This webinar will explain the components of general anaesthesia, and the permutations for induction and maintenance by inhalation or intravenous agents. The key role of neuromuscular blockade (‘paralysis’) will be stressed. Explicit awareness is a consequence of inadequate anaesthesia in association with neuromuscular blockade (which prevents the patient communicating wakefulness). Processed EEG monitoring has not gained widespread acceptance in the UK. Propofol, in combination with an opioid such as remifentanil, is used for total intravenous anaesthesia (TIVA). This technique has evolved into target-controlled infusion (TCI) anaesthesia (syringe pumps incorporating computer programs with pharmacokinetic algorithms).

Developments in fibre-optic technology and miniaturisation of digital cameras have facilitated major advances in airway management. Tracheal tubes can be placed through the larynx under direct vision. Supraglottic airways such as the laryngeal mask are used routinely for anaesthesia for short procedures. Tracheal intubation remains essential when a seal is required between respiratory and gastro-intestinal tracts, or if a patient has to be placed prone. In the event of ‘can’t intubate, can’t ventilate’, an emergency subglottic airway (cricothyroidotomy) might be required.

Surgical procedures designated for ‘local anaesthetic’ are generally those minor operations in which the surgeon infiltrates local anaesthetic. ‘Regional’ anaesthesia encompasses both neuraxial administration of local anaesthetic (spinals, epidurals, and combined spinal-epidurals) and blockade of peripheral nerve trunks (e.g. brachial and lumbar plexuses). Local anaesthetic systemic toxicity, the result of either accidental intravenous administration or exceeding maximum recommended doses for infiltration, manifests itself as a seizure and subsequent cardiac arrest. Intralipid™ is a potentially life-saving recent therapeutic advance.

A UK National Audit Project found that 700 000 spinals, epidurals and combined spinal-epidurals are undertaken annually. It was estimated that permanent harm results in up to 1 in 25 000 cases.
Siting an epidural catheter entails insertion of a needle deep to the ligaments of the backbone but outside the meninges (dura, arachnoid and pia), the membranes that contain the cerebrospinal fluid (CSF).

Successful negotiation of a finer gauge spinal needle through the meninges allows injection of local anaesthetic and opioid directly into the CSF. This is a spinal anaesthetic. Spinal anaesthetics tend to result in a higher quality of anaesthesia. Injection of an overdose of local anaesthetic can result in a ‘total’ spinal – blockade of the nerves supplying the diaphragm and consequently respiratory arrest.

Whereas awareness reflects inadequate depth of general anaesthesia, intra-operative pain - the consequence of failure to anaesthetise all the nerves supplying the surgical field - is the parallel in the awake patient having surgery under regional anaesthesia.

In Chronic Adhesive Arachnoiditis, an initial inflammatory response evolves into a process of collagen deposition and shrinkage of nerve tissue. There is controversy regarding the possible causative role of chlorhexidine (a commonly used antiseptic skin disinfectant) reaching the neuraxis.

Guidelines on consent have been published by the Association of Anaesthetists of Great Britain and Ireland. A formal signed consent form is not necessary for anaesthesia and anaesthesia-related procedures. Obligatory checklists and pre-operative briefing/postoperative debriefing have become embedded practice in the last few years. The pivotal contribution of non-technical skills (i.e. human factors) in critical incident management has been recognised.

Patient positioning is a collaborative effort involving surgeon, anaesthetist and theatre practitioner. Limb traction and pressure on nerves must be avoided. The prone position entails additional substantial risks: regular checks must be made to verify that no pressure is applied to the eyes in particular.

The salient risk of blood transfusion is administration to the wrong patient. Anaphylaxis in anaesthesia is triggered most commonly by neuromuscular blocking drugs or intravenous antibiotics. Investigation of a suspected reaction requires formal skin prick testing by an allergist. The ‘4 Hs and 4Ts’ mnemonic lists reversible causes of cardiac arrest: hypoxia, hypovolaemia, hypovolaemia, hypovolaemia, hypovolaemia.
Hyperkalaemia, hypothermia, thrombosis (coronary or pulmonary), cardiac tamponade, toxins, and tension pneumothorax.

References

National Audit Project (NAP) 3: http://www.rcoa.ac.uk/nap3

LipidRescue™: http://lipidrescue.squarespace.com/


Difficult Airway Society guidelines: http://www.das.uk.com/guidelines/guidelineshome.html

Royal College of Anaesthetists - Anaesthesia explained: http://www.rcoa.ac.uk/document-store/anaesthesia-explained