

In anaesthesia literature we come across the term 'gold standard' many a times. We look at the origin of the term and some old, new and emerging standards. We find some gold standards retain their unique position for a long time, while some may change over time.

Actually the term gold standard is taken from economics. It is a monetary standard under which the basic unit of currency is equal in value and exchangeable for a specific amount of gold. That means in USA, the worth of a dollar was guaranteed by gold held by the federal government.

After the second world war, the real gold standard was discontinued and a system similar to that was established by Bretton Woods Agreements. Under this system many countries fixed their exchange rate relative to the US dollar. USA promised to fix the price of gold at \$35 per ounce. But in 1971, even that was abolished. So now gold standard is no more in existence as it is being replaced by fiat currencies. It is interesting to note that, though the system of gold standard was abolished, we in the medical field continue to use the term.

The gold standards cannot remain static and can change over time. With the advent of new drugs, newer technologies and better understanding of human body, the possibility of changes are always there. Hence several existing gold standards can change with new inventions, though some of them, because of their superior qualities retain their position.

First we look at some standards which have not changed over time. Examples are morphine for moderate to severe pain, cuffed endotracheal tube for airway control, rapid sequence intubation for prevention of gastric aspiration, succinyl choline for rapid sequence intubation, right heart catheterisation for diagnosing pulmonary hypertension.

Morphine is an example of a gold standard which has remained over centuries. In fact it is the first analgesic known to man. It was isolated in 1804, first commercially sold by Merck in 1827. It remains the gold standard analgesic for moderate to severe pain, though it has multiple side effects. All the opiates and non-opiates which were used after morphine, could not replace it.

Isolation and securing the airway during anaesthesia was not thought of for more than 50 years after the

Gold standards and anaesthesia

Sir,

McGraw-Hill concise dictionary of modern medicine defines gold standard as the best or most successful therapeutic or diagnostic modality against which new protocols or tests or results are compared.

demonstration of ether by Morton in 1846. The first attempts at airway control were the basic airway manoeuvres of head tilt, chin lift, and jaw thrust. Later face masks were developed, first by Francis Sibson and Guedel airways were introduced in 1935. Magill and Rowbotham developed non-cuffed endotracheal tubes. Later cuffed endotracheal tubes were promoted by Arthur Guedel and Ralph M Waters, and now red rubber and Portex tubes are in use.

Recently A.J. Brain developed classic Laryngeal Mask Airway (LMA) in 1983, and later a large number of LMA family members were developed. But the gold standard for control of airway remains to be intubation with cuffed endotracheal tube.

Rapid sequence intubation is the gold standard for prevention of aspiration of gastric contents. It was originally described in anaesthesia literature as a method of airway management to minimise risk of aspiration in patients undergoing emergency caesarean section.^[1] But now it has become a part of emergency medicine practice. The succinylcholine which was introduced in 1952 remains the gold standard muscle relaxant for rapidly securing the airway even after introduction of rocuronium in 1990s.

Another gold standard which has withstood time is right heart catheterisation which came into being in 1930, for diagnosing pulmonary hypertension. It enables direct determination of right atrial and ventricular pressure, pulmonary artery pressure, capillary wedge pressure, pulmonary blood flow and responses of these parameters to intervention. Diagnostic entities which came later were CT scan in 1970s, echocardiography, ventilation perfusion scan.

The gold standard for detection of coronary ischaemic diseases is coronary angiography which is used since 1960. Though other diagnostic modalities like myocardial perfusion scan, thallium 201, technetium 99 m scans had come in the last 20 years, the gold standard remains the same.

The case of paediatric induction is very interesting. Inhalational induction is the gold standard. The technique has remained the same over the years, but the inhalation agent has changed. When halothane came into practice in 1956, suddenly it became the gold standard. But in 1990 when sevoflurane came, it replaced halothane due to its superior qualities.

Now we look at some of the standards which have changed over the years. Thiopentone after its discovery in 1934, became the gold standard for intravenous induction.^[2] But when propofol was introduced in 1984, it displaced thiopentone.

Before the development of ultrasound machine for anaesthesiology, the gold standard for peripheral nerve block was multiple injection technique using nerve stimulator. The ultrasound machine offers several advantages like improved block success rate, reduced complications and easier skill acquisition. An editorial in British Journal of Anaesthesia suggests that ultrasound has already emerged as the gold standard for nerve blocks.^[3]

Oral glucose tolerance test is the gold standard for diagnosing diabetes mellitus. But with the invention of Glycosylated haemoglobin (HbA_{1c}) test, we are able to get evidence of glucose control over the previous two months. Davidson MB had suggested in JAMA, that HbA_{1c} should replace the oral glucose tolerance test as the gold standard for diagnosis of diabetes mellitus.^[4]

For checking the tube position after intubation, there are more than twenty described methods. But the gold standard is detection of CO₂ in the exhaled gas, by capnography. ASA standards for basic monitoring suggest the use of capnography.

There are many methods of managing a difficult airway. They include many supraglottic devices and invasive procedures like retrograde intubation and cricothyroidotomy. But the gold standard is awake flexible fiberoptic intubation.

After the invention of transoesophageal echocardiography (TEE) and colour mapping, it has become the gold standard for diagnosing a number of pathological conditions. TEE was first described in 1976, and was used in anaesthesia practice later. Biplane TEE and colour flow mapping came in 1980s. TEE has now become an essential tool in the perioperative period for the anaesthesiologist. This has become the gold standard for diagnosing perioperative myocardial ischaemia or infarction,^[5] cardiac valvular pathologies, aortic dissection, evaluation of prosthetic valves and infective endocarditis.^[6]

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