA I, II, or stabilized ASA III
- ✓ An adult person must be available to accompany them home at the end of the procedure
- ✓ They should be able to initiate oral intake within few hours after the surgical procedure
- ✓ They should be capable of taking care of themselves for their routine personal chores
- ✓ A good means of transport and communication should be available to the patient at home
- ✓ They should not drive, or operate any heavy machinery on their way home following surgery.

#### ii. Surgical Factors

- Among other things, the duration, severity and potential chances of haemodynamic instability of the surgery should be taken into consideration
- The physician or surgeon should be available within 24hours in case of any emergency readmission.

#### iii. Medical Factors

- Comorbidities should be optimally managed before confirming patient's eligibility for surgery. The commonly associated comorbidities include hypertension, diabetes mellitus, and obesity among others
- The domestic environment must be conducive enough for smooth postoperative management.

#### iv. Anaesthetic Factors

- Besides preanaesthetic patient assessment, evaluating patients' basic minimum laboratory investigations, and their clinical discernment must guide the assessment of their fitness for ambulatory surgery
- The choice of anaesthetic drugs and techniques should be carefully selected in order for it not to interrupt postoperative ambulation.

### Anaesthetic Management in Ambulatory Surgery

The anaesthetic management would be broadly discussed in terms of preanaesthetic patient assessment, anaesthesia techniques and

drugs used intraoperatively and the postoperative management, discharge guidelines and scores [1,6]. With respect to premedication, pharmacologic premedication in such patients is not done systematically, but only reserved for anxious patients [4]. The best premedication, however, lies in good dialogue during preanaesthetic consultation, and the quality of reception given to patients [4].

#### a. Preanaesthetic Assessment

The preanaesthetic assessment is likened to a solid foundation for the ambulatory anaesthesia building. A detailed history and meticulous patient examination can help in the identification of medical comorbidities and risk factors for ambulatory surgery, and the initiation of appropriate measures to optimise patients' clinical status [1,9]. In order to reduce anxiety and related hazards during induction, it is imperative to counsel patients on ambulatory strategies and patient controlled postoperative pain management. Consequently, preanaesthetic assessment is endowed with the following advantages: to begin, there is reduced surgery cancellations and delays. Next, it ameliorates the patient's condition, and allows adjustments to improve their eligibility for ambulatory surgery. This is because health problems can be identified and managed adequately prior to surgery. Moreover, effective patient evaluations speed up the whole process, thus saving time [1,6,9,]. AA has therefore become a subspecialty of its own, as it accommodates increasing number of surgeries, including paediatrics, geriatrics, and patients with comorbidities.

#### Commonly Associated Comorbidities and Risk Stratification

Currently, comorbid diseases such as hypertension, diabetes mellitus, obesity, evolutive coronaropathy, renal insufficiency and obstructive sleep apnoea (OSA) among others are not considered contraindications for ambulatory surgery. They nonetheless have to be discussed according to their severity, while taking their potential risks into consideration [1,4].

With respect to hypertension, doses of antihypertensives are routinely taken on the morning of the surgical intervention, except for angiotensin-converting enzymes inhibitors (ACE inhibitors like enalapril, captopril) and angiotensin II receptor blockers (ARBs or the sartans; for instance, candesartan, losartan), both of which can cause severe intraoperative hypotension. The optimal control of blood pressure with preoperative antihypertensive drugs helps in providing cardioprotection, preservation of renal functions, and attenuation of stress response during laryngoscopy and intubation [1,5].

Diabetes management includes stoppage of oral hypoglycaemics (like metformin) a night before surgery and no insulin on the morning of the surgery. Morning report of fasting blood glucose is extremely helpful. Patients with diabetes should be prioritised as first cases to prevent metabolic consequences due to fasting status. Postoperative nausea and vomiting can be detrimental in diabetic surgical population. The newer anaesthetic techniques and drugs, minimally invasive surgical procedures, and better understanding of diabeto-anaesthesia have revolutionised ambulatory anaesthesia in diabetic patients [1]. Therefore, a careful evaluation is mandatory as diabetes is often associated with other comorbid diseases.

Generally, it is recommended to avoid general anaesthesia (GA) in patients with active respiratory tract infections, hyperreactive airway, and OSA. Bronchospasm during induction and intubation,

as well as during the perioperative period can be severe, especially in patients with chronic obstructive pulmonary disease (COPD) [1].

The body mass index (BMI) is an independent risk factor of perioperative morbidity, and an increased incidence of complications results from progressively higher BMI. Therefore, such patients are ideal for laparoscopic surgical procedures and ambulatory anaesthesia. Patients with OSA pose airway management challenges, which ranges from difficult mask ventilation and intubation; to delayed tracheal extubation, and a need for postoperative reintubation [1]. These can increase the incidence of perioperative complications. Consequently, anaesthesia techniques are selected on an individual basis, bearing in mind that no two patients are the same [1].

Excitingly, all patient groups (from six months old to geriatric populations) can currently enjoy the services of day-care surgery [1,12]. Children are the best candidates to be considered for ambulatory surgery, firstly because of minimal level of anxiety due to separation from parents, and unfamiliar environments. Secondly, they are usually healthy with few or no comorbidities [1,6,7,]. Thirdly, their minimal immunity strength greatly exposes them to nosocomial infections, which is significantly abated with day-care procedures. It is worthy of note that, postoperative apnoea is a cause for concern in patients with a clinical history of respiratory disease.

Nevertheless, a history of thromboembolism during the last 3 months, prosthetic cardiac valves, higher doses of anticoagulants, and critical or decreased platelet count among others, are not eligible for ambulatory surgery. Patients with neurological disorders, and peripheral and autonomic neuropathies are prone to postoperative respiratory complications. Patients with neuromuscular disorders, myasthenia gravis, and muscular dystrophies should not be discharged on the same day [1].

Renal and hepatic diseases are not considered as contraindications for ambulatory surgery. As such, American stratification class III-IV can equally be taken up for elective surgery, provided they meet the fitness criteria laid down for ambulatory anaesthesia [1].

#### **b. Intraoperative Anaesthetic Techniques and Medications**

The anaesthetic technique should be modified and titrated to a level so as to provide optimal anaesthesia with minimal side effects. Current recommendations state that clear liquids can be administered up to 2 hours before surgery, without increasing the gastric volume. Routine administration of metoclopramide and histamine-2 (H<sub>2</sub>) blockers (like ranitidine, cimetidine) is immensely useful in ensuring minimal residual gastric volume and acidity [1,5].

Anaesthetic techniques include: general anaesthesia (GA) techniques (inhalational anaesthesia, and total intravenous anaesthesia); regional anaesthesia techniques (neuraxial block and Bier's block), and local anaesthesia with sedation [1,5,10].

#### **General Anaesthesia (GA)**

Ambulatory anaesthesia prioritises non-invasive airway management as much as possible. Newer airway adjuncts like combitube, proSeal laryngeal mask airway (LMA) and others have greatly revolutionised the non-invasive airway management. In addition, newer drugs like sevoflurane and propofol are ultra-short acting with fast emergence, and have made huge progress in modern day AA practice. GA is the most common anaesthetic technique

done in AA, it can either be done with the use of inhalational, or intravenous agents or still, a combination of both [1,5]. Even though regional anaesthesia techniques are increasingly being used in AA, GA accounts for approximately 55% of all anaesthetic techniques done in ambulatory surgery [2].

#### **Inhalational Anaesthesia**

Traditional inhalational agents such as ether, halothane, isoflurane, nitrous oxide, and others are no longer recommended for use. Sevoflurane and desflurane have been newly discovered, and they are prioritized in modern day practice of AA because of their ultra-short acting and fast emergence (uSAFE) nature. They have a rapid action, fast elimination, and an onset of action for "l'aptitude de la rue," meaning, they have the shortest onset of action possible [12]. But these agents (sevoflurane and desflurane) are still not so much in vogue because of their high procurement cost. With the advent of numerous anaesthesia workstations, and development of advanced vaporisers, inhalational anaesthesia has made burgeoning progression in AA [1,5].

In some African countries like Cameroon and Burkina Faso, halothane and isoflurane are still the main inhalational anaesthetic agents, while sevoflurane is only used minimally in very few hospitals, and desflurane is not used at all, in Cameroon [7].

#### **Total Intravenous Anaesthesia (TIVA)**

The availability of newer and uSAFE intravenous agents like propofol and midazolam, as well as adjuvants such as remifentanyl and dexmedetomidine (precedex®) have almost replaced inhalational agents in modern ambulatory surgery [1]. Propofol has been the major contributory anaesthetic agent in the rapid evolution of ambulatory surgery due to its higher characteristics, whereby, the psychomotor tests normalise in less than 90minutes [12]. Propofol, remifentanyl and dexmedetomidine infusions have galvanised the advancements made in AA, especially in short surgical procedures. TIVA is possible for all kinds of surgery, but it is most especially used in geriatric, paediatric, ophthalmologic, and ENT surgeries. The combination of propofol, fentanyl, or remifentanyl is associated with rapid recovery characteristics, though the availability of remifentanyl is still a big limitation. The muscle relaxants of choice for AA are rocuronium, atracurium, cisatracurium or succinylcholine [1,5].

Propofol and remifentanyl are averagely used in Cameroon, while fentanyl is probably the main opioid analgesic employed in Cameroon. Though atracurium and cisatracurium are not very much used in Cameroon, rocuronium and succinylcholine are widely used within the nation for various types of surgeries.

#### **Regional Anaesthesia (RA)**

Recently, regional anaesthesia has been in vogue for ambulatory surgical procedures due to its enormous benefits: efficient intra and postoperative analgesia, reduced costs, decreased incidence of postoperative nausea and vomiting (PONV), hence less hospital re-admissions [4,13]. Nevertheless, prolonged recovery time for the complete regression of the block lengthens the postoperative care period. The most frequently used regional anaesthesia techniques include: neuraxial anaesthesia, Bier's block, and ultrasound-guided peripheral nerve blocks [1,10].

#### **Neuraxial Anaesthesia**

This technique emerged from modifying the existing spinal

anaesthesia techniques, and the advent of newer drugs which are used as adjuvants to local anaesthetics (LA). Both have made RA a suitable choice for ambulatory surgery. It is important to adapt the spinal anaesthesia technique to the necessity for a rapid patient autonomy. Low dose epidural or spinal anaesthesia is possible with reduced doses of local anaesthetics with the use of opioids and other liposoluble adjuvants. Unilateral or low-dose spinal anaesthesia technique provide comparable recovery characteristics to GA with newer inhalational anaesthetics [13]. Increasing use of spinal needles with smaller gauge and concept of unilateral, and low-dose spinal anaesthesia have proved similar anaesthesia and recovery characteristics when compared with GA using desflurane, sevoflurane and nitrous oxide. Use of spinal needles with gauge smaller than 25 has significantly reduced the incidence of postdural puncture headaches (PDPH) in AA patients [1,5,10].

The introduction of newer local anaesthetic agents such as ropivacaine and levobupivacaine has almost eliminated the risk of transient neurological symptoms, which were frequently encountered with the use of lignocaine, procaine and mepivacaine. Discharge criteria during day-care surgery in such patients should include return of sensory level S4-S5 dermatome, Bromage scale equivalent to preprocedure level, and adequate return of proprioception on standing [1,5,13].

### **Bier's Block**

Bier's block is still the gold standard for many procedures, especially pertaining to surgeries of the forearm. The advent of safe local anaesthetics like ropivacaine and levobupivacaine, the reduction of their dosages, and the use of adjuvants such as dexmedetomidine and clonidine have made Bier's block an extremely safer procedure in modern day anaesthesiology practice [1].

### **Ultrasound-guided Peripheral Nerve Block**

The availability of newer ultrasound equipment in the past decade has given an impetus to peripheral nerve blocking procedures. Apart from the fact that the block is administered with precision, the LA dose is also remarkably reduced. Even procedures like shoulder arthroscopy have now become possible to be performed on a day-care basis [1].

### **Local Anaesthesia with Sedation**

The local infiltration of LA at the incision site is an extremely simple procedure for providing effective postoperative analgesia. This is increasingly being employed even by the nonanaesthesiological fraternity as well, especially in the ophthalmic and ear, nose and throat (ENT) surgical patients. The infiltration of port sites with LA in laparoscopic procedures also provide good pain relief to an extent in the early postoperative period [1,10].

### **Emergency Day-Care Surgeries**

Few procedures with acute surgical emergencies can be taken up for AA. These include, but are not limited to closed reduction of bony fractures; tendon repairs; laparoscopic procedures such as appendectomy and cholecystectomy; ectopic gestation and removal of products of conception; breast abscess drainage, wound debridement and various other incisional and drainage procedures. Nonetheless, the decision regarding discharge has to be the responsibility of both the anaesthesiologist and the attending surgeon [1].

### **Essentials of Monitoring in Ambulatory Anaesthesia**

In the past, huge stress has been made on the 3Ms: minimum mandatory monitoring during ambulatory surgery. Nevertheless, there is no universal consensus on which parameters to be monitored during such procedures besides heart rate, noninvasive blood pressure, pulse oximetry and electrocardiogram. In resource limited settings, it is difficult to monitor the end-tidal CO<sub>2</sub> level and end-tidal concentration of inhalational anaesthetics. In developed nations, even the bispectral index system also forms the component of minimum mandatory monitoring which is greatly helpful in maintaining the adequate depth of anaesthesia, faster recovery, and minimum postoperative complications [1].

### **c. Post-operative Management, and Discharge Guidelines and Scores**

The recovery characteristics is the most important aspect during the postoperative period as patient's discharge from the hospital on ambulatory basis is decided after evaluating their recovery characteristics. Major issues before discharge such as any episode of bradycardia, hypotension, haemorrhage, PDPH, transient neurological symptoms, pain, respiratory depression, urinary retention, shivering, postoperative nausea and vomiting among others can possibly defeat the goals of AA. Recovery is usually divided in three (3) stages: early, intermediate and late recovery [1,10].

The early stage is associated with patient awakening with the return of protection reflexes. Patients undergoing local anaesthesia generally have a fast-track recovery.

With regards the intermediate stage, it begins when the patient is admitted in the postanesthesia recovery care unit until their discharge from the hospital. Any complications or symptoms during this stage can be easily managed as the recovery unit of the ambulatory surgery is usually well equipped and staffed. However, the ability to take oral fluids and self-ambulation for micturition are not considered vital criteria for discharge. The regression of neuraxial blockade beyond S3 level helps in the return of the micturition reflex.

The late recovery stage terminates when the patient fully recovers from the physiological and psychological aspects of the surgical procedure. A written set of instructions, and the contact number of the attending doctor should be handed over to the patient and the accompanying persons during discharge and should be asked to contact the attending surgeon immediately on appearance of any signs or symptoms. Ideally, such patients should be handed over summary of general details pertaining to ambulatory anaesthesia and surgical procedure.

Numerous scoring systems such as clinical recovery score, Stewart recovery score, aldrete score (for medical discharge, AS), postanesthesia discharge scoring systems (PADSS, for physical discharge) and others have been developed to monitor patients before discharge. The clinical usefulness of each varies slightly with dependence on demographic and clinical factors [1,9,10].

Nonetheless, AS serves as a better method during the initial part of recovery after AA, whereas PADSSs are more useful during discharge of the patient after ambulatory anaesthesia. The AS and PADSSs are shown on (Table 1 & 2) [9].

As a matter of fact, clinicians do not depend entirely on these rigid scoring systems. In routine practice, a blend of these scores and subjective clinical acumen (Table 3) is very useful in taking appropriate decisions relating to patient discharge.

**Table 1: The Aldrete Score**

Variable	Score
Respiration	2: able to take deep breath and cough 1: dyspnoea or shallow breathing 0: apnoea
Oxygen Saturation	2: maintains saturation > 92% in ambient air 1: saturation > 90% with oxygen inhalation 0: saturation < 90% even with supplemental oxygen
Consciousness	2: fully awake 1: arousable on calling 0: not responding
Circulation	2: BP $\pm$ 20mmHg preoperative value 1: BP $\pm$ 20-50mmHg preoperative value 0: BP $\pm$ 50mmHg preoperative value
Activity	2: able to move 4 extremities 1: able to move 2 extremities 0: unable to move extremities

Source: (Bajwa et al, 2017)[1]

**Comment:** the total score is 10. Patients scoring  $\geq 8$  (and / or are returned to similar preoperative status) are considered fit for transition to phase II recovery.

**Table 2: Postanaesthesia Discharge Scoring System (PADSS)**

Variable	Score
<b>Vital signs</b>	
Within 20% of preoperative value	2
20%-40% of preoperative value	1
40% preoperative value	0
<b>Ambulation and mental status</b>	
Oriented x 3 and has a steady gait	2
Oriented x 3 or has a steady gait	1
Neither oriented nor has a steady gait	0
<b>Pain or nausea and vomiting</b>	
Minimal	2
Moderate	1
Severe	0
<b>Surgical bleeding</b>	
Minimal	2
Moderate	1
Severe	0
<b>Intake and output</b>	
Has had per oral fluids and has voided	2
Has had per oral fluids or has voided	1
Has neither consumed per oral fluids, nor has voided	0

Source: (Bajwa et al, 2017) [1]

However, the risk of hospitalisation should be anticipated in ambulatory patients during the programming of the surgical act, and the patient and his family should be informed [4].

**Table 3: Ambulatory Discharge Criteria**

- Reflexes:** all life preserving reflexes like airway, gag, and cough, must be returned to normal
- Vital signs:** the vital signs must be stable without orthostatic changes
- Coordination:** a good coordination of various motor, sensory and psychologic body functions
- Neuraxial anaesthesia:** recovery should be assessed by the return of lower sensory levels, and a Bromage score less than 1
- Hypoxaemia:** it must be absent 20minutes after weaning the patient from supplemental oxygen
- Orientation:** patient must be oriented to person, place, time and situation
- Nausea and vomiting:** must be controlled, and patient should tolerate fluids per os
- Postoperative haemorrhage or expanding ecchymosis:** must be absent, as well as controlled
- Incisional pain:** this should be reasonably controlled
- Posture and mobility:** the patient should have a good perianal sensation, ability to self-ambulate, normal flexion and extension of the foot, and be able to sit up without support
- Communication:** patient should have a good communication with the attending surgeon or anaesthesiologist
- Understanding:** the patient should understand the requirements of postanaesthesia care and should follow advice as to when to resume daily activities.

Source: (Bajwa et al, 2017) [1].

Generally, fast-track surgery cares for the ambulatory patient using different techniques undergoing ambulatory procedures. This implies, the use of regional or spinal anaesthesia, minimally invasive surgery, excellent pain control, and fast rehabilitation (early oral nutrition and mobilisation). Such a surgery shortens recovery time by reducing patient stress response and accompanying organ dysfunction [10].

### Management of Postoperative Pain and Postoperative Nausea and Vomiting (PONV)

Though the rate of complications following ambulatory surgery is very low, the two most frequent, non-surgical complications of ambulatory surgery are pain and PONV. The headlines of their management are discussed here. The rate of unprogrammed hospitalisations is approximately 0.26%-2.6% according to the surgical teams and surgery practiced [4]. Generally, many unprogrammed hospitalisations are recorded in gynaecologic surgeries, particularly after coelioscopy and urologic surgeries, owing to bleeding or pain that cannot be managed at home [4].

### The Management of Postoperative Pain

Postoperative pain is highly distressing to the patient, it disrupts or prevents sleep, and hinders physical activity. A combination of multimodal systemic analgesics and local or regional anaesthetic techniques will help to enhance the quality of pain relief. Nonopioid analgesics like paracetamol, and nonsteroidal anti-inflammatory drugs (NSAIDs) are used as adjuvants to opioid analgesics before the patient wakes up, and it continues in the postanaesthesia care

unit (PACU), afterwards, they are administered orally [12,14].

Adding codeine to paracetamol enhances the analgesia. This association is often used in ambulatory surgery. Codeine has a good clinical tolerance but also, and most importantly, its pharmacokinetics superposes with that of paracetamol, enhancing their positive analgesic interaction [10,12].

The NSAIDS permit a reduction in the need for opioid analgesics postoperatively by 25%-50%, hence, decreasing their nausea effects. However, it is recommended to use the lowest effective dose of NSAIDS to minimise their secondary effects on certain organs. The incidence of morphine's undesirable effects (PONV and respiratory depression) is low. Initially, it should be administered intravenously before the patient awakes for extremely painful surgeries, and later on, administered in the PACU. Such administration should be titrated in small sequential doses, while talking interindividual variations into consideration. The oral route of morphine is increasingly being used in ambulatory surgery, and it is prescribed as home analgesia [10,12].

Tramadol is a morphine agonist on the  $\mu$  receptors with central monoaminergic effects. Like oral morphine, tramadol can be used secondarily, when the pain is moderate or poorly controlled by paracetamol or NSAIDS [12].

Furthermore, agents like gabapentinoids, alpha-2 agonists, ketamine, esmolol and nonpharmacologic techniques like transcutaneous electrical nerve stimulation have been used for pain relief in day surgery [10,14].

### The Management of PONV

PONV is an unpleasant experience, and has been described as one of the most undesirable outcomes of anaesthesia from a patient's perspective. It not only leads to delayed recovery and discharge from the ambulatory unit, but it may also be responsible for unplanned admission [10,13]. The incidence of PONV can be as high as ~ 80% in high risk patients, with incidence of vomiting ~ 30% and nausea ~ 50% and 20%-30% in contemporary practice [10,15]. Though it is imperative to predict the occurrence of PONV, it can be managed using antiemetics, intravenous hydration and narcotic analgesia [15].

Droperidol is a powerful antiemetic through its antagonistic effects on the dopaminergic (D2) receptors. Nevertheless, its use is limited due to its secondary effects that can counteract the motive of ambulatory surgery (patient's discharge on the same day of the surgery), which are sedation, akathisia and arrhythmias. These effects can be reduced by decreasing the dose [12]. Also, 5mg of dexamethasone effectively decreases the risk of PONV in laparoscopic ambulatory surgery more effectively than 10mg of metoclopramide [12].

Recently, the society of ambulatory anaesthesia (SAMBA) has updated its guidelines to avoid PONV. The guidelines highlight the risk factors associated with PONV in adults and children, provides strategies to reduce baseline risks, and lists of recommendations for the prophylaxis and treatment of PONV. The prophylaxis for PONV should be considered for patients with moderate and high risks. The independent risk factors are both patient-related (the female gender; non-smoking; history of PONV, motion sickness and migraine; paediatric age; and obesity in patients with other risk factors of PONV) and anaesthesia-related (use of opioids;

inhalational anaesthesia and nitrous oxide  $N_2O$  use; and a long duration of anaesthesia) [10].

### Cost-Effectiveness

The cost-effectiveness of AA can be derived from the fact that a minimum workforce is required as the patients are not admitted for the night and the short recovery times are translated into cost savings. Hospital resources are also spared which is hugely beneficial in resource-challenged settings of developing nations. Cost-effectiveness is further enhanced with setting up of audit of AA procedures which can improve the quality and efficiency of patient care.

### Recommendations

Despite the enormous benefits provided by the wide use of AA, it is still quite gloomy in developing countries like Cameroon. In addition to the poor organisation of the health care system, there are limited laparoscopic equipment and uSAFE drugs, inadequate expertise to manipulate the few available equipment, and low socioeconomic status to pay for same-day surgeries, among others. The provision of laparoscopic equipment, followed by seminars on training health personnels on the use and manipulation of these equipment, and a better organisation of health care delivery, will enhance the practice of ambulatory surgeries in Cameroon. Day-care surgery can begin from traditional theatres and doctor's offices, before emanating to ambulatory centers in later years.

### Conclusion

By and large, safe and convenient cost-effective methods to ensure patient's quick return to function and recovery are necessary in ambulatory anaesthesia. Still and all, many challenges are being confronted daily, and numerous barriers have to be broken before ambulatory anaesthesia and surgery can make its concrete place and establishment in the clinical society. The patient's comfort, recovery and autonomy is the prime concern in ambulatory surgery where the patient is "king". They should be treated as individuals, eligible for ambulatory surgery, and must undergo adequate preanaesthetic evaluation. Unfortunately, the poor organisational set-up of Cameroonian operating rooms, the unavailability of equipment and uSAFE drugs has made AA quite gloomy in Cameroon. It would be great to have ambulatory anaesthesia fully established in all parts of the world in years to come. Employing the best patient-centered strategy to meet the needs of future patients, while preserving economic feasibility within an already strained health care system would be ideal in future ambulatory surgeries.

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