Miscellaneous

Q: Theme: Administration of local anaesthetics

A. 50ml of lignocaine 2% with 1 in 200,000 adrenaline
B. 25ml of lignocaine 2% with 1 in 200,000 adrenaline
C. 45ml 0.25% bupivicaine plain
D. 45ml 0.5% bupivicaine with 1 in 200,000 adrenaline
E. 25ml 1% lignocaine plain
F. 15ml 1% lignocaine plain
G. 30ml 1% lignocaine with 1 in 200,000 adrenaline
H. 45ml 0.25% bupivicaine with 1 in 200,000 adrenaline

Please select the most appropriate local anaesthetic choice for procedure and indication described. Each option may be used once, more than once or not at all.

1. An 80 kg 30 year old male undergoes a difficult appendicectomy via a lower midline abdominal incision. Prior to this event he was well.

 45ml 0.25% bupivicaine plain

Wound infiltration is best performed using long acting local anaesthetic agent.

2. A 50kg 65 year old women presents to the surgeons for excision of a lump from her thigh. She has longstanding depression for which she takes phenelzine. She is otherwise well.

 You answered 30ml 1% lignocaine with 1 in 200,000 adrenaline

The correct answer is 15ml 1% lignocaine plain

Adrenaline containing agents are contra indicated when MAOI drugs are present as they may precipitate a hypertensive crisis.

3. A 50 kg 60 year old women presents to the surgeons for excision of lump from her back under local anaesthesia. She has longstanding depression for which she takes venlafaxine. She is otherwise well.

 You answered 25ml 1% lignocaine plain

The correct answer is 30ml 1% lignocaine with 1 in 200,000 adrenaline

Surgery on the back is often bloody and use of an adrenaline containing solution can be beneficial. SNRI's are not a contra indication to the use of adrenaline containing agents.

Local anaesthetic agents

Lidocaine

- An amide
- Local anaesthetic and a less commonly used antiarrhythmic (affects Na channels in the axon)
- Hepatic metabolism, protein bound, renally excreted
- Toxicity: due to IV or excess administration. Increased risk if liver dysfunction or low protein states. Note acidosis causes lidocaine to detach from protein binding.
- Drug interactions: Beta blockers, ciprofloxacin, phenytoin
- Features of toxicity: Initial CNS over activity then depression as lidocaine initially blocks inhibitory pathways then blocks both inhibitory and activating pathways. Cardiac arrhythmias.
- Increased doses may be used when combined with adrenaline to limit systemic absorption.

Cocaine

- Pure cocaine is a salt, usually cocaine hydrochloride. It is supplied for local anaesthetic purposes as a paste.
- It is supplied for clinical use in concentrations of 4 and 10%. It may be applied topically to the nasal mucosa. It has a rapid onset of action and has the additional advantage of causing marked vasoconstriction.
- It is lipophillic and will readily cross the blood brain barrier. Its systemic effects also include cardiac arrhythmias and tachycardia.
- Apart from its limited use in ENT surgery it is otherwise used rarely in mainstream surgical practice.

Bupivacaine

- Bupivacaine binds to the intracellular portion of sodium channels and blocks sodium influx into nerve cells, which prevents depolarization.
- It has a much longer duration of action than lignocaine and this is of use in that it may be used for topical wound infiltration at the conclusion of surgical procedures with long duration analgesic effect.
- It is cardiotoxic and is therefore contra indicated in regional blockage in case the tourniquet fails.
- Levobupivicaine (Chirocaine) is less cardiotoxic and causes less vasodilation.

Prilocaine

- Similar mechanism of action to other local anaesthetic agents. However, it is far less cardiotoxic and is therefore the agent of choice for intravenous regional anaesthesia e.g. Biers Block.

All local anaesthetic agents dissociate in tissues and this contributes to their therapeutic effect. The dissociation constant shifts in tissues that are acidic e.g. where an abscess is present, and this reduces the efficacy.

Doses of local anaesthetics

Agent	Dose plain	Dose with adrenaline
Lignocaine	3mg/Kg	7mg/Kg

Bupivacaine	2mg/Kg	2mg/Kg
Prilocaine	6mg/Kg	9mg/Kg

These are a guide only as actual doses depend on site of administration, tissue vascularity and co-morbidities.

Maximum total local anaesthetic doses

- Lignocaine 1% plain - 3mg/ Kg - 200mg (20ml)
- Lignocaine 1% with 1 in 200,000 adrenaline - 7mg/Kg - 500mg (50ml)
- Bupivicaine 0.5% - 2mg/kg- 150mg (30ml)

Maximum doses are based on ideal body weight

Effects of adrenaline
Adrenaline may be added to local anaesthetic drugs. It prolongs the duration of action at the site of injection and permits usage of higher doses (see above). It is contra indicated in patients taking MAOI's or tricyclic antidepressants. The toxicity of bupivacaine is related to protein binding and addition of adrenaline to this drug does not permit increases in the total dose of bupivacaine, in contrast to the situation with lignocaine.

References
An excellent review is provided by:
French J and Sharp L. Local Anaesthetics. *Ann R Coll Surg Engl* 2012; 94: 76-80.

Q: Botulinum toxin is a popular therapeutic agent. By what mechanism does it exert its effects?

☐	Inhibits release of acetylcholine into the neuronal synapse
☐	Blockade of the post synaptic acetylcholine receptor
☐	Increased hydrolysis of acetylcholine within the synapse
☐	Release of sterically altered acetylcholine into the synapse
☐	Increased re-uptake from within the synapse

Botulinum toxin

Botulinum toxins are produced by the bacterium *Clostridium botulinum*. The toxin is a two chain polypeptide. One of the chains is a protease that is able to attack fusion proteins at the neuromuscular junction preventing vesicles from anchoring to the membrane to release acetylcholine. By inhibiting acetylcholine release, the toxin interferes with nerve impulses and causes flaccid (sagging) paralysis of muscles in botulism, as opposed to the spastic paralysis seen in tetanus.
Botulinum toxin A is the agent used therapeutically and small doses are typically administered to the desired area. The doses are small and so in some cases the effects of treatment are transient and will wear off with time. Repeated dosing can result in more enduring muscular paralysis.

Q: What is the effect of increasing the confidence limit from 95% to 99%?

☐	Confidence interval widens
☐	Confidence interval remains unchanged
☐	Confidence interval narrows
☐	The study data becomes less accurate
☐	None of the above

The confidence limit is expressed as a percentage, usually 95%. Increasing it will increase the range of values. For example if the 95% confidence interval was between 50 and 55 and the confidence limit were increased to 99% then the value range would widen (say from 48 to 57). Conversely decreasing the confidence limit would decrease the range of values (from 52 to 54, for example).

Confidence intervals

A 95% confidence interval is often interpreted as indicating a range within which we can be 95% certain that the true effect lies. This statement is a loose interpretation, but is useful as a rough guide. The strictly-correct interpretation of a confidence interval is based on the hypothetical notion of considering the results that would be obtained if the study were repeated many times. If a study were repeated infinitely often, and on each occasion a 95% confidence interval calculated, then ninety five percent of these intervals would contain the true effect.

Q: **Theme:** Antimicrobial prophylaxis for gastrointestinal endoscopy

A. Intravenous teicoplanin
B. Oral ciprofloxacin
C. No antimicrobial prophylaxis
D. Intravenous co-amoxylav
E. Oral penicillin V
F. Intravenous tazocin

Please select the most appropriate antimicrobial prophylaxis for the following individuals who are undergoing gastrointestinal endoscopy. Each option should be used once, more than once or not at all.

6. A 38 year old man with primary sclerosing cholangitis needs an ERCP and biliary decompression.

✗ You answered Intravenous tazocin

The correct answer is Oral ciprofloxacin

PSC decompression is technically challenging and seldom achieved at the first attempt. Antimicrobial

cover is recommended in such cases and ciprofloxacin is the agent of choice.

7. A 45 year old women has mitral regurgitation and is due to undergo a colonoscopy.

☑ No antimicrobial prophylaxis

Antibiotics are not routinely indicated for prophylaxis for routine cases.

8. A 38 year old lady is due to undergo an upper GI endoscopy with duodenal biopsies. She has a mechanical aortic valve.

☒ You answered Intravenous co-amoxylav

The correct answer is No antimicrobial prophylaxis

Again, antibiotics are no longer routinely administered.

Antimicrobial cover for gastrointestinal endoscopy

- Routine antibiotics are not indicated for diagnostic upper and lower GI endoscopy
- Antimicrobial prophylaxis is not longer advocated for those individuals with underlying cardiac disease undergoing upper and lower GI endoscopy
- Prophylaxis is indicated in some therapeutic procedures (in all patients) including: ERCP for cholangitis, PEG insertion, PEC insertion, endoscopic FNA

References

Allison M *et al*. Antibiotic prophylaxis in gastrointestinal endoscopy. *Gut* 2009 (58): 869-880.

Next question

Q: Which of the following is a major component of cryoprecipitate?

☐	Protein C
☐	Protein S
☐	Factor V
☐	Factor VIII
☐	Factor IX

Cryoprecipitate

- Blood product made from plasma
- Usually transfused as 6 unit pool
- Indications include massive haemorrhage and uncontrolled bleeding due to haemophilia

Composition

Agent	Quantity
Factor VIII	100IU
Fibrinogen	250mg
von Willebrand factor	Variable
Factor XIII	Variable

Q: An 80 year old lady is investigated in the pre operative clinic and found to have severe aortic stenosis. What, if any, is the main peri operative concern?

☐	They cannot adjust their heart rate
☐	They may have ventricular hypertrophy
☐	The patient cannot increase their cardiac output
☐	They are more prone to arrhythmias
☐	There is no concern

Patients with aortic stenosis are a major perioperative concern. They may have ventricular hypertrophy and this can result in relative myocardial ischaemia and increase the risk of arrhymias. However, the main concern is that they cannot increase their cardiac output particularly if vasodilation occurs.

Aortic stenosis

- Narrowing of the aortic valve
- May occur as a result of rheumatic fever or with aging and calcific changes
- Congenitally may occur earlier due to calcification of a bicuspid aortic valve (1-2% of population)
- Symptoms include exertional angina and syncope
- Where the condition is suspected, trans thoracic echocardiography is the investigation of choice

Severity

Degree	Mean gradient (mmHg)	Aortic valve area (cm^2)
Mild	<25	>1.5
Moderate	25-40	1.0-1.5
Severe	>40	<1

Treatment
Either transcatheter or open aortic valve replacement

Q: A 28 year old lady presents with a pigmented lesion on her calf. Excisional biopsy confirms a diagnosis of melanoma measuring 1cm in diameter with a Breslow thickness of 0.5mm. The lesion is close <1 mm to all resection margins. Which of the following surgical resection margins is acceptable for this lesion?

☐	2 cm
☐	0.5 cm
☐	3 cm
☐	5 cm
☐	1 cm

Malignant melanoma

The main diagnostic features (major criteria):	Secondary features (minor criteria)
• **Change in size** • **Change in shape** • **Change in colour**	• **Diameter >6mm** • **Inflammation** • **Oozing or bleeding** • **Altered sensation**

Treatment

- Suspicious lesions should undergo excision biopsy. The lesion should be removed completely as incision biopsy can make subsequent histopathological assessment difficult.
- Once the diagnosis is confirmed the pathology report should be reviewed to determine whether further re-excision of margins is required (see below):

Margins of excision-Related to Breslow thickness

Lesions 0-1mm thick	1cm
Lesions 1-2mm thick	1- 2cm (Depending upon site and pathological features)
Lesions 2-4mm thick	2-3 cm (Depending upon site and pathological features)
Lesions >4 mm thick	3cm

Marsden J *et al*. Revised UK guidelines for management of Melanoma. *Br J Dermatol* 2010 **163**:238-256.

Further treatments such as sentinel lymph node mapping, isolated limb perfusion and block dissection of regional lymph node groups should be selectively applied.

Q: Recall bias is most commonly associated with which study design?

☐	Cohort study
☐	Cross sectional study
☐	Case control study
☐	Randomised control trial
☐	Blinded randomised control trial

Recall Bias

Recall bias represents a major threat to the internal validity of studies using self-reported data. It arises with the tendency of subjects to report past events in a manner that is different between the two study groups. This pattern of recall errors can lead to differential misclassification of the related variable among study subjects with a subsequent distortion of measure of association in any direction from the null, depending on the magnitude and direction of the bias. Although recall bias has largely been viewed as a common concern in case-control studies, it also has been documented as an issue in some prospective cohort and randomized controlled trial designs.

Q: A 12 year old child is admitted with a 12 hour history of colicky right upper quadrant pain. On examination the child is afebrile and is jaundiced. The abdomen is soft and non tender at the time of examination. What is the most likely cause?

☐	Infectious hepatitis
☐	Acute cholecystitis
☐	Hereditary spherocytosis

☐	Gilberts syndrome
☐	Crigler najjar syndrome

The child is most likely to have hereditary spherocytosis. In these individuals there may be disease flares precipitated by acute illness. They form small pigment stones. These may cause biliary colic and some may require cholecystectomy.

Hereditary spherocytosis

Most common disorder of the red cell membrane, it has an incidence of 1 in 5000. The abnormally shaped erythrocytes are prone to splenic sequestration and destruction. This can result in hyperbilirubinaemia, jaundice and splenomegaly. In older patients an intercurrent illness may increase the rate of red cell destruction resulting in more acute symptoms.
Severe cases may benefit from splenectomy.

Q: **Theme:** Choice of statistical methods

A. Students T Test
B. Fishers exact test
C. Mann Whitney U test
D. Chi Squared test
E. Spearmans rank test

Please select the most appropriate statistical method for the situation described. Each option may be used once , more than once or not at all.

14. Concerns are raised about the high frequency of admissions to intensive care units following incisional hernia repairs. It is necessary to determine whether the rates of admission are significant.

 You answered Students T Test

The correct answer is Chi Squared test

This is dichotomous data (i.e. admitted or not admitted). Comparison between two groups will be needed (probably from different centres). Numbers are likely to be large and therefore the Chi Squared the most effective test.

15. Researchers wish to determine whether there is an association between body weight and anastomotic dehisence following low anterior resection.

 You answered Chi Squared test

The correct answer is Students T Test

Body weight is likely to follow the normal distribution (provided the sample size is large enough). Therefore a T test is a suitable method for analysis.

16. Surgeons wish to determine whether there is a relationship between operating time and lymph node yield in oesophageal surgery.

You answered Mann Whitney U test

The correct answer is Spearmans rank test

This is testing a relationship between two numerical variables. Data is non parametric and a Spearmans rank test the most appropriate method.

Please rate this question:

Discuss and give feedback

Next question

Statistics

Data types

Accurately classifying the data you seek to obtain is the first step in undertaking formal data analysis.

Title	Description
Nominal	Numbers are assigned to data that has no underling numerical value (e.g. marital status)
Ordinal	Has numbers that can be assigned to a natural underlying order (e.g. tumour grades)
Discrete	Data has a discrete numerical value, that has to be a whole number (e.g. number of deaths)
Continuous	Data has a numerical value that may not be a whole number and often reflects a direct measurement (e.g. weight)

Knowing the data types allows us to direct the appropriate analysis. This is often conveniently achieved by plotting it on a graph. Where the data has a categorical nature, a histogram is often a useful starting point. Other types of data, particularly direct measurements, may be plotted as single data points. If we take the weight example from above then plotting a large number of data points may allow us to numerically determine the spread of the data. In particular whether it fits the normal distribution. Remember that if the mean, median and mode overlap numerically then the data will be normally distributed.

Parametric vs Non parametric

Parametric methods of data analysis assume that the underlying data set has a normal distribution. Non parametric methods do not make assumptions about the nature of the underlying data.

Parametric tests	Non parametric tests
T Test	Mann Whitney U
Paired T Test	Chi Squared

	Spearmans Rank Correlation
	Wilcoxon signed rank test

There are many others

Types of test

Test type	Features
T Test	Direct comparison of data sets which are normally distributed
Mann Whitney U	Ranked method for non parametric data
Wilcoxon matched pairs/ signed rank	Analog of the paired T Test, data must be interval, data based on magnitude of differences
Spearmans Rank Correlation	Statistical dependence between 2 variables. May be used for continuous or discrete variables
Chi Squared test	Test of association between two qualitative variables,valid if 80% expected frequencies exceed 5 or all exceed 1. Fishers exact test may be used for small samples

Next question

Q: Which of the following statements relating to the Chi Squared test is true?

☐	The test makes comparisons between groups
☐	The test is more useful if small numbers are present
☐	The test requires prior calculation of the potency ratio
☐	A probability of p <0.1 indicates statistical significance
☐	The test compares actual values rather than proportions or number of occurrences

Note that where numbers are less than 40, Yates correction may be required, this can reduce the value of Chi Square. The numbers used in Chi Squared tests are proportions rather than actual values.

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	samples

Q: Which of the following has the greatest impact on the positive predictive value of a test?

☐	Prevalence
☐	Subjects who are true negatives
☐	Specificity
☐	Relative risk
☐	None of the above

The positive predictive value (PPV) is the probability that an individual with a positive screening result has the disease. The sensitivity is the probability that an individual with the disease is screened positive and the specificity is the probability that an individual without the disease is screened negative.
Its value depends upon the prevalence of the condition being tested for and the sensitivity of the test used.
It may be calculated by dividing the number of true positives by the number of true positives and the number of false positives.

Positive predictive values

Screening tests

- Sensitivity: proportion of true positives identified by a test
- Specificity: proportion of true negatives correctly identified by a test
- Positive predictive value: proportion of those who have a positive test who actually have the disease
- Negative predictive value: proportion of those who test negative who do not have the disease

Predictive values are dependent on the prevalence

- Likelihood ratio for a positive test result = sensitivity/(1-specificity)
- Likelihood ratio for a negative test result = (1-sensitivity)/specificity

Likelihood ratios are not prevalence dependent

Q: **Theme:** ASA grading

A. ASA I

B. ASA II

C. ASA III

D. ASA IV

E. ASA V

The American society of anaesthesiologists physical status scoring system is a popular method for stratifying patients physical status. Please select the most appropriate ASA grade for each of the following scenarios. Each option may be used once, more than once or not at all.

3. A 66 year old man is admitted following a collapse whilst waiting for a bus. Clinical examination confirms a ruptured abdominal aortic aneurysm. He is moribund and hypotensive

 ASA V

Patients who are moribund and will not survive without surgery are graded as ASA 5.

4. A 23 year old man with a 4cm lipoma on his flank is due to have this removed as a daycase. He is otherwise well.

 ASA I

Absence of co-morbidities and small procedure with no systemic compromise will equate to an ASA score of 1.

5. A 72 year old man is due to undergo an inguinal hernia repair. He suffers from COPD and has an exercise tolerance of 10 yards. He also has pitting oedema to the thighs.

 You answered ASA III

The correct answer is ASA IV

Severe systemic disease of this nature is a constant threat to life. Especially as he also has evidence of cardiac failure.

American Society of anesthesiologists physical status scoring system (ASA)

ASA grade	Description
1	No organic physiological, biochemical or psychiatric disturbance. The surgical pathology is

	localised and has not invoked systemic disturbance.
2	Mild or moderate systemic disruption caused either by the surgical disease process or though underlying pre-existing disease
3	Severe systemic disruption caused either by the surgical pathology or pre-existing disease
4	Patient has severe systemic disease that is a constant threat to life
5	A patient who is moribund and will not survive without surgery

Q: In 2010 the journal Nature was stated to have an impact factor of 30.98. Which of the following is not needed to derive this information?

☐	The total number of citable articles published by Nature in 2009
☐	The total number of citable articles published by Nature in 2008
☐	The number of times that articles published by Nature in 2008 were cited by articles in indexed journals in 2010
☐	The number of citable articles published in 2007
☐	The number of times that articles published by Nature in 2009 were cited by articles in indexed journals in 2010

The number of citable articles published by the journal in the preceding 2 years prior to the year in which the impact factor is quoted is needed.

Impact factor

The impact factor of an academic journal is a measure reflecting the average number of citations to recent articles published in the journal. It is frequently used as a proxy for the relative importance of a journal within its field, with journals with higher impact factors deemed to be more important than those with lower ones. The impact factor was devised by Eugene Garfield, the founder of the Institute for Scientific Information. Impact factors are calculated yearly starting from 1975 for those journals that are indexed in the Journal Citation Reports.

Calculation
In a given year, the impact factor of a journal is the average number of citations received per paper published in that journal during the two preceding years. For example, if a journal has an impact factor of 10 in 2007, then its papers published in 2005 and 2006 received 10 citations each on average in 2007. The 2007 impact factor of a journal would be calculated as follows:

A = the number of times that articles published in that journal in 2005 and 2006, were cited by articles in indexed journals during 2007.
B = the total number of "citable items" published by that journal in 2005 and 2006. ("Citable items" are usually articles, reviews, proceedings, or notes; not editorials or letters to the editor.)

2007 impact factor = A/B.

(Note that 2007 impact factors are actually published in 2008; they cannot be calculated until all of the 2007 publications have been processed by the indexing agency.)

New journals, which are indexed from their first published issue, will receive an impact factor after two years of indexing; in this case, the citations to the year prior to Volume 1, and the number of articles published in the year prior to Volume 1 are known zero values. Journals that are indexed starting with a volume other than the first volume will not get an impact factor until they have been indexed for three years. Annuals and other irregular publications sometimes publish no items in a particular year, affecting the count. The impact factor relates to a specific time period; it is possible to calculate it for any desired period, and the Journal Citation Reports (JCR) also includes a five-year impact factor.

Q: A 56 year old man presents with symptoms of neuropathic facial pain and some weakness of the muscles of facial expression on the right side. On examination he has a hard mass approximately 6cm anterior to the right external auditory meatus. What is the most likely diagnosis?

☐	Adenoid cystic carcinoma
☐	Lymphoma
☐	Adenocarcinoma
☐	Pleomorphic adenoma
☐	Mucoepidermoid carcinoma

The patient is most likely to have a malignant lesion within the parotid. Of the malignancies listed; adenoid cystic carcinoma has the greatest tendency to perineural invasion.

Please rate this question:

Parotid gland disease

- Most parotid neoplasms (80%) are benign lesions
- Most commonly present with painless mass in cheek region
- Up to 30% may present with pain, when this is associated with a discrete mass lesion in the parotid it usually indicates perineural invasion.
- Perineural invasion is very unlikely to occur in association with benign lesions

- 80% of patients with facial nerve weakness caused by parotid malignancies will have nodal metastasis and a 5 year survival of 25%

Types of malignancy

Type of lesion	Features
Mucoepidermoid carcinoma	30% of all parotid malignancies Usually low potential for local invasiveness and metastasis (depends mainly on grade)
Adenoid cystic carcinoma	Unpredictable growth pattern Tendency for perineural spread Nerve growth may display skip lesions resulting in incomplete excision Distant metastasis more common (visceral rather than nodal spread) 5 year survival 35%
Mixed tumours	Often a malignancy occurring in a previously benign parotid lesion
Acinic cell carcinoma	Intermediate grade malignancy May show perineural invasion Low potential for distant metastasis 5 year survival 80%
Adenocarcinoma	Develops from secretory portion of gland Risk of regional nodal and distant metastasis 5 year survival depends upon stage at presentation, may be up to 75% with small lesions with no nodal involvement
Lymphoma	Large rubbery lesion, may occur in association with Warthins tumours Diagnosis should be based on regional nodal biopsy rather than parotid resection Treatment is with chemotherapy (and radiotherapy)

Q: Which of the processes listed below is least likely to reduce the possibility of systematic errors arising from a clinical study?

☐	Logarithmic transformation
☐	Stratification
☐	Randomisation
	Restricted entry criteria

☐	
☐	Logistic regression

Logarithmic transformation is used to compare data sets that have different variances or are non normally distributed.

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Q: Which of the following is a not a diagnostic criteria for brain death?

☐	No response to sound
☐	No corneal reflex
☐	Absent vestibular-cochlear reflex
☐	No response to supra orbital pressure
☐	No cough reflex with bronchial stimulation

Brain death

Conditions for brainstem death testing
There must be an identifiable pathology causing irremediable brain damage. This may be intra - or extra - cranial.

2. The patient must be deeply unconscious.
a. Hypothermia must be excluded as the cause of unconsciousness and the patients core temperature should be over 34◦C.
b. There should be no evidence that the patients state is due to depressant drugs. This refers to narcotics, hypnotics and tranquillisers as well as neuromuscular blocking drugs. A
careful drug history is required, whilst drug levels and antagonists may need to be used.
c. Potentially reversible circulatory, metabolic and endocrine disturbances must have been

excluded as the cause of the continuing unconsciousness. Some of these disturbances may occur as a result of the condition rather than the cause and these do not preclude the diagnosis of brain stem death.

3. The patient must be apnoeic, needing mechanical ventilation. This condition must not be secondary to the effect of sedative drugs of neuromuscular blockade. This may require testing with a nerve stimulator to show intact neuromuscular transmission. Alternatively, demonstration of tendon reflexes can also demonstrate intact transmission

Criteria for brain death

- Fixed pupils which do not respond to sharp changes in the intensity of incident light
- No corneal reflex
- Absent oculo-vestibular reflexes - no eye movements following the slow injection of at least 50ml of ice-cold water into each ear in turn (the caloric test)
- No response to supraorbital pressure
- No cough reflex to bronchial stimulation or gagging response to pharyngeal stimulation
- No observed respiratory effort in response to disconnection of the ventilator for long enough (typically 5 minutes) to ensure elevation of the arterial partial pressure of carbon dioxide to at least 6.0 kPa (6.5 kPa in patients with chronic carbon dioxide retention). Adequate oxygenation is ensured by pre-oxygenation and diffusion oxygenation during the disconnection (so the brain stem respiratory centre is not challenged by the ultimate, anoxic, drive stimulus)

The test should be undertaken by two appropriately experienced doctors on two separate occasions.

Q: Which of the anaesthetic agents below is most likely to induce adrenal suppression?

☐	Propofol
☐	Etomidate
☐	Sodium thiopentone
☐	Ketamine
☐	Midazolam

Etomidate is a recognised cause of adrenal suppression, this has been associated with increased mortality when used as a sedation agent in the critically ill.

Anaesthetic agents

The table below summarises some of the more commonly used IV induction agents

Agent	Specific features
Propofol	• Rapid onset of anaesthesia • Pain on IV injection • Rapidly metabolised with little accumulation of metabolites • Proven anti emetic properties • Moderate myocardial depression • Widely used especially for maintaining sedation on ITU, total IV anaesthesia and for daycase surgery
Sodium thiopentone	• Extremely rapid onset of action making it the agent of choice for rapid sequence of induction • Marked myocardial depression may occur • Metabolites build up quickly • Unsuitable for maintenance infusion • Little analgesic effects
Ketamine	• May be used for induction of anaesthesia • Has moderate to strong analgesic properties • Produces little myocardial depression making it a suitable agent for anaesthesia in those who are haemodynamically unstable • May induce state of dissociative anaesthesia resulting in nightmares
Etomidate	• Has favorable cardiac safety profile with very little haemodynamic instability • No analgesic properties • Unsuitable for maintaining sedation as prolonged (and even brief) use may result in adrenal suppression • Post operative vomiting is common

Q: Which measure of central tendency in a dataset is most susceptible to skewness?

☐	Mode
☐	Median
☐	Mean
☐	Both mode and median
☐	None of the above

The mean, median and mode are all measures of central tendency. However, the mean is most susceptible to data which is skewed (i.e. has single large outliers). Visual inspection of a dataset (if small) will usually allow a rapid means of determining if this is the case. Plotting data points graphically will also facilitate identification of skewed data. Both median and mode are better alternative measures of central tendency when data is skewed.

Descriptive statistics

Descriptive statistics include a point estimate of the measured variable as well as a measure of the variability of the data around that point estimate. Typical examples of point estimates include; mean, median and mode. The two most commonly employed measurements of variability include standard deviation and the inter quartile range. The standard deviation is usually considered in association with the mean, while the inter quartile range is used alongside the median. Other measures of data variability include the standard error of the mean and confidence interval. The standard error of the mean represents the measure of variation around the point estimate of the mean of a group of sample means, as such it should only be used when describing the characteristics of more than one sample.

Q: Which one of the following is equivalent to the pre-test probability?

☐	Post test odds / (1 + post-test odds)
☐	Pre-test odds x likelihood ratio
☐	The prevalence of a condition
☐	The incidence of a condition
☐	Post-test odds / likelihood ratio

The prevalence is the proportion of a population that have the condition at a point in time whilst the incidence is the rate at which new cases occur in a population during a specified time period.

Pre- and post- test odds and probability

Pre-test probability
The proportion of people with the target disorder in the population at risk at a specific time (point prevalence) or time

interval (period prevalence)

For example, the prevalence of rheumatoid arthritis in the UK is 1%

Post-test probability
The proportion of patients with that particular test result who have the target disorder

Post-test probability = post test odds / (1 + post-test odds)

Pre-test odds
The odds that the patient has the target disorder before the test is carried out

Pre-test odds = pre-test probability / (1 - pre-test probability)

Post-test odds
The odds that the patient has the target disorder after the test is carried out

Post-test odds = pre-test odds x likelihood ratio

where the likelihood ratio for a positive test result = sensitivity / (1 - specificity)

Q: A 23 year old man is due to undergo a splenectomy. What is the optimal time for administration of the pneumococcal vaccine?

☐	Two weeks post operatively
☐	Two weeks pre-operatively
☐	Six weeks pre-operatively
☐	Five days pre-operatively
☐	One month post operatively

Pre-operative vaccination is preferred, ideally this should be two weeks before surgery.

Hyposplenism

Hyposplenism may complicate certain medical conditions where splenic atrophy occurs or may be the result of medical intervention such as splenic artery embolization and splenectomy for trauma. Diagnosis of hyposplenism is difficult and whilst there may be peripheral markers of the splenectomised state (e.g. Howell Jolly bodies) these are neither 100% sensitive or specific. The most sensitive test is a radionucleotide labeled red cell scan. Hyposplenism, by whatever mechanism it occurs dramatically increases the risk of post splenectomy sepsis, particularly with encapsulated bacteria. For this reason individuals are recommended to be vaccinated and have antibiotic prophylaxis.

Key recommendations

- All those with hyposplenism or may become so (such as prior to an elective splenectomy) should receive pneumococcal, haemophilus type b and meningococcal type C vaccines. These should be administered 2 weeks prior to splenectomy or two weeks following splenectomy. The vaccine schedule for meningococcal disease essentially consists of a dose of Men C and Hib at 2 weeks and then a dose of the MenACWY vaccine one month later. Those aged under 2 may require a booster at 2 years. A dose of pneumococcal polyvalent polysaccharide vaccine (PPV) is given at two weeks. A conjugated vaccine (PCV) is offered to young children. The PCV is more immunogenic but covers fewer serotypes. Boosting PPV is either guided by serological measurements (where available) or by routine boosting doses at 5 yearly intervals.

- Annual influenza vaccination is recommended in all cases

- Antibiotic prophylaxis is offered to all. The risk of post splenectomy sepsis is greatest immediately following splenectomy and in those aged less than 16 years or greater than 50 years. Individuals with a poor response to pneumococcal vaccination are another high risk group. High risk individuals should be counseled to take penicillin or macrolide prophylaxis. Those at low risk may choose to discontinue therapy. All patients should be advised about taking antibiotics early in the case of inter-current infections.

- Asplenic individuals traveling to malaria endemic areas are at high risk and should have both pharmacological and mechanical protection.

Dosing-antibiotics
Penicillin V 500mg BD or amoxicillin 250mg BD

References
Davies J *et al*. Review of guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen: Prepared on behalf of the British Committee for Standards in Haematology by a Working Party of the Haemato-Oncology Task Force. *British Journal of Haematology*2011 (155): 308317.

Q: What is the most appropriate method for describing data generated from an ordinal scale?

☐	Mode and standard deviation
☐	Mode and inter quartile range
☐	Mode and standard error of the mean
☐	Mean and standard deviation
☐	Median and inter quartile range

Ordinal data expresses relative differences between subjects when the actual numerical differences are either unknown or cannot be derived. Quantitative comparisons cannot be made for ordinal data. As a result the descriptive statistic of choice for ordinal data is the median and inter quartile range. The inter quartile range describes data between the 25th and 75th centile, with the median illustrating the 50th percentile rank.

Statistics

Data types
Accurately classifying the data you seek to obtain is the first step in undertaking formal data analysis.

Title	Description
Nominal	Numbers are assigned to data that has no underling numerical value (e.g. marital status)
Ordinal	Has numbers that can be assigned to a natural underlying order (e.g. tumour grades)
Discrete	Data has a discrete numerical value, that has to be a whole number (e.g. number of deaths)
Continuous	Data has a numerical value that may not be a whole number and often reflects a direct measurement (e.g. weight)

Knowing the data types allows us to direct the appropriate analysis. This is often conveniently achieved by plotting it on a graph. Where the data has a categorical nature, a histogram is often a useful starting point. Other types of data, particularly direct measurements, may be plotted as single data points. If we take the weight example from above then plotting a large number of data points may allow us to numerically determine the spread of the data. In particular whether it fits the normal distribution. Remember that if the mean, median and mode overlap numerically then the data will be normally distributed.

Parametric vs Non parametric

Parametric methods of data analysis assume that the underlying data set has a normal distribution. Non parametric methods do not make assumptions about the nature of the underlying data.

Parametric tests	Non parametric tests
T Test	Mann Whitney U
Paired T Test	Chi Squared
	Spearmans Rank Correlation
	Wilcoxon signed rank test

There are many others

Types of test

Test type	Features
T Test	Direct comparison of data sets which are normally distributed
Mann Whitney U	Ranked method for non parametric data
Wilcoxon matched pairs/ signed rank	Analog of the paired T Test, data must be interval, data based on magnitude of differences
Spearmans Rank	Statistical dependence between 2 variables. May be used for continuous or

Correlation	discrete variables
Chi Squared test	Test of association between two qualitative variables,valid if 80% expected frequencies exceed 5 or all exceed 1. Fishers exact test may be used for small samples

Q: The best graphic representation of frequency distribution data gathered of a continuous variable is:

☐	Line graph
☐	Simple bar Graph
☐	Multiple bar chart
☐	Box Whisker plot
☐	Histogram

Histograms are a good method displaying frequencies of continuous variables.

Continuous variables

If a variable can take on a value at any point between its minimum and maximum value then it is termed a continuous variable. Otherwise it is called a discrete variable. Patient weights are an example of continuous variables as fractions of numbers are possible (if the equipment is accurate). Discrete variables could include factors such as polyp identification during colonoscopy (as partial polyps don't exist- though partial retrieval certainly can!)

Q: A 53 year old man presents with an ulcerated mass at the anal verge. A biopsy is taken and the histology demonstrates as squamous cell carcinoma. Infection with which of the viruses below is most likely to have contributed to the development of the condition?

☐	Human papillomavirus 16
☐	Human T-lymphotropic virus 1
☐	Human immunodeficiency virus 2
☐	Human immunodeficiency virus 1
☐	Human papillomavirus 7

Infection with human papilloma virus 16 is a risk factor for the development of intra epithelial dysplasia of the anal skin with subsequent increased risk of invasive malignancy.

Oncoviruses

- Viruses which cause cancer
- These may be detected on blood test and prevented by vaccine

These are the main types of oncoviruses and their diseases:

Oncovirus	**Cancer**
Epstein-Barr virus	Burkitt's lymphoma Hodgkin's lymphoma Post transfusion lymphoma Nasopharyngeal carcinoma
Human papillomavirus 16/18	Cervical cancer Anal cancer Penile cancer Vulval cancer Oropharyneal cancer
Human herpes virus 8	Kaposi's sarcoma
Hepatitis B virus	Hepatocellular carcinoma
Hepatitis C virus	Hepatocellular carcinoma
Human T-lymphotropic virus 1	Tropical spastic paraparesis Adult T cell leukaemia

Q: A 54-year-old female is admitted one week following a cholecystectomy with profuse diarrhoea. Apart from a minor intra-operative bile spillage incurred during removal of the gallbladder, the procedure was uncomplicated. What is the most likely diagnosis?

☐	Campylobacter infection
☐	E. Coli infection
☐	C. Difficle infection
☐	Pelvic abscess

☐	Salmonella infection

Antibiotics are not routinely administered during an uncomplicated cholecystectomy. Indications for administration of broad spectrum antibiotics include intraoperative bile spillage. Delayed pelvic abscesses following bile spills are extremely rare since most surgeons will manage these intra-operatively.

Clostridium difficile

Clostridium difficile is a Gram positive rod often encountered in hospital practice. It produces an exotoxin which causes intestinal damage leading to a syndrome called pseudomembranous colitis. Clostridium difficile develops when the normal gut flora are suppressed by broad-spectrum antibiotics. Clindamycin is historically associated with causing Clostridium difficile but the aetiology has evolved significantly over the past 10 years. Second and third generation cephalosporins are now the leading cause of Clostridium difficile.

Features

- Diarrhoea
- Abdominal pain
- A raised white blood cell count is characteristic
- If severe, toxic megacolon may develop

Diagnosis is made by detecting Clostridium difficile toxin (CDT) in the stool

Management

- First-line therapy is oral metronidazole for 10-14 days
- If severe, or not responding to metronidazole, then oral vancomycin may be used
- For life-threatening infections a combination of oral vancomycin and intravenous metronidazole should be used

Q: In the UK NHS what is the main role of the "Caldicott guardian"?

☐	Liaising between NHS trusts and the General Medical Council about cases of professional misconduct
☐	Safeguarding the welfare of vulnerable adults
☐	Investigating cases of suspected child abuse
☐	Enforcing key principles of the Human Tissue Act

☐	Safeguarding confidential patient information for an organisation

Caldicott guidelines

A review was commissioned in 1997 by the Chief Medical Officer of England "owing to increasing concern about the ways in which patient information is being used in the NHS in England and Wales and the need to ensure that confidentiality is not undermined. Such concern was largely due to the development of information technology in the service, and its capacity to disseminate information about patients rapidly and extensively".

Caldicott principles
1. **Justify the purpose**
Every proposed use or transfer of patient identifiable information within or from an organisation should be clearly defined and scrutinised, with continuing uses regularly reviewed, by an appropriate guardian.

2.**Don't use patient identifiable information unless it is absolutely necessary**
Patient identifiable information items should not be included unless it is essential for the specified purpose(s) of that flow. The need for patients to be identified should be considered at each stage of satisfying the purpose(s).

3.**Use the minimum necessary patient-identifiable information**
Where use of patient identifiable information is considered to be essential, the inclusion of each individual item of information should be considered and justified so that the minimum amount of identifiable information is transferred or accessible as is necessary for a given function to be carried out.

4.**Access to patient identifiable information should be on a strict need-to-know basis**
Only those individuals who need access to patient identifiable information should have access to it, and they should only have access to the information items that they need to see. This may mean introducing access controls or splitting information flows where one information flow is used for several purposes.

5.**Everyone with access to patient identifiable information should be aware of their responsibilities**
Action should be taken to ensure that those handling patient identifiable information - both clinical and non-clinical staff - are made fully aware of their responsibilities and obligations to respect patient confidentiality.

6.**Understand and comply with the law**
Every use of patient identifiable information must be lawful. Someone in each organisation handling patient information should be responsible for ensuring that the organisation complies with legal requirements.

Q: In order to calculate the sample size for a trial the limits of α and β must be considered in addition to which of the following?

☐	The outcome of interest
☐	The magnitude and variability of the expected effect size of the intervention on the primary outcome

☐	The magnitude and variability of the expected effect size of the intervention on the secondary outcome
☐	All of the above
☐	None of the above

In addition to alpha and beta (usually set at 0.05 and 0.1-0.2), investigators need to consider an estimate of the magnitude of and variability of the expected effect size of the intervention on the primary outcome, as well as planned statistical analysis. These data are derived from literature reviews or, where no data is know, from a pilot study.

Power calculations and statistical error

Statistical error

Type 1 Error	A test rejects a true null hypothesis. Analogous to false positive. It usually equates to the significance level assigned to a test.
Type 2 Error	A test fails to reject a false null hypothesis. It is related to the power of a test.

Statistical power
The power of a test is the probability that the test will reject the null hypothesis when it is false (thereby avoiding a type 2 error). Increasing the power of a test will reduce the probability of a type 2 error. Usually a value of 0.8 is selected.

Q: A patient attends the clinic having recovered from a major abdominal procedure. At the end of the consultation they hand you £250 GBP in cash. They insist on your taking the gift.
What is the best course of action?

☐	Hand the gift to the clinical director
☐	Accept the gift and document it and the donors details in a formal departmental record
☐	Hand the gift to the hospital charity
☐	Pass the gift to a homeless patient on the ward
☐	Accept the gift and inform the GMC that you have done so

The GMC guidance on this topic is outlined below.

Gifts from patients

The debate surrounding the receipt of gifts is covered by the GMC in their guidance. The following guidance is

provided:
"6. You must not encourage patients to give, lend or bequeath money or gifts that will directly or indirectly benefit you.
7. You may accept unsolicited gifts from patients or their relatives provided:
a. this does not affect, or appear to affect, the way you prescribe for, advise, treat, refer, or commission services for patients
b. you have not used your influence to pressurise or persuade patients or their relatives to offer you gifts.
8. However, if you receive a gift or bequest from a patient or their relative, you should consider the potential damage this could cause to your patients trust in you and the publics trust in the profession. You should refuse gifts or bequests where they could be perceived as an abuse of trust.
9. You must not put pressure on patients or their families to make donations to other people or organisations."

They go on to issue the following specific guidance about gifts of monetary value:
"The acceptance of gifts by general practitioners in all four UK countries is subject to statutory regulation. General Medical Services contract regulations state that a register should be kept of gifts from patients or their relatives which have a value of £100 or more unless the gift is unconnected with the provision of services. The register of gifts should include the donors name and nature of the gift. NHS trusts set their own policies on gifts."

Q: A 73 year old man undergoes a brachial embolectomy for an embolus which occurs as a result of atrial fibrillation. He is commence on dabigatran therapy. What is the main mode of action of this drug?

☐	Direct inhibition of thrombin
☐	Activation of antithrombin III
☐	Inhbition of clotting factors VII and Xa
☐	Inactivation of clotting factor Xa
☐	None of the above

Anticoagulants

Agent	Mechanism of action	Monitoring	Mechanism of reversal	Indications
Heparin	Activation of antithrombin III - this inactivates thrombin and factor Xa	APTT	For unfractionated heparin renal inactivation occurs quickly on stopping therapy, for more rapid reversal intravenous protamine may be used	Situations where rapid and predictable anticoagulation is required, low molecular weight heparins are used in stable patients both as prophylaxis against thromboembolic events and also as therapy for these (in

				higher doses)
Warfarin	Inhibits vitamin K dependent synthesis of calcium dependent clotting factors; II, VII, IX, X and protein C and S (the latter two agents are involved in clot degradation and account for the need to maintain heparin therapy whilst treatment is started	INR	Vitamin K, or prothrombin complex concentrate, FFP may also be used but will expand circulating volume	Situations where long term anticoagulation is needed. It is contraindicated in pregnancy
Dabigatran	Competitive direct thrombin inhibitor	No monitoring available	Idarucizumab	Prevention of CVA and other embolic events in patients with atrial fibrillation, prevention of DVT in orthopaedic surgery

Q: A 59 year old women is anxious about having a screening mammogram because of the risk of a false positive examination. Why may such false positives occur?

☐	Test has a high specificity
☐	Test has a high sensitivity
☐	There is a high prevalence of breast cancer
☐	There is a low prevalence of breast cancer
☐	The test is inaccurate

False positive

A false positive may occur when a screening test falsely identifies individuals as having a condition when none is present. This is a price that is paid for having a sensitive screening test. In surgical practice both faecal occult blood testing and mammography probably generate the greatest burden and worry as a result of false positive results.

Q: A 50 year old man is in a persistent vegetative state following a road traffic accident. He is being cared

for in a hospital in England. The consultant is considering withdrawing artificial feeding. What is the most appropriate definitive course of action?

☐	Hold a multidisciplinary meeting and carers and the family and then uphold the consensus decision
☐	Obtain a second opinion from a consultant in another specialty and then proceed to withdraw if both agree this is the correct course of action
☐	Approach the English courts for a ruling
☐	Simply withdraw the feed because there is no clinically perceived benefit and a doctor is not required to continue to provide a treatment in such circumstances
☐	Withdraw feeding if 3 consultants from unrelated specialties (one of which must be a neurologist) consider withdrawal to be appropriate

Withdrawal of feeding from patients in PVS in England and Wales is a decision that can only be sanctioned by a court of law.

Nutrition and end of life decisions

The General Medical Council has issued guidance about the provision of nutrition in the end of life setting.

The guidance states that the nutritional needs of all patients should be assessed on their own merits. Offer of food and drink by mouth (including spoon feeding) is basic nuture and in UK law is not deemed to be treatment. However, drips, radiological inserted feeding tubes, NG feeding and TPN are deemed to be treatments.

In deciding whether to offer feeding by an invasive means, the patients views should be ascertained. If a patient has capacity and declines such measures then their views must be respected. If the patient does not have capacity, then the risks and benefits of initiating or continuing such treatments should be considered by those caring for the patient.

If a patient requests invasive feeding, but, it is deemed to be clinically inappropriate, then a clinician is not obliged to provide it. However, it is good practice to explore the patients views on the matter carefully and consider obtaining a second opinion where appropriate.

Where a patient is in a persistent vegetative state, the decision to withdraw feeding in England and Wales should be made by a court. The courts in Scotland have not issued such a directive but it is suggested that legal advice be taken in such circumstances. A recent case (Court of Protection, Mr Justice Peter Jackson, M v A Hospital, 20/9/17) has suggested that not all cases need be brought before a court. Particularly when the views of health care professionals and family are aligned. However, this is not yet, published GMC guidance. Where doubt exists, a court application remains likely.

Q: **Theme:** Body mass index

A. Obese Class III (Very severely obese)

B. Very severely underweight

C. Normal

D. Obese Class I (Moderately obese)

E. Severely underweight

F. Underweight

G. Overweight

H. Obese Class II (Severely obese)

Please match the following body mass indexes to the descriptors provided. Each option may be used once, more than once or not at all.

24. BMI 20

 Normal

25. BMI 24

 Normal

26. BMI 37

 Obese Class II (Severely obese)

Body mass index

Body mass index is widely used and is calculated by the formula;
BMI= mass (Kg)/height $(m)^2$

Values

Category	Value

Very severely underweight	less than 15
Severely underweight	from 15.0 to 16.0
Underweight	from 16.0 to 18.5
Normal (healthy weight)	from 18.5 to 25
Overweight	from 25 to 30
Obese Class I (Moderately obese)	from 30 to 35
Obese Class II (Severely obese)	from 35 to 40
Obese Class III (Very severely obese)	over 40

Obesity classification is taken from the WHO obesity classification system.

Q: Which of the following statements relating to MRI scanning is untrue?

☐	They apply a field strength that is measured in teslas
☐	Co-administration of gadolinium is usually required for accurate imaging of vessels
☐	In T1 images fat is darker than water
☐	It is safe to use in pregnancy
☐	Gadolinium is usually used to enhance T1 images

T1 images water is dark and fat bright
T2 images fat is dark and water bright

MRI scanning

- Non radioactive imaging technique involving application of electromagnetic field to tissues resulting in proton spinning
- Magnetic field has uniform field density and strength
- Field strength measured in teslas,open magnets have lower teslas
- Gadolinium based contrast agents may improve resolution

- Most MRI contrast agents work by reducing the T1 relaxation times of neighboring protons with an increased rate of stimulated emission from high energy states
- Gadolinium has a better safety profile than iodonated contrast media
- Basic scans are referred to as either T1 or T2 weighted and this refers to the spin lattice relaxation time
- T1 scans are often collected before and after infusion of contrast agents and are useful for distinguishing between grey and white matter. In T1 images water is dark and fat is bright.
- In T2 scans, the water fat density is reversed so that water is bright and fat is dark
- It is safe to use in pregnancy. Implanted devices are contra indications to use

Q: Which of the following is least commonly associated with Dupuytrens contracture?

☐	Peyronie's disease
☐	Alcoholic cirrhosis
☐	Phenytoin use
☐	Mycobacterium tuberculosis infection
☐	Dysplasia of the palmar fascia

In Dupuytrens disease the palmar fascia becomes hyperplastic and subsequently contracts. It is associated with the condition Peyronies disease in which the penis may become distorted. It is associated with liver disease, drugs such as phenytoin which can induce epithelial hyperplasia and chronic infections. A number of surgical excisional therapies are described and should be reserved for those with progressive or debilitating symptoms.

Dupuytrens contracture

- Fixed flexion contracture of the hand where the fingers bend towards the palm and cannot be fully extended.
- Caused by underlying contractures of the palmar aponeurosis . The ring finger and little finger are the fingers most commonly affected. The middle finger may be affected in advanced cases, but the index finger and the thumb are nearly always spared.
- Progresses slowly and is usually painless. In patients with this condition, the tissues under the skin on the palm of the hand thicken and shorten so that the tendons connected to the fingers cannot move freely. The palmar aponeurosis becomes hyperplastic and undergoes contracture.
- Commonest in males over 40 years of age.
- Association with liver cirrhosis and alcoholism (there is a historical association with TB infection). However, many cases are idiopathic.
- Treatment is surgical and involves fasciectomy. However, the condition may recur and many surgical

therapies are associated with risk of neurovascular damage to the digital nerves and arteries.

References

Robert H. Jackson and John W. King. Tenosynovitis of the Hand: A Forgotten Manifestation of Tuberculosis. *Clin Infect Dis*. (1989) 11 (4): 616-618.

Q: What is the mechanism of action of ciprofloxacin?

☐	Destruction of bacterial aquaporin proteins
☐	Inhibition of reverse transcriptase
☐	Direct injury to the bacterial cell wall
☐	Inhibition of DNA gyrase
☐	Osmotic injury to the cell

Antibiotics : mechanism of action

The lists below summarise the site of action of the commonly used antibiotics

Inhibit cell wall formation

- penicillins
- cephalosporins

Inhibit protein synthesis

- aminoglycosides (cause misreading of mRNA)
- chloramphenicol
- macrolides (e.g. erythromycin)
- tetracyclines
- fusidic acid

Inhibit DNA synthesis

- quinolones (e.g. ciprofloxacin)
- metronidazole
- sulphonamides
- trimethoprim

Inhibit RNA synthesis

- rifampicin

Q: **Theme:** Sutures

A. 3/0 undyed polybutester

B. 3/0 undyed polyglactin

C. 1/0 dyed polyglyconate

D. 1 dyed polydioxanone

E. 5/0 polypropylene

F. 3/0 dyed polyglyconate

G. 4/0 silk

H. 6/0 polyester

I. 2/0 undyed polybutester

J. 1 dyed polyglycolic acid

Please select the most appropriate suture for the situation described. Each option may be used once, more than once or not at all.

30. Closing the linea alba

 1 dyed polydioxanone

1 PDS is commonly used for this purpose as it has the tensile strength. Note that polyglycolic acid (Dexon) will not retain its tensile strength for long enough.

31. Construction of an ileo-colic anstomosis

 You answered 3/0 undyed polyglactin

The correct answer is 3/0 dyed polyglyconate

A hand sewn ileo-colic anastomosis will typically use a 3/0 suture as this will provide adequate tensile strength. Many sutures could be used but only polyglyconate has the correct size of the options provided.

32. Placing a patch onto the femoral artery

 You answered 6/0 polyester

The correct answer is 5/0 polypropylene

Polypropylene is a favored for vascular suturing because it is inert and retains its tensile strength. Polyester also fulfills this requirement. However, the suture sizes in the options do not match.

Sutures

The ideal sutures should fulfill the following criteria:

- Achieve its purpose
- Disappear once its work is complete
- Be free from infection
- Be non- irritant

(Moynihan 1920)

Many sutures are currently available and for the purposes of examinations it is important to be clear and distinct on the difference between trade names and raw material/ generic names. Commonly used sutures are described in the table below;

Agent	Classification	Durability	Uses	Special points
Silk	Braided Biological	Theoretically permanent although strength not preserved	Anchoring devices, skin closure	Knots easily, poor cosmesis
Polyglactin 910	Braided	Strength retained for	Widespread, ranging	Use undyed for skin

(vicryl)	multifilament, synthetic	60% at 2 weeks, broken down by hydrolysis , complete by 90 days	from visceral anastomosis through to skin closure	closure
Polyglyconate (maxon)	Synthetic monofilament	Tensile strength 70% at 2 weeks, complete absorption by 180 days	Used as alternative to PDS and polyglactin 910 in some centres	Undyed version available
Polydiaxanone (PDS)	Synthetic , polyester polymer	70% tensile strength at 2 weeks, breakdown up to 3 months (longer with thicker sutures)	Widespread surgical applications including visceral anastomoses, dermal closure, mass closure of abdominal wall	Used in most surgical specialties (avoid dyed form in dermal closure)
Polyester (ethibond, Dacron, tecron)	Both monofilament and braided synthetic	Remains indefinitely, tensile strength preserved	Vascular grafts, prolonged tissue approximation	n/a
Polypropylene (prolene)	Synthetic monofilament	Both suture and tensile strength persist indefinitely	Especially popular for vascular anastomoses	Poor handling characteristics
Nylon (ethilon)	Synthetic mono and multifilament	Degrades at a rate of 15% per year	Wide range of uses	Avoid in vascular anastomoses

When catgut was withdrawn from use Ethicon introduced vicryl rapide sutures, these have a polymer of lower molecular weight that is more rapidly hydrolysed and therefore absorbs more quickly.

Sizes

USP gauge	Diameter (max in mm
10/0	0.025
4/0	0.203
2/0	0.330
0	0.406
1	0.483
2	0.559

Q: Which of the following blood products can be administered to a non ABO matched recipient?

☐	Whole blood
☐	Platelets
☐	Packed red cells
☐	Fresh frozen plasma
☐	Cryoprecipitate

In the UK, platelets either come from pooling of the platelet component from four units of whole donated blood, called random donor platelets, or by plasmapharesis from a single donor. The platelets are suspended in 200-300 ml of plasma and may be stored for up to 4 days in the transfusion laboratory where they are continually agitated at 22°C to preserve function. One adult platelet pool raises the normal platelet count (150 - 450 platelets x 10^9/litre) by 510 platelets x 10^9/litre. ABO identical or compatible platelets are preferred but not necessary in adults; but rhesus compatibility is required in recipients who are children and women of childbearing age to prevent haemolytic disease of the newborn.

Cross matching blood products

Cross matching

Must be cross matched	Can be ABO incompatible in adults
Packed red cells	Platelets
Fresh frozen plasma	
Cryoprecipitate	
Whole blood	

Q: A 45-year-old man presents to surgical outpatients with a long history of recurrent abdominal pain and vomiting. He is noted to have a peripheral motor neuropathy on examination. What is the most likely diagnosis?

☐	Huntington's disease
☐	Myeloma
☐	Acute intermittent porphyria
☐	Lawrence-Moon-Biedl syndrome
☐	Friedreich's ataxia

Neurological signs combined with abdominal pain is acute intermittent porphyria or lead poisoning until proven otherwise.
Lawrence-Moon-Biedl syndrome is a pleiotropic disorder with variable expressivity and a wide range of clinical variability observed both within and between families. The main clinical features are rodcone dystrophy, with childhood-onset visual loss preceded by night blindness; postaxial polydactyly; truncal obesity that manifests during infancy and remains problematic throughout adulthood; specific learning difficulties in some but not all individuals; male hypogenitalism and complex female genitourinary malformations; and renal dysfunction, a major cause of morbidity and mortality.

Acute intermittent porphyria

Acute intermittent porphyria (AIP) is a rare autosomal dominant condition caused by a defect in porphobilinogen deaminase, an enzyme involved in the biosynthesis of haem. The results in the toxic accumulation of delta aminolaevulinic acid and porphobilinogen. It characteristically presents with abdominal and neuropsychiatric symptoms in 20-40 year olds. AIP is more common in females (5:1)

Features

- abdominal: abdominal pain, vomiting
- neurological: motor neuropathy
- psychiatric: e.g. depression
- hypertension and tachycardia common

Diagnosis

- classically urine turns deep red on standing
- raised urinary porphobilinogen (elevated between attacks and to a greater extent during acute attacks)
- assay of red cells for porphobilinogen deaminase
- raised serum levels of delta aminolaevulinic acid and porphobilinogen

Q: Which of the following is not utilised as a descriptive statistic?

☐	Mean
☐	Median
☐	Mode
☐	Z score
☐	Standard deviation

The z score is determined using the normal distribution and is not a descriptive statistic.

Descriptive statistics

Descriptive statistics include a point estimate of the measured variable as well as a measure of the variability of the data around that point estimate. Typical examples of point estimates include; mean, median and mode. The two most commonly employed measurements of variability include standard deviation and the inter quartile range. The standard deviation is usually considered in association with the mean, while the inter quartile range is used alongside the median. Other measures of data variability include the standard error of the mean and confidence interval. The standard error of the mean represents the measure of variation around the point estimate of the mean of a group of sample means, as such it should only be used when describing the characteristics of more than one sample.

Q: Which of the following is most useful in distinguishing between liver metastases from colorectal cancer and small liver haemangioma on CT scanning?

☐	Hypovascular
☐	Multifocal nature
☐	Size
☐	Hypodense relative to surrounding liver tissue
☐	None of the above

Haemangioma remains an important differential diagnosis and confirmation with MRI (which accurately identifies such lesions) should occur prior to surgery.

Liver metastasis from colorectal cancer

Approximately 70% of patients with metastatic colorectal cancer will have disease that is confined to the liver.

Detection is usually made using CT scanning. Colorectal metastases will usually be hypovascular relative to the surrounding liver tissue and appear to be hypoattentuating on CT. On MRI scanning they will usually appear as hypodense lesions on T1 weighted image and hyperdense on T2 weighted images. Only 15% of patients will have disease that is surgically resectable.

Classification of resectable disease

Resection category	Features
Usually resectable	Four or fewer segments or deposits in the liver Residual liver volume >40% Vena cava not involved Contra lateral portal pedicle
Potential resection	Involvement of 5-6 segments Contra lateral named vascular structure involvement Central hepatectomy Vascular reconstruction
Not resectable	Involvement of two portal branches Involvement of three hepatic veins Marked extra hepatic disease (e.g. portal nodes, non resectable distant disease)

Role of chemotherapy

Use of FOLFOX 4 chemotherapy regime is standard. The agents used include; oxaliplatin, fluorouracil and folinic acid. This is typically given prior to liver resection. A regime lasting 3 months is usually favored as it provides the best compromise between treatment related toxicity and improvement in outcome.

Recurrence is seen in up to 60% of patients undergoing surgical resection of liver metastasis. Usually within the first 1-2 years.

Q: Which of the following statements relating to transfusion related lung injury is untrue?

☐	It is commoner following transfusion with fresh frozen plasma than with packed red cells
☐	It is a recognised complication of platelet transfusion
☐	It occurs as a result of leucocyte antibodies in the transfused plasma
☐	Typically manifests as acute onset pulmonary oedema 1-2 hours following transfusion
☐	Early therapy with diuretics reduces pulmonary infiltrates and improves outcomes

Transfusion related lung injury is most common following the transfusion of plasma components such as platelets and FFP. The condition is due to leucocyte antibodies in the transfused plasma. This causes leucocyte sequestration and degranulation in the lung. This produces marked microvascular and tissue damage with the

development of a non cardiogenic pulmonary oedema. Because the primary problem is one of tissue injury, diuretic therapy is largely unhelpful.

Massive haemorrhage

Definition
This is the loss of one blood volume in a 24 hour period or the loss of 50% of the circulating blood volume in 3 hours. A blood loss of 150ml/ minute is also included. The normal adult blood volume is 7% of total adult body weight. The blood volume equates to between 8 and 9% of a child's body weight.

Complications of massive transfusion

Complication	Key points
Hypothermia	Blood is refrigerated Hypothermic blood impairs homeostasis Shifts Bohr curve to the left
Hypocalcaemia	Both FFP and platelets contain citrate anticoagulant, this may chelate calcium
Hyperkalaemia	Plasma of red cells stored for 4-5 weeks contains 5-10 mmol K^+
Delayed type transfusion reactions	Due to minor incompatibility issues especially if urgent or non cross matched blood used
Transfusion related lung injury	Acute onset non cardiogenic pulmonary oedema Leading cause of transfusion related deaths Greatest risk posed with plasma components Occurs as a result of leucocyte antibodies in transfused plasma Aggregation and degranulation of leucocytes in lung tissue accounts for lung injury
Coagulopathy	Anticipate once circulating blood volume transfused 1 blood volume usually drops platelet count to 100 or less 1 blood volume will both dilute and not replace clotting factors Fibrinogen concentration halves per 0.75 blood volume transfused

References
Stainsby *et al*. Guidelines on the management of massive blood loss. *British Journal of Haematology*2006 (135): 534 641.

Q: A surgical team wish to conduct a meta analysis of randomised controlled trials of the use of low molecular weight heparins in the prevention of post operative deep vein thrombosis. How would these results be best displayed graphically?

☐	Forest plot
☐	Box Whisker plot
☐	Violin plot
☐	Kaplan Meier graph
☐	None of the above

Data from multiple RCT's are best displayed using Forest plots. Funnel plots may be used to determine the effect of small studies and their overall effect on the data. Violin plots and Box Whisker plots are often used to graphically display non parametric data from single studies and are not generally used to display data from meta analyses.

Forest plots

A Forest plot is a graphical display designed to illustrate the relative strength of treatment effects in multiple quantitative scientific studies, addressing the same question. It is often used to graphically display meta analyses of randomised controlled trials.

The graph may be plotted on a natural logarithmic scale when using odds ratios or other ratio-based effect measures, so that the confidence intervals are symmetrical about the means from each study and to ensure undue emphasis is not given to odds ratios greater than 1 when compared to those less than 1. The area of each square is proportional to the study's weight in the meta-analysis. The overall meta-analysed measure of effect is often represented on the plot as a vertical line. This meta-analysed measure of effect is commonly plotted as a diamond, the lateral points of which indicate confidence intervals for this estimate.

A vertical line representing no effect is also plotted. If the confidence intervals for individual studies overlap with this line, it demonstrates that at the given level of confidence their effect sizes do not differ from no effect for the individual study. The same applies for the meta-analysed measure of effect: if the points of the diamond overlap the line of no effect the overall meta-analysed result cannot be said to differ from no effect at the given level of confidence.

Q: **Theme:** Phases of trials

A. Phase 0 trial

B. Phase I trial

C. Phase II trial

D. Phase III trial

E. Phase IV trial

Please select the trial phase that most closely matches the description provided. Each option may be used once, more than once or not at all.

39. A trial performed after a marketing license has been granted.

 Phase IV trial

40. A trial that is performed on a small number of participants using a sub therapeutic dose of drug.

 You answered Phase I trial

The correct answer is Phase 0 trial

41. A trial in which likely safe dosages are determined.

 You answered Phase II trial

The correct answer is Phase I trial

Drug trials

Phase of trial	Description
Phase 0	Safety and efficacy data Usually sub therapeutic dose given Small number of patients
Phase I	Small number of patients Safe dose range Side effect profile Dose escalation studies often used
Phase II	Larger number of participants May be compared to existing therapies Adverse effect data captured
Phase III	Large number of participants Comparison to placebo or existing therapy Often randomised

Phase IV	Done following licensing Determine long term safety and efficacy

Q: **Theme:** Common epidemiological studies

A. Case controlled study

B. Randomised controlled trial

C. Blinded randomised controlled trial

D. Cohort study

E. Cross sectional study

Please select the study which most closely matches the scenario provided. Each option may be used once, more than once or not at all.

42. An investigator wishes to determine the prevalence of acute colitis within a defined population.

 You answered Case controlled study

The correct answer is Cross sectional study

Cross sectional studies are often used to assess the prevalence of a condition.

43. An investigator wishes to determine whether individuals who have irritable bowel syndrome were likely to have been admitted to hospital as children with appendicitis.

 You answered Cohort study

The correct answer is Case controlled study

Case controlled studies are used when the individual of interest already has the disease.

44. An investigator wishes to determine whether individuals who work in one occupation are more likely to develop leukaemia than those in a different occupation.

 You answered Case controlled study

The correct answer is Cohort study

Groups are identified in advance of the condition. Therefore a Cohort study is appropriate.

Common epidemiological studies

Case controlled study
A case-control study is a type of study design used widely, often in epidemiology. It is a type of observational study in which two existing groups differing in outcome are identified and compared on the basis of some supposed causal attribute. Case-control studies are often used to identify factors that may contribute to a medical condition by comparing subjects who have that condition/disease (cases) with patients who do not have the condition/disease but are otherwise similar (controls). They require fewer resources but provide less evidence for causal inference than a randomized controlled trial.

Cohort study
A cohort study is often undertaken to obtain evidence to try to refute the existence of a suspected association between cause and effect; failure to refute a hypothesis often strengthens confidence in it. Crucially, the cohort is identified before the appearance of the disease under investigation. The study groups follow a group of people who do not have the disease for a period of time and see who develops the disease (new incidence). The cohort cannot therefore be defined as a group of people who already have the disease. Prospective (longitudinal) cohort studies between exposure and disease strongly aid in studying causal associations, though distinguishing true causality usually requires further corroboration from further experimental trials.

Cross sectional studies
Cross-sectional studies involve data collected at a defined time. They are often used to assess the prevalence of acute or chronic conditions, or to answer questions about the causes of disease or the results of medical intervention. They may also be described as censuses. Cross-sectional studies may involve special data collection, including questions about the past, but they often rely on data originally collected for other purposes. They are moderately expensive, and are not suitable for the study of rare diseases. Difficulty in recalling past events may also contribute bias.

Randomised control studies
These studies involve the experimenter allocating a specific exposure or intervention to a group of people who are randomly assigned to a particular group. They may be blinded or non blinded. The method of randomisation and the degree of blinding will have a direct impact on the potential bias of the study. In order to establish the numbers need to enter the study it is usual to perform a power calculation.

Q: Which of the following most closely describes the risk of a type I statistical error?

☐	Power calculation
☐	P Value
	Odds ratio

☐	
☐	Relative risk
☐	None of the above

Type 1 errors occur when a test rejects a true null hypothesis and is therefore related to the significance level of the test result.

Power calculations and statistical error

Statistical error

Type 1 Error	A test rejects a true null hypothesis. Analogous to false positive. It usually equates to the significance level assigned to a test.
Type 2 Error	A test fails to reject a false null hypothesis. It is related to the power of a test.

Statistical power

The power of a test is the probability that the test will reject the null hypothesis when it is false (thereby avoiding a type 2 error). Increasing the power of a test will reduce the probability of a type 2 error. Usually a value of 0.8 is selected.

Q: A 56 year old man with chronic schizophrenia undergoes a cholecystectomy. He receives metoclopramide for post operative nausea. Twenty minutes later he becomes agitated and develops marked oculogyric crises and oromandibular dystonia. Which of the following drugs may best alleviate his symptoms?

☐	Sulpiride
☐	Procyclidine
☐	Lorazepam
☐	Haloperidol
☐	Chlorpromazine

This man has developed an acute dystonic reaction. Administration of further anti dopaminergic drugs will worsen the situation. Procyclidine will help to reverse the event. This is most likely to have occurred because the patient is on long term anti psychotics and has then received metoclopramide.

Acute dystonic reaction

The anti dopaminergic drugs (such as antipsychotics) may result in extrapyramidal side effects. These may range

from mild parkinsonian symptoms such as resting tremor and bradykinesia. Through to acute dystonic reactions which are characterised by abnormal and involuntary facial and bodily movements, such as spasmodic torticollis, oculogyric crisis and oromandibular dystonia.

Chronic cases are generally only encountered in psychiatric units. In surgical practice the administration of the anti dopaminergic drug metoclopramide may be sufficient to precipitate an attack.

Treatment may be required if symptoms are sufficiently troublesome; benzhexol and procyclidine are two drugs which may be used.

Q: **Theme:** Anaesthetic agents

A. Etomidate

B. Ketamine

C. Methohexitone

D. Midazolam

E. Metraminol

F. Sodium thiopentone

G. Propofol

Please select the most appropriate anaesthetic induction agent for the procedure described. Each option may be used once, more than once or not at all.

47. A 32 year old man is admitted for a trendelenberg procedure for varicose veins. He is known to have porphyria.

 You answered Midazolam

The correct answer is Propofol

This is a daycase procedure for which propofol is ideal. Sodium thiopentone and etomidate are contraindicated in porphyria.

48. A 77 year old lady with unstable ischaemic heart disease requires an emergency femoral hernia repair. She is volume depleted and slightly hypotensive.

 You answered Propofol

The correct answer is Ketamine

Ketamine is not negatively inotropic and will not depress cardiac output. Propofol and Sodium thiopentone will produce myocardial depression. Some doctors may also consider etomidate. However, it may cause adrenal suppression and post operative vomiting- which she is at high risk of developing.

49. A 22 year old man is brought to theatre for an emergency apppendicectomy for generalised peritonitis. He is vomiting.

 You answered Propofol

The correct answer is Sodium thiopentone

Most anaesthetists would use sodium thiopentone for a rapid sequence induction (which this man will need).

Anaesthetic agents

The table below summarises some of the more commonly used IV induction agents

Agent	Specific features
Propofol	• Rapid onset of anaesthesia • Pain on IV injection • Rapidly metabolised with little accumulation of metabolites • Proven anti emetic properties • Moderate myocardial depression • Widely used especially for maintaining sedation on ITU, total IV anaesthesia and for daycase surgery
Sodium thiopentone	• Extremely rapid onset of action making it the agent of choice for rapid sequence of induction • Marked myocardial depression may occur • Metabolites build up quickly • Unsuitable for maintenance infusion • Little analgesic effects
Ketamine	• May be used for induction of anaesthesia

	• Has moderate to strong analgesic properties • Produces little myocardial depression making it a suitable agent for anaesthesia in those who are haemodynamically unstable • May induce state of dissociative anaesthesia resulting in nightmares
Etomidate	• Has favorable cardiac safety profile with very little haemodynamic instability • No analgesic properties • Unsuitable for maintaining sedation as prolonged (and even brief) use may result in adrenal suppression • Post operative vomiting is common

Q: What is the reciprocal of absolute risk reduction?

☐	Odds ratio
☐	Number needed to treat
☐	False positive
☐	False negative
☐	None of the above

In epidemiology, the absolute risk reduction, or risk difference is the decrease in risk of a given activity or treatment in relation to a control activity or treatment. It is the inverse of the number needed to treat.

Absolute risk reduction

The absolute risk reduction is the decrease in risk of a given activity or treatment in relation to a control activity or treatment. It is the inverse of the number needed to treat.

The absolute risk reduction is usually calculated for two different treatments. For example, consider surgical resection (X) versus watchful waiting (Y) for prostate cancer. A defined end point, such as 5 year survival is required. If the probabilities pX and pY of this end point are known then the absolute risk reduction is calculated (pX-pY).

The inverse of absolute risk reduction is the *Number Needed to Treat* . This is useful in determining the cost Vs benefit of many treatments.

Number needed to treat
Definition: how many patients would be need to receive a treatment to prevent one event. It is the absolute difference between two treatments.

Q: A 74-year-old woman with thyroid cancer is admitted due to shortness of breath. What is the best investigation to assess for possible compression of the upper airways?

☐	Arterial blood gases
☐	Forced vital capacity
☐	Transfer factor
☐	Peak expiratory flow rate
☐	Flow volume loop

Flow volume loop is the investigation of choice for upper airway compression.

Flow volume loop

A normal flow volume loop is often described as a 'triangle on top of a semi circle'

Flow volume loops are the most suitable way of assessing compression of the upper airway

Q: A 95Kg man has undergone an open appendicectomy. The surgeon decides that his post operative analgesic needs may be augmented by the use of local anaesthetic infiltration. She decides to use bupivicaine (0.5%). What is the maximum volume she can safely infiltrate?

☐	45ml
☐	30ml
☐	20ml
☐	55ml
☐	75ml

Bupivicaine toxicity is related to protein binding and is not affected by the use of adrenaline.

Bupivicaine dosing is based on ideal body weight and a maximum dose of 150mg is allowed. This equates to 30ml of 0.5% solution

Local anaesthetic agents

Lidocaine

- An amide
- Local anaesthetic and a less commonly used antiarrhythmic (affects Na channels in the axon)
- Hepatic metabolism, protein bound, renally excreted
- Toxicity: due to IV or excess administration. Increased risk if liver dysfunction or low protein states. Note acidosis causes lidocaine to detach from protein binding.
- Drug interactions: Beta blockers, ciprofloxacin, phenytoin
- Features of toxicity: Initial CNS over activity then depression as lidocaine initially blocks inhibitory pathways then blocks both inhibitory and activating pathways. Cardiac arrhythmias.
- Increased doses may be used when combined with adrenaline to limit systemic absorption.

Cocaine

- Pure cocaine is a salt, usually cocaine hydrochloride. It is supplied for local anaesthetic purposes as a paste.
- It is supplied for clinical use in concentrations of 4 and 10%. It may be applied topically to the nasal mucosa. It has a rapid onset of action and has the additional advantage of causing marked vasoconstriction.
- It is lipophillic and will readily cross the blood brain barrier. Its systemic effects also include cardiac arrhythmias and tachycardia.
- Apart from its limited use in ENT surgery it is otherwise used rarely in mainstream surgical practice.

Bupivacaine

- Bupivacaine binds to the intracellular portion of sodium channels and blocks sodium influx into nerve cells, which prevents depolarization.
- It has a much longer duration of action than lignocaine and this is of use in that it may be used for topical wound infiltration at the conclusion of surgical procedures with long duration analgesic effect.
- It is cardiotoxic and is therefore contra indicated in regional blockage in case the tourniquet fails.
- Levobupivicaine (Chirocaine) is less cardiotoxic and causes less vasodilation.

Prilocaine

- Similar mechanism of action to other local anaesthetic agents. However, it is far less cardiotoxic and is therefore the agent of choice for intravenous regional anaesthesia e.g. Biers Block.

All local anaesthetic agents dissociate in tissues and this contributes to their therapeutic effect. The dissociation constant shifts in tissues that are acidic e.g. where an abscess is present, and this reduces the efficacy.

Doses of local anaesthetics

Agent	Dose plain	Dose with adrenaline
Lignocaine	3mg/Kg	7mg/Kg
Bupivacaine	2mg/Kg	2mg/Kg
Prilocaine	6mg/Kg	9mg/Kg

These are a guide only as actual doses depend on site of administration, tissue vascularity and co-morbidities.

Maximum total local anaesthetic doses

- Lignocaine 1% plain - 3mg/ Kg - 200mg (20ml)
- Lignocaine 1% with 1 in 200,000 adrenaline - 7mg/Kg - 500mg (50ml)
- Bupivicaine 0.5% - 2mg/kg- 150mg (30ml)

Maximum doses are based on ideal body weight

Effects of adrenaline

Adrenaline may be added to local anaesthetic drugs. It prolongs the duration of action at the site of injection and permits usage of higher doses (see above). It is contra indicated in patients taking MAOI's or tricyclic antidepressants. The toxicity of bupivacaine is related to protein binding and addition of adrenaline to this drug does not permit increases in the total dose of bupivacaine, in contrast to the situation with lignocaine.

References

An excellent review is provided by:
French J and Sharp L. Local Anaesthetics. *Ann R Coll Surg Engl* 2012; 94: 76-80.

Q: You are asked to provide a reference for your senior house officer who has been working on the unit as a core trainee for the past twelve months. During that time you have not been impressed with their level of work and on a number of occasions they have presented themselves for work unfit to perform their clinical activities as they were intoxicated. They now wish to work in a new trust and have asked for a reference. What is the best course of action?

☐	Refuse to provide a reference as it would be unsupportive
☐	Write an open reference for the new trust outlining your concerns
☐	Report the individual to the GMC
☐	Follow trust policy for raising concerns
☐	Write a reference in which you focus on their strong points only

Where there are concerns about fitness to practice it would be usual practice to formally investigate these prior to informing an outside body be it the GMC or another trust. If these are not concluded in a timely or satisfactory manner then the GMC should usually be informed.

References and good medical practice

The GMC issues guidance about writing references, in particular the make the following key recommendations:

- You must be honest and objective when writing references, and when appraising or assessing the performance of colleagues, including locums and students. References must include all information relevant to your colleagues' competence, performance and conduct.
- You must be honest and trustworthy when writing reports, and when completing or signing forms, reports and other documents. You must make sure that any documents that you write or sign are not false or misleading
- You must be honest and objective and keep to the principles of equality and diversity when appraising or assessing colleagues performance. This includes when assessing trainees during the Annual Review of Competence Progression (ARCP) or other equivalent process. The safety of patients and the public could be put at risk if you make false, exaggerated or incomplete comments about another professionals competence or experience.
- You should provide information about a candidates conduct, including matters that might affect a patients trust in the individual candidate or the publics trust in the profession as a whole.
- If you have concerns about a candidate's fitness to practise you should follow the advice at paragraph 25 of Good medical practice.

In relation to this last point they outline the processes for raising concerns about a colleague. In the first instance this usually involves review at trust level prior to informing the regulator.

Q: A surgeon has been collecting data relating to the heights of children with ulcerative colitis. What is the best method for establishing the central tendency and dispersion of the data?

☐	Mode and standard error of the mean
☐	Mode and standard deviation
☐	Mean and standard deviation
☐	Mean and inter quartile range
☐	Median and interquartile range

Median and inter quartile range is the best method for establishing central tendency and is least susceptible to outliers. Remember that the data set will be derived from symptomatic individuals (who may have been taking mediation and been malnourished for some time).

Statistics

Data types

Accurately classifying the data you seek to obtain is the first step in undertaking formal data analysis.

Title	Description
Nominal	Numbers are assigned to data that has no underling numerical value (e.g. marital status)
Ordinal	Has numbers that can be assigned to a natural underlying order (e.g. tumour grades)
Discrete	Data has a discrete numerical value, that has to be a whole number (e.g. number of deaths)
Continuous	Data has a numerical value that may not be a whole number and often reflects a direct measurement (e.g. weight)

Knowing the data types allows us to direct the appropriate analysis. This is often conveniently achieved by plotting it on a graph. Where the data has a categorical nature, a histogram is often a useful starting point. Other types of data, particularly direct measurements, may be plotted as single data points. If we take the weight example from above then plotting a large number of data points may allow us to numerically determine the spread of the data. In particular whether it fits the normal distribution. Remember that if the mean, median and mode overlap numerically then the data will be normally distributed.

Parametric vs Non parametric

Parametric methods of data analysis assume that the underlying data set has a normal distribution. Non parametric methods do not make assumptions about the nature of the underlying data.

Parametric tests	Non parametric tests
T Test	Mann Whitney U
Paired T Test	Chi Squared
	Spearmans Rank Correlation
	Wilcoxon signed rank test

There are many others

Types of test

Test type	Features
T Test	Direct comparison of data sets which are normally distributed
Mann Whitney U	Ranked method for non parametric data
Wilcoxon matched pairs/ signed rank	Analog of the paired T Test, data must be interval, data based on magnitude of differences

Spearmans Rank Correlation	Statistical dependence between 2 variables. May be used for continuous or discrete variables
Chi Squared test	Test of association between two qualitative variables,valid if 80% expected frequencies exceed 5 or all exceed 1. Fishers exact test may be used for small samples

Q: To which of the following is the Declaration of Helsinki most applicable?

☐	Research involving human subjects
☐	Risk stratification of an individual with multiple endocrine neoplasia
☐	Doctors treating prisoners of war
☐	Doctors treating individuals under the mental health act
☐	Doctors considering using an Independent mental capacity advocate for planned surgery

The declaration of Helsinki primarily governs research.

Declaration of Helsinki

The Declaration of Helsinki is a statement of ethical principles for medical research involving human subjects, including research on identifiable human material and data.
It is a lengthy document. However, it core principles are that individuals who participate in research are treated in a fair and ethical manner. Research studies should conform to core principles of participant safety and wellbeing and this should take precedence at all times over the needs of the researchers.
Emphasis is placed on the consent process that needs to be both comprehensive and understandable.
A robust governance system should be in place to review the research progress and promptly halt any study where participants are deemed to have sustained harm as a result of their participation.

Next question

Q: A 38 year old lady with severe bipolar disorder is scheduled for a cholecystectomy. She is taking lithium therapy. Her treatment is within the therapeutic range. Which of the following interactions is most likely?

☐	Reduced efficacy of neuromuscular blocking drugs
☐	Haemodynamic instability on induction with sevoflurane
☐	Prolongation of action of neuromuscular blocking drugs

☐	Hypertension when propofol is used
☐	Resistance to effects of sodium thiopentone

Lithium therapy

Lithium does not need to be stopped for minor surgery; it has been suggested that it should be stopped 24 - 48 hours before major surgery but this is disputed. From a psychiatric perspective interruptions in lithium therapy are bad for the patient since there is good evidence that they lead to a worse course of affective disturbance than if the patient was left untreated. Lithium prolongs both depolarising and non depolarising neuromuscular block, therefore a nerve stimulator should be used. It may also reduce anaesthetic requirements as it blocks brain stem release of noradrenaline and dopamine. Drugs which may exacerbate renal impairment should be used with caution, including NSAIDs which as mentioned above may also increase lithium levels. Careful attention should be paid to fluid and electrolyte balance. If discontinued, lithium should be restarted 24 hours post-operatively.

Q: You are involved in the care of a 38 year old man who holds a firearms license. He has been accidentally shot in the leg by his son who was playing with his gun. The injury is only superficial and you judge the family to be stable and the child seems to be well cared for. The patient is keen to be discharged and for no further police involvement. What is the correct course of action?

☐	Discharge the patient
☐	Inform the patients general practitioner so the information can be considered when the firearms license is renewed
☐	Inform the police
☐	Ask to see the firearms license and discharge the patient if it is valid
☐	Inform the trust legal department

Where an individual holds a license, there are still concerns that may be in the wider interests that the event is disclosed.

Confidentiality- gunshot and knife wounds

The GMC has issued guidance that states that where a person presents with a gunshot injury the police should usually be informed. Ideally, this should be undertaken with the patients consent. However, disclosure may be justified in the interests of public protection. Therefore, disclosure can occur without consent. However, you should inform the patient that this is the action you intend to take. There is a suggestion that even accidental firearm injuries be reported. This is because people need to hold a firearms license and the injury may be indicative of factors that mean that an individual is no longer safe to hold such a license.

Knife wounds should also usually be reported. The exception to this being accidental knife injuries. The other

exception to this is where the treating clinician considers that no-one other than the patient is at risk of harm and the patient themselves does not wish disclosure.

In individuals under the age of 18 years. All injuries be they knife or gun related raise safeguarding concerns and should be reported.

Q: A female with a pelvic gastro intestinal stromal tumour develops a local recurrence. What is the most appropriate course of action?

☐	Radical radiotherapy
☐	Chemotherapy with 5FU
☐	Chemotherapy with cisplatin
☐	Pelvic exenteration
☐	Treatment with abl tyrosine kinase inhibitor

Drugs such as imatinib are licensed for recurrent GIST and may provide far better palliation than that achieved by radiotherapy, conventional chemotherapy or surgery.

Gastrointestinal stromal tumour

GIST's are not common tumours (10 per million) and originate primarily from the interstitial pacemaker cells (of Cajal). Up to 70% occur in the stomach, the remainder occurring in the small intestine (20%) and the colon and rectum (5%). Up to 95% are solitary lesions and most are sporadic. The vast majority express CD117 which is a transmembrane tyrosine kinase receptor and in these there is a mutation of the c-KIT gene.

The goal of surgery is resection of the tumour with a 1-2cm margin of normal tissue. As a result extensive resections are not required. Unfortunately there is a high local recurrence rate, the risk of which is related to site, incomplete resections and high mitotic count. Salvage surgery for recurrent disease is associated with a median survival of 15 months.

The prognosis in high risk patients is greatly improved through the use of imatinib, which in the ACOSOG trial (imatinib vs placebo) improved relapse rates from 17% to 2%.
In the UK it is advocated by NICE for use in patients with metastatic disease or locally unresectable disease.

Q: In conducting a meta analysis, what is the most useful method of graphically displaying studies to try and identify the presence of publication bias?

☐	Box - Whisker plot

☐	Violin plot
☐	Funnel plot
☐	Bar chart
☐	ROC curves

Funnel plots

- A funnel plot is a useful graph designed to check the existence of publication bias in systematic reviews and meta-analyses. It assumes that the largest studies will be near the average, and small studies will be spread on both sides of the average. Variation from this assumption can indicate publication bias.

- In common with confidence interval plots, funnel plots are conventionally drawn with the treatment effect measure on the horizontal axis, so that study size appears on the vertical axis, breaking with the general rule. Since funnel plots are principally visual aids for detecting asymmetry along the treatment effect axis, this makes them considerably easier to interpret.

- The funnel plot is not without problems. If high precision studies really are different from low precision studies with respect to effect size (e.g., due to different populations examined) a funnel plot may give a wrong impression of publication bias. The appearance of the funnel plot can change quite dramatically depending on the scale on the y-axis whether it is the inverse square error or the trial size