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MRCGP Revision Guide FreeBook

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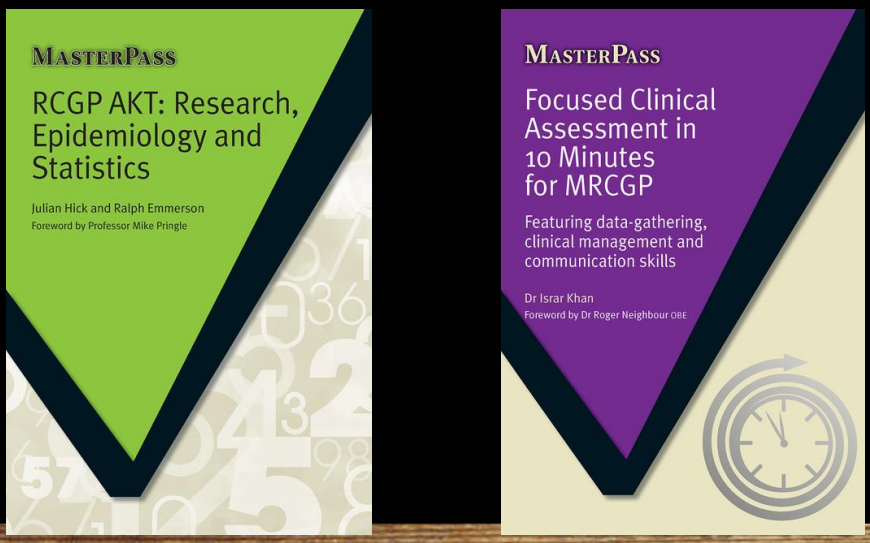

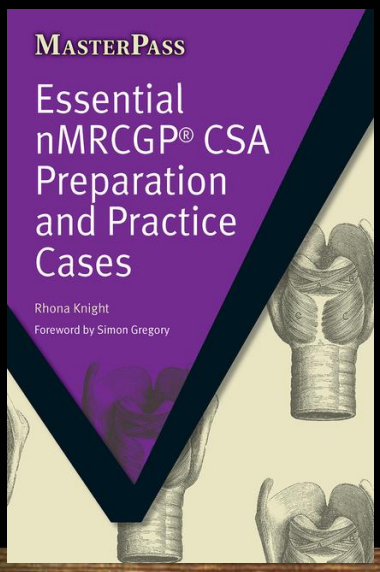

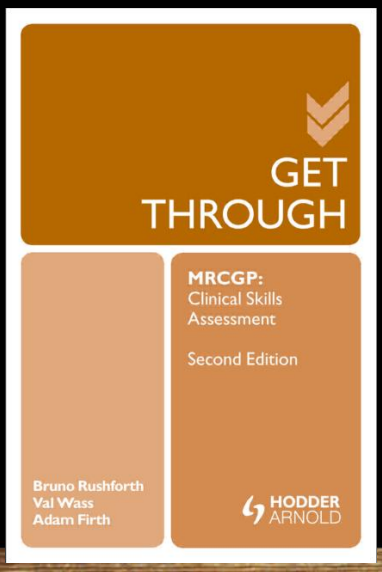

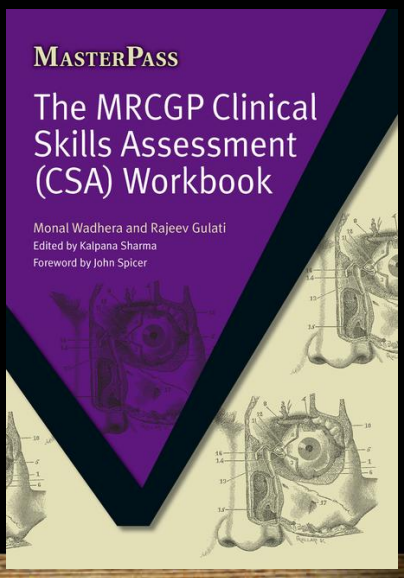

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Introduction

MRCGP Freebook

This Freebook is written for those planning to undertake the Membership of the Royal College of General Practitioners (MRCGP). The MRCGP comprises three components: an *Applied Knowledge Test* (AKT), a *Clinical Skills Assessment* (CSA), and *Workplace Based Assessment* (WPBA). The AKT is usually taken prior to the CSA, with WPBA's being undertaken regularly throughout training. This book concentrates on the AKT and CSA components. More information, including any recent changes, can be found here.

The AKT is essentially a 3 hour 10 minute computer-based 200 item knowledge assessment with a composition of approximately 80% clinical medicine, 10% evidence based medicine, and 10% health informatics and administration. An AKT content guide can be found here.

The clinical medicine component is well covered with online question banks and textbooks. However many candidates often find evidence based medicine both confusing and variably covered in courses/training programmes and textbooks. **Chapter one** provides an introduction to statistic methods, often a feature in the AKT, and an understanding of which is essential in order to fully appraise medical research.

The CSA is an objective structured clinical examination (OSCE) comprising 13 ten minutes consultations. More information can be found here. Each case within the CSA is marked under three domains:

1) Data-gathering, technical & assessment skills
2) Clinical management skills
3) Interpersonal skills

It is important to be aware of these domains, how they are marked with positive and negative indicators, and how to develop your consults in such a way that you meet these within the time constraints. **Chapter two** provides useful guidance within the domain of data-gathering, technical & assessment skills.

The best way to prepare for the CSA is practice, practice, practice! This can take multiple forms: seeing as many patients in your GP rotations as possible, frequent WPBA's, trainer observed surgeries, and finally role-playing with colleagues. Most find a small study group that meets regularly to be very helpful as it allows for peer support, clinical practice, and for areas of weakness to be addressed while gaining constructive feedback. To maximise these sessions, 'mock' or sample cases that can be role-played and subsequently explored are required. **Chapter three** focuses on writing your own CSA cases. These need to be structured and, ideally, mapped against the marking domains. This chapter helps by providing a helpful template. Further chapters, not included within this book, cover the important skills of marking and providing feedback.

It can sometimes be helpful to have pre-written cases. These can often be challenging and facilitate discussion on wider issues identified within the case. They can of course also be very useful when you are short of time! **Chapter four** presents a case with multiple domains. The case involves a 16 year old female, attending alone, with a rash following a course amoxicillin for a sore throat. Like most sample or 'mock' cases a history is provided for a colleague to role-play. The case, taken at face value, may seem relatively simple but further exploration may yield additional issues. This tests a wide range of skills including interpersonal, data gathering, clinical assessment and management skills as well as knowledge of child consent, confidentially, and the law.

Finally, **chapter five** focuses on a 57 year old gentleman with motor neurone disease (MND) who wishes to discuss how he wants to die. This chapter provides a sample clinical case, an approach to information gathering and management, and finally a clinical summary of MND to facilitate learning.

Note to readers: References from the original chapters have not been included in this text. For a fully-referenced version of each chapter, including footnotes, bibliographies, references and endnotes, please see the published title. Links to purchase each specific title can be found on the first page of each chapter. As you read through this FreeBook you will notice that some excerpts reference previous chapters . Please note that these are references to the original text and not the Freebook.

01: **RCGP AKT: Research, Epidemiology and Statistics**

- Chapter: Introduction to Statistical Methods

CHAPTER 3

Introduction to statistical methods

INTRODUCTION

In this chapter we will look at some of the building blocks of statistical methods such as averages and the normal distribution. We also look at graphical representation of data, choosing a statistical test and types of bias. These are all topics that are covered in the AKT, but they are also the basis for a more sophisticated use and understanding of data and statistics. First we need to consider how data can be classified into different types. Understanding that there are different types of data helps when deciding on appropriate ways to use and understand them.

Q 3.1 Choose the single best answer from the following options. Levels of measurement are:

a) different heights of data on a bar chart
b) basic techniques for measuring data
c) advanced statistical analysis tools
d) the hierarchy of data types
e) questions regarding how studies are performed.

Q 3.2 Choose the single best answer from the following options. Temperature as measured by the centigrade scale is a type of:

a) nominal data
b) ordinal data
c) interval data
d) ratio data.

Q 3.3 Choose the single best answer from the following options. Answers on a Likert scale from strongly dislike to strongly like are what type of data?

a) Nominal data
b) Ordinal data
c) Interval data
d) Ratio data

Q 3.4 Choose the single best answer from the following options. Data that consist of a list of names would be considered which level of measurement?

a) Nominal
b) Ordinal
c) Interval
d) Ratio

LEVELS OF MEASUREMENT

Data can be collected or produced in many different ways; the data collected vary in their attributes. This is important to understand, as it affects how data can be presented, manipulated and understood. There are statistical tests that make most sense with a particular type of data. For example, it makes less sense to talk of the average gender in a group of people than it does to talk about the average height of that group of people. The concept that there are different types of data is often referred to as 'levels of measurement'; this encompasses the idea that there is a hierarchy within data types, with some being more useful than others.

Nominal data

The simplest type of data is nominal data – this is simply data that are a name for something, such as nationality, gender or type of doctor. Essentially, nominal data are data that cannot meaningfully have a specific number attached to them. You may assign women the number 1 and men the number 2 for the purposes of data entry, but you could assign any number to either; it doesn't matter which number is assigned to a group, as long as each group has its own number. This means that nominal data cannot meaningfully have mathematical operations performed on them. It doesn't make sense to add or multiply names. The mode (the most common item) is the appropriate central tendency measure to describe nominal data.

Ordinal data

Ordinal data can be put into a meaningful order but the degree of difference between data points is not known. An example of ordinal data would be ranking of physicians' preferences for using different medications to treat a particular condition. The data are in order but you cannot tell what the difference is between data points – it cannot be measured meaningfully. A medication ranked the most popular cannot be said to be twice as good as a medication ranked second. It makes most sense to use the median (the middle-ranked item) as the measure of central tendency for ordinal data, but using the mode also makes sense. Using the mean makes less sense, because of the lack of a consistent difference between data points.

Interval and ratio data

Interval data have a fixed mathematical difference between each point. For example, temperature lies on an interval scale – the difference between 36 °C and 37 °C is the same as the difference between 37 °C and 38 °C. However, data in this category do not have a zero point where there is nothing that can be measured. A temperature of 0 °C does not mean the absence of temperature but refers to the freezing point of water. The zero is an arbitrary point. You could equally imagine a useful and valid temperature scale that had zero as the freezing point of another chemical compound, such as carbon dioxide. Because the choice of the zero point is arbitrary, there are limits to the mathematical operations you can meaningfully do with interval data; you cannot meaningfully multiply interval data but you can add and subtract it.

Data that are part of a set that does have a definite zero point – for example, height or weight – are called *ratio data* or *scale data*. Interval or ratio data can be subject to more statistical tests and mathematical manipulation. Doubling height or weight does make sense.

It is possible to use the arithmetical mean as the measure of central tendency for interval and ratio data. It is also possible to measure the spread of the data using the range (the largest number minus the smallest number) and standard deviation (a measure of the average distance from the mean of a data set).

DESCRIPTIVE STATISTICS

Q 3.5 Match the following types of descriptive statistic with the most appropriate definition.

1) Median	a) The difference between the smallest and largest data point
2) Standard deviation	b) The arithmetical average
3) Range	c) The most common item of data
4) Mode	d) Data ranked in order and split into four sets, each with the same number of points
5) Mean	e) A measure of the spread of the data around the mean
6) Quartile	f) The middle point of the data when ranked in order

Q 3.6 Work out the mean, median, mode and range of the data presented in this table.

5	3	3	1
2	2	1	3
4	3	3	3
1	6	4	4

Mean
Median
Mode
Range

Measures of central tendency: the mean, median and mode

Measures of central tendency are useful in expressing what could be considered the midpoint or the typical value in a data set. However, as we have already seen, there are three commonly used ways of calculating this that apply in different situations.

If the average is mentioned, it often refers to the *mean – that is, the arithmetical average whereby every number is added together and then divided by how many numbers there are*. The big downside to the mean is that it can be misleading when there are outliers or a very skewed distribution. The mean for the data in Question 3.6 is 48/16 = 3

The median is the value that falls in the middle of the data set if all the values are put in order of size. This value is less affected by outliers than the mean. Because of this, the median is often used to describe skewed distributions. The median

for Question 3.6 is 3. Note that where there is an even number of data values, you find the two numbers in the middle and then add these together and divide by 2.

The mode is the most frequently occurring value in a data set. It is not always a single value – bimodal distributions, for example, are characterised by two equally frequent modes. The mode's biggest advantage is that it can be used with non-numerical data – for example, the most commonly used drugs for a particular condition. The mode for the data in Question 3.6 is 3.

Measures of dispersion or spread: range, percentiles, quartiles and standard deviation

The range is the difference between the largest and smallest values in a data set. Therefore, it gives a good sense of the dispersion of the values – whether they are clustered closely together or spread out.

Percentiles (or centiles) are the number of data points divided by 100 with the data set out in order, normally from smallest to largest. They are useful in working out where a figure falls in a data set. If a data set includes 300 data points, then each centile includes three data values. If a value is found to be on the 20th centile, that means that 20% of the data points fall below that value.

Quartiles, however, are more useful for summarising data: they are the 25th centile (the lower quartile), the 50th centile (the median) and the 75th centile (the upper quartile). *The interquartile range is often used to show the middle 50% of the data between the 25th and 75th centiles*. The mean of this range can be more useful in estimating the central tendency of a data set where there are outliers.

The *standard deviation describes how much variation there is from the mean*. The larger the standard deviation the more spread out the data are. If the standard deviation is large, this may reflect a large degree of uncertainty in experimental results or it may reflect a heterogeneous (very different) sample or population. It is important to contemplate what this means in the context of research you are considering – look at what is being measured and why.

THE NORMAL DISTRIBUTION

Q 3.7 In a normal distribution, what proportion of data will fall within one standard deviation either side of the mean (to one decimal place)?

a) 99.7%
b) 95.4%
c) 68.3%
d) 34.2%

Q 3.8 True or false?

a) There is only one normal distribution, which is why it is called the normal distribution.
b) There are many normal distributions.
c) The normal distribution cannot be used to calculate deviation from the mean.
d) The normal distribution can be graphically represented by a bell curve.
e) Whether the data are normally distributed or not is not very important when choosing a statistical test.

Q 3.9 Choose one or more answers from the following options. In a normal distribution:

a) the data lies roughly equally on either side of the mean
b) the median has the same value as the mean
c) the mode has a higher value than the mean
d) the mode has a smaller value than the mean
e) the median has a smaller value than the mean

The idea of a normal (also called a Gaussian) distribution is very important to understand. Many statistical techniques are only appropriate when data are normally (or close to normally) distributed. It is a theoretical distribution that can be described as a bell-shaped curve that is symmetrical around the mean value of the sample or population. In a normal distribution, the median will be the same as the mean and the mode. *In a normal distribution, 68.3% of data will lie within one standard deviation either side of the mean, 95.4% within two standard deviations and 99.7% within three standard deviations*. A graph of three normal distributions is shown in Figure 3.1.

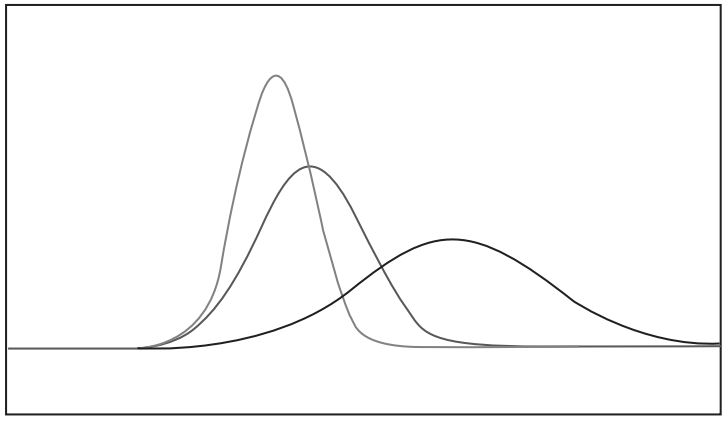

FIGURE 3.1 Three different but normally distributed data sets represented graphically

Note that there is not a single 'normal distribution'. The graph shows three different normal distributions, all of which fulfil the key criterion of being symmetrical around the mean. *The 'normal distribution' therefore includes the idea that data are symmetrically grouped around the mean in a bell shape* rather than a specific height and width of the graph. The width and height of the graph is determined by the standard deviation of the data, whereas the mean defines the centre of the curve.

Skewed distributions

Data with a longer tail to one side of the central measure when plotted are said to be skewed. Negative skew, also known as skew to the left, has a longer or fatter tail to the left side (smaller values) when graphed. Positive skew is the opposite, with a longer or fatter tail to the right side (higher values). In a negatively skewed distribution the mode will be greater than both the median and the mean. Likewise, in a positively skewed distribution the mode will be less than the median and the mean. It is frequently held that in a positively skewed data set, the mean is greater (or to the right on a graph) than the median, whereas in a negatively skewed data set the mean is less than the median. However, this rule is very often wrong when distributions are more complicated with evident asymmetry in the size of each tail or when there is more than one mode. Figure 3.2 provides graphs demonstrating simple skew:

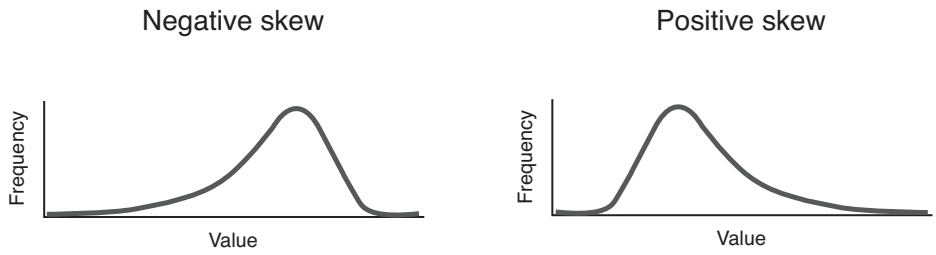

FIGURE 3.2 Example of **(a)** negative skew and **(b)** positive skew: in these simple cases of skew you would expect mean < median < mode in the negative skew and mean > median > mode in the positive skew

GRAPHICAL REPRESENTATION OF DATA

Q 3.10 Match the type of graph to the most appropriate definition.

1) Pie chart	a) The length of bars is proportional to the values they represent
2) Bar chart	b) A two-dimensional plot of ordered observations that are connected
3) Histogram	c) Shows relative frequencies for a relatively small selection of categories
4) Line chart	d) Adjacent bars whose area matches the frequency of observations in an interval

Q 3.11 True or false?

a) Bar charts are useful for continuous (interval or ratio) data.
b) Histograms are bar charts that use frequencies rather than percentages.
c) Pie charts with many categories are easy to read.
d) Line graphs are not suitable for continuous data.
e) Histograms should only be used for continuous data.
f) Scatter plots cannot have more than two variables.
g) Box plots are a good way of comparing the median, range and interquartile range of variables.
h) Frequency tables should always show relative frequencies.

Frequency tables, pie charts and bar charts are useful for presenting qualitative or categorical data (data that fit into categories rather than having a meaningful numerical value). Histograms, box plots, line graphs and scatter plots are useful for presenting quantitative or numerical data. Scatter plots are good for showing the relationship between two (or sometimes more than two) variables. Remember that simple presentation is nearly always more useful than any graphical effects. Be wary of three-dimensional graphs or graphs that use pictures to represent categories. These can be difficult to read and misrepresent the size of categories. Also be wary of charts with axes that do not start at zero or are logarithmic – these distort the differences between categories.

Frequency tables

These show the number in each category set out in a table – the frequency with which each category occurs. They may also include the relative frequency – that is, the proportion of the sample that falls into each category. The example outlined in Figure 3.3 sets out the frequencies of chronic diseases within a practice population. Note that the percentages here are not relative to one another, as

the categories are not mutually exclusive (a patient could have diabetes, chronic kidney disease and ischaemic heart disease).

	Number of patients	Percentage of practice list
Diabetes	225	6%
Ischaemic heart disease	150	4%
Chronic kidney disease	123	3.3%
Stroke or transient ischaemic attack	68	1.8%

FIGURE 3.3 A simple frequency table showing the number of patients with certain chronic diseases in a practice of 3750 patients

Pie charts

These are very common and they are an easy and simple way to present relative frequencies when there are only a few categories that are mutually exclusive and so can be added up to make 100%. Each category is represented by a slice of the circle (or pie); the area in each slice is proportional to the relative frequency. They are often presented as three-dimensional, which is misleading because some slices will appear to have more area or volume than others. Also remember to look at the number as well as the percentage in each category – if the numbers in each category are small, the results have to be treated with caution. Pie charts, while commonly used, are not seen to be as useful as other

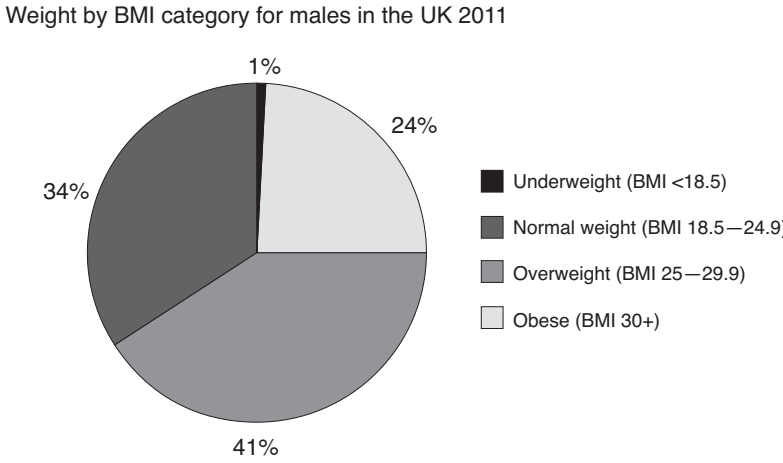

FIGURE 3.4 A pie chart showing UK data for male weight in 2011 – the percentage labels have been added so it is easier to compare categories (data from Public Health England)

types of graph by many statisticians because research has shown that they are often misinterpreted. This is because pie charts use area rather than length for comparison and area is harder to judge than length. Thus pie charts are less helpful than bar charts for comparing categories with accuracy.

Bar charts

Bar charts are used to display the frequency of items in discrete categories of data or particular attributes, such as the mean value for a category. Bar charts are more helpful than pie charts in several ways, but particularly when there are a lot of categories to be presented. Typically, they present frequencies on the y-axis (the vertical axis) and categories on the x-axis (the horizontal axis), but switching this around can be useful when there are lots of categories or where they have long labels. The height (or length) of the bar represents the frequency of the result.

Similarly to pie charts, bar charts are best used for categorical data, but unlike pie charts the frequencies do not have to add up to 100%. When presenting nominal data, it does not matter in which order the bars are shown, but with ordinal data there is an inherent order that should be preserved. It is also possible to present data split into subgroups by grouping bars together or by stacking them on top of one another. They can also be used to compare data from different time points or after different interventions.

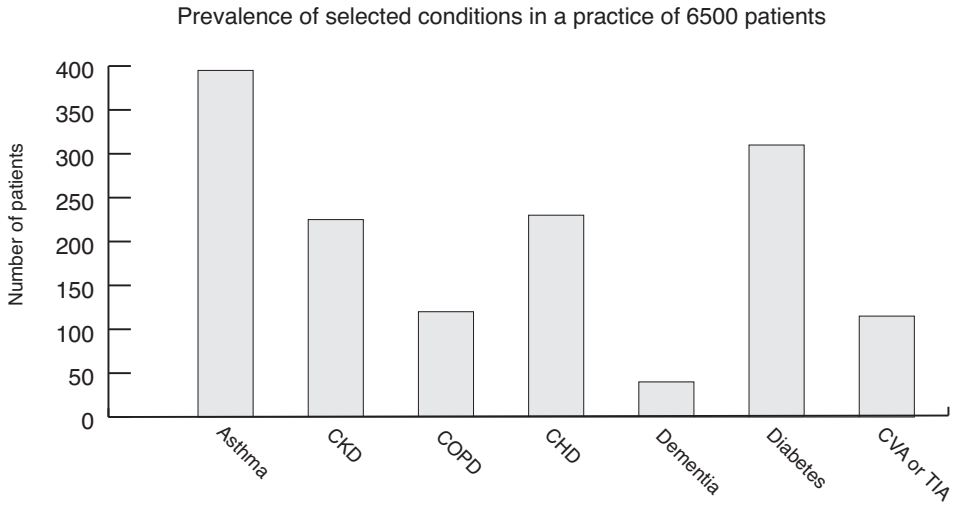

FIGURE 3.5 A bar chart with counts of patients in selected categories of chronic disease (CKD = chronic kidney disease, COPD = chronic obstructive pulmonary disease, CHD = coronary heart disease, CVA = cerebrovascular accident, TIA = transient ischaemic attack)

Bar charts can distort data if they are not comparing like with like or have graphic effects such as three-dimensional bars. A common distortion is to start the axis at a value other than zero, which makes the ratio of categories appear very different to reality. Also beware scales that have any transformation, such as logarithmic scales – these can distort differences between categories. Figure 3.5 shows an example of a bar chart.

Histograms

Histograms are used to display continuous data such as interval and ratio data. They show the shape of the distribution of the data. In a histogram, continuous data are split into ranges known as bins. The area of a bar represents the number of data points falling within that range. When reading a histogram, pay careful attention to the ranges chosen – the width of the bars should be equal where the ranges are equal. The bins should touch one another because the data are continuous. If a bin does not contain any values, then there should be a gap between bars – that is, the bar is shown as having zero height. Look at the shape to see if the data are clustered around the mean or skewed and also look for outliers or gaps in the data. Outliers will affect the mean, the range and the standard deviation of a data set. It is likely that gaps will have a similar impact.

Note that histograms differ from bar charts in that they show the distribution of data within ranges whereas bar charts compare the frequency of variables. Bar charts normally plot categorical data (data that can be sorted into

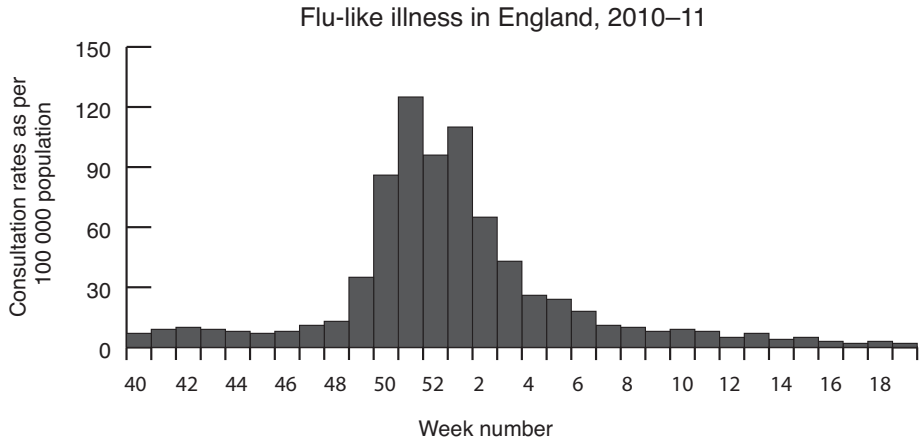

FIGURE 3.6 A histogram showing flu-like illness consultation rates in England in 2010–11: note the bars are adjacent to one another, as the data are continuous; also note the dip over the Christmas week (52), probably due to data collection difficulties rather than a real drop in illness rates (data from Public Health England)

mutually exclusive categories); histograms can only plot continuous data. The bars in bar charts can often be rearranged without it making any difference to the meaning of the graph but this is not the case for a histogram. Figure 3.6 gives an example of a histogram.

Line graphs

Line graphs are also used to show continuous data. They are often used to show time series data, which plot changes in one or more variables over time. They are useful for identifying patterns over time, such as seasonal variation in disease activity. They can also be used for other continuous data series such as distance – for example, showing how distance from a source of pollution affects asthma rates. The data need to be collected sufficiently often to make meaningful comparison possible and to ensure that important variations are not omitted.

The x-axis should represent the continuous variable, such as time or distance, and the y-axis should indicate the measurement. Where several data series are collected, they can be shown together to allow easy comparison of trends. Line graphs should not be used for categorical data – that cannot be joined meaningfully. A common use of line graphs in biostatistics is a Kaplan–Meier survival curve, which shows the proportion of people surviving after diagnosis or treatment.

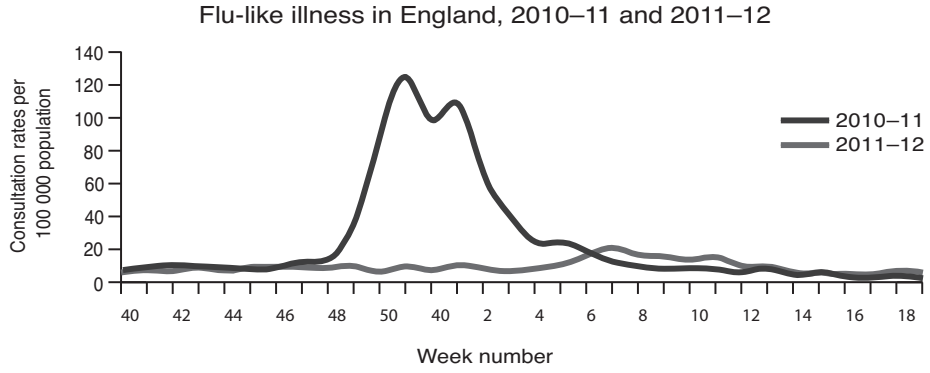

FIGURE 3.7 A line graph of the same data as shown in Figure 3.6, with additional data for 2011–12: each year is shown as a separate line, which makes the graph much easier to read than if a histogram were used (data from Public Health England)

Box plots

Often called a box-and-whisker plot, this is used to show the distribution of interval data with the central value and variability also shown. There is a central box with a line across it to represent the median, the edges of the box represent

the upper and lower quartiles, and lines (whiskers) extend from the box to the maximum and minimum values. This can show any skew in the distribution and suggest whether there are outliers. They are useful when comparing two or more data sets. For example, they could be used to compare the effect of a drug in men and women or cholesterol levels before and after an intervention.

Box plots can be drawn either vertically or horizontally, although the former is more common. The whiskers can be used to represent values other than maximum and minimum, so make sure you check what is being shown. Some plots include outliers as dots beyond the extent of the whiskers. The size of the box is sometimes used to show the relative size of each group being graphed, with the height (if the box is shown horizontally) or width (if the box is shown vertically) proportional to the size of the group.

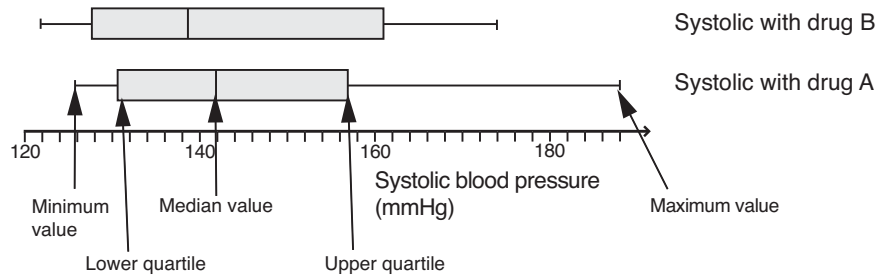

FIGURE 3.8 A box plot showing the difference in systolic blood pressure with two antihypertensive medications (labels added to show the values used to construct the plot)

Scatter plots

'Bivariate' data have two quantitative variables for each measurement – for example, age and height of study participants. It is often easier to interpret bivariate data if the data are graphed. A scatter plot maintains the relationship of the two variables, with one on the y-axis and the other on the x-axis.

If there is a relationship between the variables it is possible to see both the strength of the relationship (how closely the points cluster together or along a line) and the direction of the relationship. If the variables increase together it is a positive association, or if one decreases as the other increases this is a negative association. Note that the line of association does not have to be straight – it is often curved. For example, in a graph showing mortality against time from diagnosis for a terminal disease, the line tends to be curved, with a small proportion of patients living longer than most others.

It is possible to use a scatter plot to graph more than two variables through the use of three-dimensional charts and gradated colours. These charts can be more difficult to read unless carefully constructed. Figure 3.9 gives an example of a simple scatter plot.

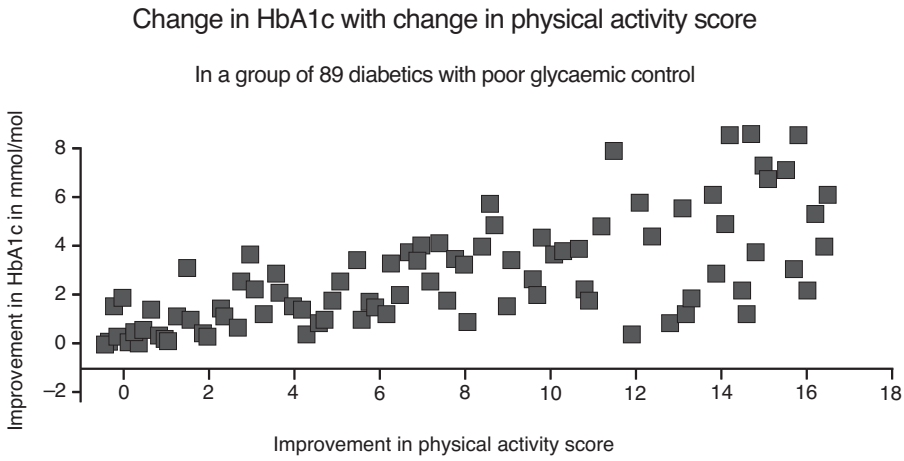

FIGURE 3.9 A scatter plot of changes in HbA1c with changes in physical activity scores (this is based on the well-known relationship between diabetic control and physical exercise, but the figures are not from a real study)

CORRELATION

Q 3.12 From the following options, choose all answers that could be true. A correlation coefficient of +1 implies:

a) there is a perfect correlation between two variables
b) there may be falsification of results as there appears to be no error in measurements
c) as one variable increases, the other variable decreases
d) as one variable increases, the other variable also increases
e) when graphed the relationship would be shown by a straight line, with all points falling on it

Q 3.13 Which of the following is the best definition of a confounding variable?

a) A variable that is related to both the dependent and independent variables being studied and which alters both.
b) A variable that causes the independent variable to alter without an obvious cause.
c) A factor that has not been accounted for in the design of a study.
d) A variable that causes results to be confusing.
e) A variable that has been studied but its behaviour is unknown.

Correlation is a measure of the extent to which one variable changes as another variable changes. If correlation is positive, this means both variables change in the same direction – for example, as air pollution increases so does the prevalence of asthma. Negative correlation means that as one variable increases the other decreases – for example, as age increases, kidney function decreases. If there is correlation this does not mean that every study participant demonstrates the same relationship between variables, just that there is a tendency for one variable to change in a particular direction as the other variable changes.

Spurious correlation is where there wrongly appears to be a correlation between two variables because of another factor that is linked to both of them. The third factor here would be referred to as a confounder. If a study shows a link between poor oral health and oesophageal cancer rates, you may postulate that there is a link between the two; in fact, smoking is a causative factor in both and is therefore a confounding variable. Correlations can also appear to exist, even when there is no real relationship between variables, because of chance or poor methodology.

If you consider a scatter plot, the closer the points are to the line of association then the higher the correlation between the variables. Correlation is often measured using Pearson's product-moment correlation coefficient or Spearman's rank correlation coefficient (*see* Figure 3.10).

Pearson's product-moment correlation coefficient is only appropriate for data that show a linear relationship, in that the data falls on or around a straight line when plotted. Spearman's rank correlation coefficient does not have the same requirement, so it can be used with data that fall on a curved line. It is always worth examining the graphical representation of the data, because there are several ways in which a data set can have the same correlation coefficient and only one of those is a linear relationship.*

The more closely the relationships alter with each other, the nearer the (Pearson's) correlation coefficient will be to 1, either +1 for a positive relationship or –1 for a negative relationship. A correlation of 1 means that all points lie on the same line, but this would be unusual because there is normally some error in the measurement of variables. Note that Spearman's rank correlation coefficient gives a result of +1 when as one variable increases the other *always* increases, and it gives a result of –1 when as one variable increases the other *always* decreases.

Remember that correlation does not mean that there is a causal relationship between variables. However, in some cases, such as height compared with age in children, it is obvious that as average age increases so will average height,

* Anscombe's quartet illustrates how different relationships can have the same correlation coefficient and the same summary statistics (mean and variance). See Anscombe FJ. Graphs in statistical analysis. *Am Stat*. 1973, **27**(1): 17–21.

and so correlation can be taken to imply causation. Further investigation, such as completing a randomised controlled trial, is often necessary to prove causal links after correlation is found. Causality can be established if a relationship is shown that has a time order, a positive dose–effect relationship and there are not any confounding factors. Internal validity is *the degree to which it can be shown that there is a causal relationship between variables.*

CONFIDENCE INTERVALS

Q 3.14 Which of the following options will help a confidence interval become narrower? Choose one or more answers.

a) A smaller sample size
b) A significantly increased sample size
c) Studying a population with a lot of variability
d) Studying a population with more homogeneity
e) Having a more complex study design

A confidence interval is an estimate of the range of values within which the true parameter lies. A parameter applies to the whole population and not just the sample being studied. Knowing the confidence interval is necessary, because a sample is highly likely to vary in some ways from the population from which it is drawn.

The confidence interval is calculated from the observations in a study. It is based on the idea that if you drew lots of samples from the population being studied, you would be able to combine the results to get closer to the actual parameter. A confidence interval is not the probability of a particular result being the true parameter for the population. It is a range within which the population parameter can be expected to be found in a proportion of samples. This proportion is commonly set at 95%. If a confidence interval of 99% is used, then the true population parameter is 99% likely to fall within that range.

This is similar and related to the idea of the level of significance (or a p-value) discussed in Chapter 5, but do not confuse the two definitions. The p-value signifies the probability that the result of a repeat of the trial or measurement would be equal to or more extreme than the one observed, if the null hypothesis was true (*see* Chapter 5).

Generally, the larger the sample size and the less variability (i.e. more homogeneity) within the population as a whole, then the smaller the confidence interval will be. If you study only a handful of subjects from within a very large population, there is a very good chance that they will vary significantly from the population as a whole, particularly if that population has a lot of variation

within it, and this will lead to a wide confidence interval. More complex study designs generally increase the confidence interval. Where confidence intervals are very large this suggests that further, larger studies are necessary before any conclusions should be drawn. We will look further at confidence intervals when we consider relative risk and odds ratios in Chapter 5, including where the confidence interval crosses the line of no effect – meaning that the study has not found a significant difference between parameters.

PARAMETRIC AND NON-PARAMETRIC TESTS

Q 3.15 Which of the following are characteristics of non-parametric tests?

a) They make more assumptions about a population.
b) They assume that the population being studied fits into a normal distribution.
c) They are often simpler to use and interpret than parametric tests.
d) They are more powerful than parametric tests.
e) They do not rely on accurate sampling for their validity.

Parameters are values that describe a complete population – as opposed to a statistic, which is a value calculated from a sample. For example, the mean is a parameter when it is calculated for the whole population and a statistic when it is calculated from a sample. Why is this distinction important? Knowing the difference helps in understanding the difference between parametric and non-parametric tests.

Parametric methods are those statistical methods that are used when we know that the population we are studying fits into a normal or a related distribution. Non-parametric methods are those that do not assume that the population studied fits into a particular distribution.

As non-parametric tests make fewer assumptions about the population, they can be much more widely applied than parametric tests, and they are often simpler to use and interpret as well. However, when we would like to infer something about a population, a parametric test is more useful. Parametric tests are also more useful for more complicated modelling. If assumptions are incorrect, parametric tests can give misleading results, but if the assumptions are correct, then they can provide more accurate and precise statistics.

CHOOSING A TEST

A common practice question for the AKT relates to which tests should be used when. This is problematic: statisticians research and debate the circumstances

under which certain tests can be appropriately used. Statistics is not a monolithic subject with only one right way to do things; it is evolving. There are reasons why tests should or should not be used in particular circumstances. The understanding, refinement and rejection of these reasons evolve in the same way as any other scientific subject.

Figure 3.10 has *suggestions* for the most appropriate tests in particular circumstances. It should be used with caution. It does not assume that these are rules written in stone. For example, there are good reasons why ordinal data could be treated in a similar way to interval data. Having a basic understanding of which tests may be applied in particular circumstances is often useful when reading research reports. However, it is advisable to discuss with an expert statistician if you need to choose a test for research purposes.

		Dependent variable			
Independent variable		Nominal	Ordinal	Interval, normally distributed	Interval, non-normally distributed
	Nominal	Chi-square test	Mann–Whitney U test	Student's t-test	Mann–Whitney U test
	Ordinal	Mann–Whitney U test	Spearman's rank correlation coefficient	Spearman's rank correlation coefficient and linear regression	Spearman's rank correlation coefficient
	Interval, normally distributed	Logistic regression		Pearson's product-moment correlation coefficient and linear regression	Linear regression
	Interval, non-normally distributed	Logistic regression		Pearson's product-moment correlation coefficient or Spearman's rank correlation coefficient and linear regression	Pearson's product-moment correlation coefficient or Spearman's rank correlation coefficient

FIGURE 3.10 Choice of statistical test, based on the level of measurement of the independent and dependent variables

Figure 3.10 uses the levels of measurement discussed at the beginning of this chapter. Note that interval-level data are split into normally distributed and non-normally distributed – that is, parametric and non-parametric. Figure 3.10 splits variables up into independent and dependent variables. The independent variable is also known as the explanatory variable, because changes in it explain changes in the dependent variable.

Here is a brief explanation of each of these tests. Remember that there are

variations on many of these tests and also that there are many other tests that we have not mentioned.

Chi-squared test

This is used to compare observed data with an expected outcome. Expected means according to the null hypothesis – the proportions would be expected to be the same in two groups if there was no effect of a variable. This is a non-parametric test for nominal data. You may use it to compare groups – for example, smokers and non-smokers.

Mann–Whitney U test

This is a non-parametric test used to investigate whether differences in the median results for two groups could have occurred by chance. This applies to ordinal data so could be used when patients use a rating scale for pain or depression and are subject to different interventions.

Student's t-test

This is named after the pseudonym adopted by a statistician in a seminal paper, not because it is the favoured test of undergraduates! It is used to test whether the mean value in the dependent variable is the same for each of two groups. This is the parametric equivalent of the Mann–Whitney U test.

There is a paired version of this test, which tests whether the mean scores for a single group vary significantly under two different conditions. The data are paired – that is, there are two results for each research participant. This is useful when you compare results for a group, pre and post exposure to a drug or intervention.

Spearman's rank correlation coefficient

This was discussed briefly in the section on correlation earlier. It is used with ordinal data or with interval data that are put into rank order. It results in a correlation coefficient between –1 and +1. No correlation between the variables would result in a value of 0. An example of where this may be used is to look at how depression scores change, or not, in relationship to levels of exercise.

Pearson's product-moment correlation coefficient

This was also discussed in the section on correlation earlier. This is often referred to simply as the correlation coefficient. It is a parametric test that is used when both variables are interval-level data. It gives a figure for how strong the relationship is between the two variables. This is normally used with linear regression: in effect it is a measure of the linear correlation between the variables.

Linear regression

Used when you have two interval-level variables whereby you have two readings for each research participant. A simple example would be where calorie intake and weight change were measured and the strength of the relationship between increased calorie intake and weight gain can be seen. Typically, you would plot the points on a scatter plot and fit them with a line of regression to show the strength of the relationship. This can be used for more than two variables, which is called multiple linear regression.

Logistic regression

Used when the dependent variable is nominal with two values, such as yes or no. This is similar to linear regression except that the dependent variable is nominal rather than interval data. Like linear regression, it is possible to do multiple logistic regression when you have more than one independent variable. This could be used to investigate the link between having a heart attack (the nominal variable – yes or no) and blood pressure readings or cholesterol values.

BIAS

Bias is commonly used to suggest that a particular opinion is held with a refusal to contemplate the possible merits of alternative views. It has a related but more specific meaning in statistics; namely, that there *is a systematic distortion of results due to factors that have not been allowed for in designing, carrying out and reporting a study*. Figure 3.11 lists some different types of bias in statistics; it is possible for a study to have several types of bias. The aim of a good study is to try to avoid or reduce bias in order for the results to be more helpful, robust and generalisable.

Types of bias	
Systematic bias	External influences that may affect the accuracy of measurements and favour one outcome over another, such as where researchers are under pressure to produce a particular result.
Funding bias	Where a source of funding may affect the way the study is conducted and reported, such as drug company sponsorship of a study.
Selection bias	An error in choosing, or randomising, the individuals to take part in a study, whereby some groups or individuals are more likely to be chosen than others. This may occur when rigorous selection methods are not used.
Sampling bias	The research subjects are not representative of the population being considered. This is quite common when drugs are tested on young fit people rather than elderly patients with multiple morbidities.
Procedure bias	Where subjects in different groups are not treated the same, sometimes because of the group they are in. For example, being offered extra treatments because it is known they are being given an older drug or a placebo – this is why double-blinding is important.
Recall bias	Where research subjects are asked to recall events but do so inaccurately because of the inherent problems with relying on memory.
Lead-time bias	If a disease is discovered in a research subject at an earlier stage than other subjects, this makes it look like they have an increased survival over a set period of time. This can apply to screening programmes that appear to increase survival simply because people are detected at an earlier stage – the actual age at death may not be affected.
Late-look bias	Where information is gathered inappropriately late, meaning that some subjects cannot respond – this is particularly problematic when studying fatal diseases.
Spectrum bias	Evaluating a diagnostic test in a biased group of patients leading to an overestimate of the sensitivity and specificity of the test and therefore making the test appear more helpful than it really is. This may occur if the test is evaluated on a preselected group such as hospital patients rather than primary care patients or the general population.
Reporting or publication bias	If data are not reported there will be a skew in the data that is available and this can make an intervention look more or less useful than it really is. The obvious example would be withholding negative findings because it is felt they are not useful or interesting, or more problematically that they make a drug less likely to sell well.
Hawthorne effect	Where research subjects modify their behaviour because they know they are being studied. This is due to research participants', not researchers', expectations. An example may be that research participants wish to appear healthier than they really are and so do more exercise than normal and eat more healthily while being studied. There is evidence that this effect wears off after the study has been going for a week or so.
Pygmalion (or Rosenthal) effect	Where beliefs held by researchers encourage research participants to perform better than expected. This may be a particular problem with some psychological studies. If the researchers let the participants know that their performance is expected to improve if they receive a particular intervention, that knowledge may spur them on to achieve more than they would otherwise.
Golem effect	The opposite of the Pygmalion effect, where expectations are lowered so the participants do worse than they would have otherwise achieved.

FIGURE 3.11 Types of bias

02: **Focused Clinical Assessment in 10 Minutes for MRCGP**

- Chapter: Data-gathering, Technical and Assessment Skills

Chapter 3

Data-gathering, technical and assessment skills

The first of the three domains of performance assessed in the CSA is **data-gathering, technical and assessment skills**, also known as data-gathering, examination and clinical assessment skills:

> *Gathering and using data for clinical judgement, choice of examination, investigations and their interpretation. Demonstrating proficiency in performing physical examinations and using diagnostic and therapeutic instruments.*

Areas of the curriculum assessed by this domain are **problem-solving skills** and **clinical practical skills**.

Problem-solving skills:

> *Gathering and using data for clinical judgement, choice of examination, investigations and their interpretation. Demonstration of a structured and flexible approach to decision-making.*

Clinical practical skills:

> *Demonstrating proficiency in performing physical examinations and using diagnostic and therapeutic instruments.*[1]

Introduction to data-gathering skills (focused clinical assessment)

The data-gathering skills section of the CSA is about gathering relevant and focused information from history-taking, clinical examination and results of investigations (provided in the case notes) for clinical judgement, identifying significant abnormal findings in the data gathered, appropriately evaluating and interpreting the clinical findings and, finally, recognising their implications and significance.

In simple terms, data gathering tests your ability to take a targeted history, perform a selective clinical examination (to elicit physical signs) and gather information as part of the focused clinical assessment of the patient. Then, later on in the consultation, the data collected should be used to establish a working diagnosis or consider a limited list of possible differential diagnoses, formulate a safe and acceptable management plan and communicate this information effectively to the patient.

Data gathering, particularly history-taking, also tests your ability to use appropriate communication and interpersonal skills to gather information more effectively. Therefore, there is a degree of overlap between these two domains of performance assessed in the CSA examination.

A focused clinical assessment is the cornerstone for managing symptoms and clinical conditions in general practice. Being able to make good clinical decisions depends on gathering and making the best use of valuable information from a focused clinical assessment. GPs need to be able to perform a focused clinical assessment using organisational and clinical skills at a high level, often under time constraints, to manage their patients safely and appropriately. The two essential components of the focused clinical assessment are taking an accurate history and carrying out a selective physical examination, in a patient-centred way. Assessing patients clinically through history-taking and physical examination provides the basis for safe and effective clinical practice. This chapter will clearly guide you through a focused clinical assessment of a patient in a systematic and efficient manner.

It is divided into the following three sections:

3.1. History-taking

3.2. Performing a physical examination

3.3. Interpreting results of investigations provided

3.1. History-taking

The CSA assesses your ability to take a focused history, assess symptoms and signs accurately and identify the key issues in the presentation.

You will be expected to take a history accurately and sensitively from the patient or carer that routinely includes biological, psychological and social factors.

By the end of history-taking, you need to have a full understanding of the problem or dilemma presented and its implications for the patient.

The following sub-sections will systematically take you through history-taking in some detail. They concentrate on gathering important and relevant information from a focused history and clinical examination and assessment of the patient.

3.1.1. Background

The consultation (the professional interview) is absolutely basic to the job of the GP. By this stage in your training, you may be feeling comfortable in the consultation setting. An important part of consulting is the development of basic clinical skills, which include taking a patient history. The history in the GP consultation is a very powerful tool to deal with the majority of problems encountered in everyday practice. Exact figures vary, but there is general agreement that the majority of diagnoses may be reached on the basis of history-taking alone; that is to say, merely by talking to the patient.

By this stage in your training, you should be taking competent histories naturally and easily and have developed an appropriately professional style. In the CSA, you will have to take a concise, relevant, targeted and systematic yet comprehensive and holistic history of the presenting symptom/problem that includes all the relevant information required for making a working diagnosis/list of possible differential diagnoses, identifying appropriate investigations to confirm the diagnosis and formulating a safe management plan.

3.1.2. Introduction

At the beginning of the assessment, the buzzer will sound and the first patient will knock on the candidate's door and enter the consulting room, along with the examiner. Stand up, gently smile, make good eye contact and shake the patient's hand. Greet and welcome them politely into the consultation, using their name

(the opening greeting) and clearly introduce yourself, using your professional title and surname. Starting with a good, solid introduction often helps to put patients at ease.

3.1.3. Open consultation: presenting complaint (PC) – open questions

The consultation should start with an initial open-ended question to attempt to discover the main reason(s) for the patient's attendance (i.e. to identify patient's agenda). An 'open question' is one which cannot be simply responded to with a one-word or one-phrase answer; it is formulated to engage the person answering, and to allow them to express themselves according to the question, to gain as much information as possible. Open questions are particularly helpful to find out the reason(s) for a person's visit and to spot a hidden agenda or a potential ethical dilemma. They are most useful at the beginning of the consultation because they increase the chances of identifying relevant problems early in the consultation. For example, questions such as, *'How can I help you today?'* or *'What can I do for you today?'* can elicit the reason(s) for the patient's contact, their PC or their concern(s) more easily. Use a phrase that you feel comfortable with and that sounds natural and caring.

Eliciting the patient's main problem(s) is a key task in communicating with patients that good doctors should be able to perform. Doctors frequently interrupt patients soon after they begin their opening statement, with patients failing to disclose their complaints and/or concerns fully. Listen patiently to the patient's initial narrative, and be able to obtain an accurate description of their presenting problem. Expect them to do most of the talking early on, and don't interrupt the patient until they have disclosed their PC or voiced their concerns.

Once you have identified the reason(s) for the consultation, follow up with a second open and probing question to address the patient's agenda, fully exploring the nature of the presenting problem. For example, *'Can you tell me a little bit more about that, please?'* Give the patient time to gather their thoughts and bring up other aspects of their complaint.

If you are ever stuck in the CSA, other useful open questions that can be used to facilitate the doctor–patient dialogue and elicit more information include: *'Tell me how it all started?'*, *'How long has it been going on for?'* and *'If you go back to the day it started, can you tell me exactly what happened?'*

Therefore, the three simple but essential open questions that can be helpful in the CSA are:

1. *'How can I help you today?'*
2. *'Can you tell me a little bit more about that, please?'*
3. *'Can you tell me how it all started?'*

3.1.4. The 'golden minute'

In order for you to identify the patient's hidden agenda and recognise significant verbal and non-verbal patient clues (signals or messages), we have something called the 'golden minute'. This is a very critical time at the beginning of the consultation when a great deal of valuable information can be elicited. During the golden minute, allow the patient to do most of the talking, pay close attention to what they tell you and be alert to unconventional as well as conventional medical clues you receive from the patient. Allow the patient to say what they want freely, encourage them to tell their individual story in their own words and give them a chance to disclose their concerns, perceptions and feelings about their predicament.

Avoid unnecessary interruptions that interfere with dialogue or rapport (unless you absolutely have to). The advantage of saying nothing is that it allows you to listen to the patient's version of the problem, in their own words. This is at the heart of the contemporary fashion for narrative-based medicine: *'Listen to the patient: they are telling you the diagnosis'*. Listen actively to what the patient actually says, pick up on the patient's agenda (which may be hidden), emotions and worries (if they are evident) and respond to them with genuine interest and sincerity. Responding to emotional clues with various communication strategies enhances further disclosure. Listen attentively to the patient's story to ensure that clues in the consultation that require your full attention are not missed. Often by listening, key issues will be disclosed that would never be found by closed questions. For example, the symptomatic presentations of sore throat, cough, abdominal pain, etc. will have different underlying stories that will not be so obvious with a history taken by closed questioning. (Don't underestimate the level of challenge presented by the apparently trivial complaint or underestimate the complexity of apparently simple consultations.)

Aside from listening to what your patient actually says, you need to be constantly aware of non-verbal signals. Observe the patient and look at their

non-verbal communication. You can become alert to such facial indicators as frowns, raised eyebrows and blushes. Picking up on and responding appropriately to the patient's clues, both verbal and non-verbal, is a key component of patient-centred interviewing. Using relevant information gained from acting on patient clues is likely to increase patient satisfaction and adherence to treatment, and lessen patient vulnerability to anxiety and depression.

Finally, throughout history-taking, be encouraging, nod your head while listening, lean forward, make good eye contact and say *'mmm', 'yes', 'sure'* or some other emollient phrase at appropriate times to facilitate the dialogue progression.

3.1.5. History of presenting complaint (HPC) – closed questions

When assessing a patient clinically, the main bulk of the consultation should be spent on collecting information in a focused yet patient-centred way. You will need to demonstrate proficiency and competence in obtaining an adequate history from the patient, recognising the importance of focusing on the patient's problem(s).

A focused yet comprehensive assessment of the PC is clearly central for recognising and managing symptoms in general practice. The history should initially focus on the relevant issues around the patient's current PC and underlying condition (address the patient's agenda) with a series of closed-ended questions. Closed questions are the most efficient method of obtaining further details about a patient's problem and help clinch details of the clinical history. For example, *'Where exactly is the pain?'* or *'When did the pain start?'*

Use selected closed questions mainly to assess the nature and duration/time course of the PC, to clarify the patient's answers and to explore pertinent symptoms from the relevant system(s) to differentiate various possible diagnostic lines. Further points to be determined should appear to be guided by the probabilities of disease. You need to know the important and relevant questions to ask for different symptoms competently and confidently and be able to follow up various possible diagnostic lines. Questions should be phrased simply and clearly, and double or misleading questions should be avoided. If you ask good questions, you will get good answers, and if you ask poor questions, you will only get poor answers.

What the patient says or does may change your subsequent line of thinking and questioning approach. Therefore, keep an open mind, don't make immediate

assumptions about the problem and don't have any preconceived ideas about what it may be. Be led by what the patient wants to talk about and address the patient's agenda. Don't be occupied in thinking about what you are going to say next and miss what the patient is saying now or what s/he is doing. Don't just have the next question ready in your head; if you do, your history-taking will appear disjointed, with your line of questioning erratic and not following a clearly reasoned way of thinking. The consultation will appear disorganised and unnatural, as some elements will be thrown in apparently at random. Rather, be appropriately selective in the particular questions you ask, embedding your enquiry in previous responses, so that a fluent and logical progression is clear. The consultation should have a clear sense of progress, and matters should be advanced as a result of the consultation.

Finally, avoid using formulaic phrases in your questions that are not normal for everyday consulting. Relying on stock phrases that do not suit your individual style of consulting can sometimes be perceived as an interrogation, as the open questions rapidly turn to closed biomedical history-taking. Adopting a non-interrogative and non-threatening approach to history-taking allows patients to come forward about their problem(s) more comfortably and openly.

3.1.6. Red flags/Alarm symptoms

The other main issue to consider when assessing patients clinically is the identification of important and relevant red flags (or alarm symptoms), which are worrying features specific to each condition. Systematically searching for important symptoms and being aware of their implications can help identify diagnoses that you should try not to miss and increases the chance of diagnosing more serious disease, such as cancer, earlier.

Red-flag questions can help to rule in and rule out potentially serious organic pathology and ensure the consultation is safe. Red flags are very unlikely to be known beforehand or offered spontaneously by the patient and have to be elicited. If an important red flag is missed and therefore an unlikely but serious disease is not ruled out, it may be seen as unsafe and dangerous. This does not mean that you have to go into every conceivable detail or chase rare diagnoses. It is about taking a patient history in the degree of detail that is compatible with safety but which takes account of the epidemiological realities of general practice.

3.1.7. Patient health beliefs, understanding and preferences: ideas, concerns and expectations (ICE)

All patients have different health beliefs: ideas (thoughts/perceptions/feelings), concerns (worries) and expectations, influenced by personal experience, media information or family/cultural beliefs. Doctors rarely ask their patients to volunteer their ideas about their problems and, in fact, doctors often evade their patient's perceptions and inhibit their expression. Yet, if discordance between doctor's and patient's ideas and beliefs about the illness remains unrecognised, poor understanding, adherence, satisfaction and outcome are likely to ensue.

Enquiring about the patient's ICE shows responsiveness to their health beliefs, health understanding and health preferences and effectively demonstrates patient-centred consulting. ICE lie at the heart of patient-centred interviewing and should be gathered in the first half of the consultation. Sometimes the health beliefs of patients will be obvious in a consultation, sometimes not. Patients don't always come forward with their own ideas, thoughts, perceptions, feelings and concerns about their predicament, and sometimes have to be prompted or asked about them directly. On occasion, they may volunteer their health beliefs without any prompting. Sometimes, the way they look or what they say gives you clues to an underlying worry, and you should develop the necessary skills to recognise these behaviours.

For most cases in the CSA, it is important to ensure that you enquire about all the patient's health beliefs properly and sufficiently at some point in the consultation, using ICE questions in a realistic way, where appropriate for that case, so you can use the information gathered to guide the rest of the consultation. Details of the patient's ICE do not need to be investigated exhaustively, but the patient's perspectives of a problem should be sought and you should have a clear idea of any ICE.

When to ask about the patient's ICE will vary depending upon the PC. Examples of ICE questions include:

- I: *'What do you think might be causing it?'*
- C: *'Is there anything about what's going on that's particularly worrying you?'*
- E: *'What do you hope I will be able to help you with today?'*

When eliciting the ICE of patients, avoid using formulaic phrases in your questions that are not normal for everyday consulting; for example, '*What are your worries?*' Avoid following a scripted approach that feels 'clunky' or insincere to the patient or to the examiner. Be yourself and make the ICE questions you use sound like your own natural speech, not like questions you have heard from others. Also, you are more likely to find out about the patient's ICE if you tailor your questions and their timing to each individual, rather than asking the questions out of context.

Don't forget to address and deal with the patient's ICE later in your explanations. Asking questions about a patient's main concerns, for example, but then not utilising the information or integrating it into the consultation does not demonstrate person-centred care.

3.1.8. The rest of the medical history

Gather the rest of the medical history in sufficient detail, covering all the relevant aspects of the case. Work through the routine history in a logical manner enquiring about relevant past medical history (PMH), past surgical history and previous hospital admissions; drug history (DH), including over-the-counter (OTC) medications, herbal remedies and drug allergies; and family history (FH), if appropriate to the circumstances presented.

History-taking is not expected to be all inclusive, and so this does not have to be done in every consultation to ensure that no information has been left out. With this in mind, do not take too long to cover what is not thought to be essential, as it can lead to poor time management, and only enquire about relevant history that you might find helpful as part of your focused clinical assessment of the patient. Remember that it is about obtaining sufficient information about symptoms and details of the medical history, tailored to the circumstances, which in turn defines the clinical problem(s).

3.1.9. Psychosocial history (PSH)

The patient's social and cultural background has an effect on personal definitions of, beliefs about and attitudes towards health and disease, and also has an effect on their response to illness. An understanding of the impact of social factors upon health and sickness and the role of psychological factors as determinants of disease and health is required.

Demonstrating an awareness of the impact of health problems (acute or chronic illness, hospitalisation or the death of a patient/relative) on the patient's life, their perception of themselves, their relationships and their family is central to practising effective patient-centred medicine.

Patients come to the doctor with problems that have clinical, social, psychological and emotional dimensions. Doctors have a responsibility to consider all aspects of a patient's well-being, including biological, psychological and social factors. You will be expected to recognise the social and psychological factors contributing to each consultation (what non-clinical issues have prompted the patient to consult). You will need to think beyond the biomedical model of disease and recognise the effects that social factors may have on the patient's illness and vice versa, and appreciate the importance of psychological factors for patients and their families.

Where appropriate, as part of your extended data gathering, it is necessary to elicit the relevant social background and psychological aspects of the presentation to place the patient's problem in context. It is essential to explore the physical, psychological and social impact of the patient's problem on their everyday life rather than just their health to establish a complete picture of their PC. What impact does the illness have upon the patient's personal and social lifestyle, including the ability to function at work, home and leisure activities? What effects does the health problem have on the patient's image? What are the effects of the illness on the members of the patient's family? Exploring these areas is very important for maintaining a therapeutic relationship and a therapeutic environment in community settings. They show the patient that you are interested in his or her psychosocial well-being and that of the family. Additionally, you will find building up a personal understanding with the patient very rewarding in everyday practice.

3.2. Performing a physical examination

The CSA assesses your ability to perform a targeted physical examination (to elicit physical signs), demonstrate appropriate clinical examination skills and interpret clinical signs.

You will be expected to examine patients accurately and sensitively in appropriate settings to gather relevant data.

3.2.1. Background

An integral part of focused clinical assessment and data gathering is to carry out a physical examination, where appropriate, especially if it would be useful in establishing the diagnosis. The main aim of the physical examination is to rule in your working diagnosis and to rule out other potentially serious underlying conditions that have entered your differential diagnoses. Also, by performing an appropriate examination, you show that you take the person seriously and that you care, which can help with establishing rapport. Having said this, clinical examinations are not the main basis of the assessment, and are infrequently tested in the CSA. More commonly, the assessor or the patient will give you the physical findings of an examination after you have sought permission to perform it instead of agreeing to the examination.

3.2.2. Approach to the clinical examination of the patient

After a history has been taken from the patient, a few cases will require the patient to be examined and some clinical examination skills to be demonstrated. Don't leap quickly to less productive physical examinations without appreciating the importance of a good, adequate history. Taking a well-organised history will give you a solid basis for guiding your physical examination (and making clinical judgements). Use the information that you gather to plan your physical examination and think of which signs you would look for so that you can adopt a focused and selective examination.

Before carrying out any physical examination, the patient's permission must be sought and a simple explanation given. If the patient feels that a proposed examination would be personally intrusive, they will decline the examination.

Always offer the patient a chaperone; male doctors will require a chaperone when examining female patients in many circumstances, female doctors in certain

cases. In the case of intimate examinations, you should make absolutely sure you have gained informed consent and offered a chaperone. These are examinations that you are unlikely to be asked to demonstrate on a role player, but a mannequin or model may be used in the consultation to demonstrate a clinical examination technique.

At all times during the physical examination, show sensitivity for the patient's feelings and be alert to non-verbal clues. Undertake the examination in a way that does not distress the patient.

You will not normally find abnormal physical signs when conducting clinical examinations, but you should examine the patient in such a way that you would elicit them if they were present.

On completing the physical examination, don't just leave the patient, but assist them getting off the examination couch, getting dressed, etc. if you feel help is needed. Don't forget to wash your hands after each patient is examined. Usually, an alcohol hand gel is provided on the desk in each consultation room. Performing this task is also part of being a successful candidate.

3.2.3. Diagnostic equipment

You will be expected to be knowledgeable, proficient and competent in the appropriate use of standard clinical instruments and in examination techniques, including use of a stethoscope, ophthalmoscope, auroscope/otoscope, thermometer, patella hammer, tape measure and peak flow meter. This includes having an understanding of the appropriate use of these medical devices in common situations. Again, your technique needs to be smooth and fluent, as if you use them regularly and you use them well.

3.3. Interpreting results of investigations provided

The CSA assesses your ability to analyse and interpret the results of methods used in the investigation of common and serious medical conditions in primary care, and to recognise their implications and significance.

You should be able to analyse and interpret test results accurately. These include such results as urinalysis, urine microscopy, culture and sensitivities, swabs, bloods, electrocardiographs, X-rays (e.g. chest radiographs), scans (e.g. ultrasound), spirometry and skin scrapings.

The results of investigations may be provided in the 'patient's notes', and you may find some of this information useful to integrate into the consultation. It is therefore absolutely essential to read all the background information relating to each case before the patient enters your consulting room.

Further on, the data collected during the clinical assessment phase of the consultation should then be used in the clinical management stage of the consultation to establish a working diagnosis/construct a limited list of possible differential diagnoses, formulate a safe and appropriate management plan and communicate this information effectively to the patient.

03: **Essential NMRCGP CSA Preparation and Practice Cases**

- Chapter: Writing your own Cases

6

Writing your own cases

> The White Rabbit put on his spectacles. 'Where shall I begin, please your Majesty?' he asked.
>
> 'Begin at the beginning,' the King said gravely, 'and go on till you come to the end: then stop.'
>
> (*Alice's Adventures in Wonderland*, p. 128)

Writing your own case is one of the best ways to get into the head of the examiner. By doing this you will work out what is being looked for, but it also will help your consultation skills more generally. The fact that you have to be specific and write things down is part of this process. You will have to ask yourself, and answer, a number of questions. What is the elbow pain *really* like? What *is* the patient concerned about and why? How do you do an examination to confirm or refute the possible diagnosis of intermittent claudication? What information will the patient give and when? What does the doctor have to do to get the information? How will the patient react to a suggested management plan?

Assessment domains

The CSA is assessed in three domains. As we have seen, the first two domains, those of Data Gathering and Clinical Management, are more of the 'white coat' skills, whereas the Interpersonal Skills domain looks more at the 'cardigan' aspects. While domains may change with time, essentially they will need to look at clinical competence and communication. The present explanations of the three domains were given in Box 2.1.

Writing a case

The easiest way to write a case is to use a template. This makes sure that there are few gaps for even the most excellent consulter to identify. If the doctor wishes to find out about the patient's job, and the impact of the problem, you will need to have decided this in the case writing, or the case may go in a very different direction to how you planned it. However, you don't need to consider how to give a 'standardised performance' where every candidate is presented with exactly the same patient and story. As you are not writing the case for a reliable high stakes exam, this rather complex and time-consuming task is not necessary. A three-part template that can be used for writing cases is given in Boxes 6.1 to 6.3 on the following pages.

BOX 6.1 Template for writing cases – Part 1

CSA case preparation document
Part 1
Name:
Age:
Sex:
Ethnicity:
BMI:
Special visual features:

Presenting problem:
What is the diagnosis or problem when framed?
Curriculum statement:

Learning outcomes from curriculum statement:
1
2
3
4

What knowledge is needed for this case?

What is the current evidence relevant to this case?

Where can the evidence be found?

BOX 6.2 Template for writing cases – Part 2

Part 2
What are you looking for:
- in history?
- on examination?
- in management?

What is needed for a good consultation?

What will an above average registrar do?

What will an average registrar do?

What will a below average registrar do?

BOX 6.3 Template for writing cases – Part 3

Part 3
What will the patient say when they come in?

Describe the presenting problem.

a. For a symptom:
- What is it?
- Where is it?
- Does it radiate?
- When did it start?
- How did it start?
- What is it like?
- How bad is it?
- What does it stop the patient doing?
- Any triggers?
- How has it developed over time?
- Any exacerbating or relieving factors?
- Any associated features?

What diagnoses might relate to this problem?

What questions would you expect the candidate to ask to rule in and out other possible diagnoses? What are the answers to these questions?

b. For a problem:
- What happened or has been happening?

- How did it all start?
- How have things developed?
- What is happening now?
- How has it affected the person?
- How has it affected others?
- Has anything helped to make things worse or better?
- Anything else that has contributed to the problem?

How might this problem be framed?

What questions would you expect the candidate to ask to try to crystallise what the key problem is and what are the answers?

Consider the patient's ideas, concerns and expectations

- What does the patient think is going on and why?
- What do particular words or concepts mean to the patient?
- Why do they think this?
- What particularly are they concerned about? Why?
- What are they wanting or expecting? Why?

Cues

- What verbal cues will the patient give?
  - How will they give them?
  - What words are key?
  - What happens if the candidate doesn't pick them up?
- What non-verbal cues will the patient give?
  - How will they give them?
  - Dress?

  - Affect?
  - Body language?
  - What happens if the candidate doesn't pick them up?

Psychosocial

- What is the home situation?
- Family and friends?
- How is the problem impacting?
- Lifestyle
  - Drugs
  - Smoking
  - Alcohol
  - Sexual behaviour
  - Belief systems
- How does the patient spend his time?
  - Work?
  - Hobbies?
  - What does he do?
  - How is the problem impacting?

Examination

- What will be found on examination?
- How will this be demonstrated?
  - Exam card? What will it say?
  - Actual examination? What will it demonstrate?

Management
- What will the patient expect in management?
- What will the patient accept in management?
- How involved will they be in the management?
- What questions will they ask?
- What will they do if they are unhappy with the management?

Patient record
- Put together a patient medical record sheet
  — Blood results? Well (wo)man check? Smears? Medication? Allergies?

Stages to a good case

When writing a case to use in a learning set, the following 12 stages will help to guide you through the process.

Stage 1: choose the subject area

The first thing to do in writing a case is to choose the subject area to consider. If working in a team, make sure that the cases you each write cover the breadth of the curriculum and that you are not all doing the same subject area. Ideally, choose a curriculum statement relevant to an area in which you are less able. For example, a female doctor may identify men's health as being a weak area, and will be willing to prepare a patient story on a man with a prostate problem. In a similar way, a male doctor may use his choice of case to learn more about HRT or PMT.

For the Transition Group CSA training day, described in Chapter 4, case areas were allocated to cover a variety of aspects of the curriculum, as indicated in Table 6.1 below. This is where the complexity of life makes a difference. One registrar, Deborah, who couldn't come to the day, still wrote a case, whereas others who were planning to write cases didn't, but came along anyway. Flexibility is of the essence. Others wrote cases and were sick on the day. This will happen in learning sets too.

Stage 2: examine the curriculum statement

Examine the curriculum statement related to the case. Look at this broadly. Don't just rush to tick the boxes. Use the time to identify any learning needs that you could note down and add to your e-portfolio. Then try to think of a patient you have seen that had a problem that could be adapted to fit some of the learning outcomes. Choose the learning outcomes you are going to write the case to fit and write them down.

TABLE 6.1 Case allocations for the CSA training day

	Name	*Patient*	*Statement*	*Difficulty*	*Emphasis*
1	Deborah	Male 33	Sexual health	Moderate	Domain 3 Evidence-based element
2	Vicky	Male 6	ENT and facial problems	Easy	Domain 1 New problem Mum presents
3	Caroline	Male 55	Healthy people: promoting health and preventing disease	Moderate	Domain 2 Ongoing problem
4	Mark	Male 26	Digestive problems	Difficult	Domain 3 New problem
5	Krishna	Male 48	Cancer and palliative care	Moderate	Domain 2 Preventative element
6	Uma	Male 42	Metabolic problems	Difficult	Domain 3 Emphasis on ICE
7	Hannah	Male 66	Mental health	Easy	Domain 1 New problem
8	Shiloh	Male 47	Men's health	Moderate	Domain 2 Emphasis on bio-psychosocial
9	Kesh	Female 33	Genetics in Primary Care	Difficult	Domain 3 Possible serious diagnosis
10	Dave	Female 15	Clinical ethics and values-based practice	Easy	Domain 1 New problem
11	Kafa	Female 25	Skin problems	Moderate	Domain 2 Ongoing problem
12	Shamit	Female 35	Neurological problems	Difficult	Domain 3 Unrealistic patient expectations
13	Himanshu	Female 45	Women's health	Easy	Domain 1 Evidence-based element

Stage 3: consider the knowledge base

Think about what knowledge base is needed to address the issues the case presents. Look for the latest evidence, for example on NICE or SIGN, or if none of these cover the subject area, other national or local guidelines. Consider how the diagnosis is usually made and what the management options could be in a typical case. Really get your head around the knowledge base and add this to your learning log on the e-portfolio. It may be that you want to do something slightly different,

for example a complaint. Just use the same process. For example, find out about the practice, local and national complaints policies and try to understand how they could be applied in the context of a 10-minute 'consultation'.

Stage 4: what should a GP registrar do?

Decide what it is reasonable to expect a GP registrar to do in this case and write it down. Be specific about what you are expecting in the history, examination, management and interpersonal aspects.

Stage 5: define levels of performance

Define what you think an average, a good and a poor performance would be. Be specific. Rather than say 'investigate appropriately', specify what those appropriate investigations might be and what you might expect good, average and poor registrars to do. By committing yourself on paper, your colleagues can more easily challenge you to justify what you were expecting and why, which will help your more general learning.

Stage 6: picture the patient

Picture the patient. And remember you are going to have to role play them. Consider their age, sex, appearance, BMI and any other visual features that will serve as cues. For example, an Asian gentleman of 50 years is more likely to visually cue the need for CVS screening than is a 16-year-old girl with body piercings. In the latter case, however, you may well be thinking risk-taking behaviour and chlamydia. In your learning sets, you will need to give this extra information to the doctor before the consultation starts. In the exam itself, go with the visual cues that you are given.

Stage 7: fully describe the problem

Describe the presenting problem *fully*. For example, if you are looking at a frozen shoulder you will need to describe:

- where the pain is
- where it radiates to
- what it's like
- how bad it is
- what its impact has been
- what it feels like
- how long it has been there
- how it started and has varied over time
- whether it has been there before
  - if so, when and how did it resolve
- what makes it better
- what makes it worse
- any other symptoms that are associated with it.

If it was your receptionist complaining about your practice manager, you could use a similar information-gathering approach, using open questions so that you can clarify what she has come about and what has actually happened or is happening. You could explore when it happened, what led up to it and what

has happened since, identifying factors that seem to make the situation worse or better, or anything else that the receptionist has noticed that may be relevant. Using a similar process you can clarify most problems that could be presented.

Stage 8: summarise the problem

Summarise the presenting problem in your own words, and write it down.

Stage 9: what are the likely diagnoses?

With this presenting problem, consider what the diagnoses could be. List each likely one, remembering the probabilities of disease. If you walk in the British countryside in summer, you are more likely to see a horse than a giraffe. In the same way, if you are presented with a patient with a cough and a fever, a viral upper respiratory tract infection (URTI) is higher on your list than Plasmodium falciparum. If, however, the patient saw the nurse four weeks ago for travel advice before going to India and you can see that they were given malaria tablets, malaria may become one of the important diagnoses you would like to exclude.

For each reasonable diagnosis, consider what open and closed questions a doctor might ask in order to rule diagnoses in and out. Decide what the answers should be to move the doctor in the right direction. If the doctor comes out with any questions you have not identified, the answer will have to be 'no'.

Stage 10: identify ICE

Identify the patient's ideas, concerns and expectations. You will need to decide what the patient thinks is going on and why. If they say that they think they are having a heart attack, you will also need to decide what they understand a heart attack to be and what it means to them. They could just see it as a death sentence and have no idea of what the underlying pathology and aetiology are. However, you could decide your patient is a cardiac nurse who is already thinking about the advantages and disadvantages of a coronary artery bypass graft (CABG) as compared to angioplasty and who might know more about it than the doctor does. You will have to do some reading here, to improve your own knowledge in this area.

Clarifying the patient's view of words like 'arthritis', 'colitis', 'ME' or even 'bunion', will help you describe your patient's narrative. This will automatically lead in to looking at their worries and what they expect the doctor to do and why they expect them to do it. Once you have decided on this you will then need to determine what the doctor has to do to trigger them into giving this information and whether they are going to cue this verbally or non-verbally. Is the patient going to come in looking worried? Are they going to use words like 'serious' or 'concerned'? All of this needs to be defined.

Also determine the psychosocial aspects of the case, defining the home and work life of the patient and their social network. This will include necessary lifestyle issues, but make these appropriate for the case, with as few blind alleyways for the consulting doctor to go down as possible. Remember, you are aiming for a 10-minute consultation.

Stage 11: what are the likely examinations?

Consider, in the light of all the information above, what possible diagnoses could

the doctor be thinking of? Remember horses not giraffes, but also remember that rare illnesses do happen. Think what examination the doctor might do to prove or disprove their hypotheses, and decide what the findings would be. You then need to decide whether you want the doctor to do an examination or not. This will probably depend on how complex the rest of the case is, as time will be an issue. If an examination can be done in the time, decide how you will give the findings. This could be by simulating abnormal findings or by giving an examination card. The card should be directed to be given after the doctor has indicated what they want to examine.

Stage 12: management plans

Think what the ideal management options would be and decide what the patient's response to each of them would be if they are given a choice of management. Decide what questions the patient would ask to clarify things, and what the patient will say if asked about their understanding of the management plan and follow-up. Consider what an appropriate follow-up would be and decide what the patient would say if asked what they want to do about follow-up.

Once you have gone through all 12 stages, read through the case again, critically tidying up the details. Then get a colleague, or even your trainer, to go through it and see if they can see any other areas that could be tidied up or developed further. Print out enough copies for your learning set. Meet up as a learning set and run the case.

04: **Get Through MRCGP: Clinical Skills Assessment**

- Chapter: Station 10

STATION 10

Information given to candidates

Zoë Brighthouse is a 16-year-old patient whose parents and older sister are also registered with the practice.

Her records show that she attended the surgery a week ago with her mother and saw one of the Foundation Year 2 doctors.

At that time she was complaining of a week's history of sore throat and general malaise.

Examination is documented as:

Chest	Clear
Otoscopy	Normal
Throat	?Exudate on tonsils
Neck	Enlarged lymph nodes anterior cervical chain

She was prescribed 1 week's course of amoxicillin 500 mg TDS for ?tonsillitis

She had been prescribed amoxicillin for an ear infection earlier in the year without any problems.

The patient is on her own today.

As the patient enters the room she says, 'I've stopped those tablets the other doctor gave me because they made me come out in a rash.'

- What do you think this station is testing?
- Make notes or discuss your thoughts with a colleague before you read on.

Plan your approach to this station:

Information given to simulated patient

Basic details – You are Zoë Brighthouse, a Caucasian 16-year-old pupil at the local state school.

Appearance and behaviour – You are quiet and take a while to open up to the doctor. But if you feel that the doctor has a caring and understanding manner, then you are more likely to be forthcoming earlier on in the consultation about your true concerns about HIV (see Ideas, concerns and expectations).

History

Freely divulged to doctor – You have been feeling 'awful' for a couple of weeks now with a sore throat, fever, general aches and pains and tiredness. Last week you saw one of the other doctors at the practice with your mother and you were prescribed antibiotics for a throat infection. The same day you started the tablets you came out in a fine red rash all over your body, so you have not taken any more. The rash has now settled. You were not able to book an earlier appointment than today.

Divulged to doctor if specifically asked – You have only missed 3 days of school in the last 2 weeks. You have not had a cough or brought up any phlegm. You have not vomited and you have not suffered from diarrhoea or constipation. You have not had any abdominal pain or pain passing urine. You are not going to the toilet to urinate more frequently and you do not have excessive thirst. Two weeks ago you had vaginal sex with a boy from your class who you do not know very well, after a party at the home of a friend. You did not have oral sex. It was the first time you had ever had sex. You asked him to use a condom – which he did – as you are not on the pill and were worried about getting pregnant. You do not think there were any problems such as the condom splitting. You only had a couple of drinks that night and felt in control of the situation. The sex was consensual. You have not had any genital symptoms, such as itchiness or a discharge. You have never had any genital infections. You did a pregnancy test last week, 'just to make sure', which was negative. Your periods are always regular and you started your period on time 4 days ago. You did not tell the doctor last week about having had sex as your mother was with you.

Ideas, concerns and expectations – You are upset with yourself as you had planned not to have sex until you were older, with someone you loved. You think that the tablets probably did cause the rash but read on the internet that when you are infected with HIV you can develop an illness with general aches and pains, a sore throat and a rash – just like your symptoms. Even though you used a condom when you had sex, you are still worried that you could have got a sexually transmitted infection, such as HIV. You have heard of condoms splitting without people knowing and this has been preying on your mind. You have never wanted to take the oral contraception pill or any hormonal alternatives as you 'don't want to put all those hormones in your body'. You want advice from the doctor on the chances of you having HIV and whether you should have an HIV test.

First words spoken to doctor – 'I've stopped those tablets the other doctor gave me because they made me come out in a rash.'

Medical history – You had eczema as a child but are no longer affected by this. You rarely go to see the doctor as you are generally fit and well. You had an ear infection earlier this year which settled with antibiotics.

Drug history – You do not take any regular medication and took only one of the antibiotic tablets the doctor prescribed last week. You took the same antibiotic (amoxicillin) for an ear infection earlier this year without any problems. As far as you know you are not allergic to any medication. You do not use any illicit drugs.

Social history – You live with your parents and sister who is 1 year older than you. You are doing well at school and have GCSE exams coming up at the end of this academic year. You are popular at school and have a close group of friends. You have the odd cigarette when you are out but you do not really like smoking. You are sensible about drinking alcohol – you never get really drunk – but you do drink several alcopops when you go out with your friends at the weekend.

Family history – There are no major health problems in your family.

- Having read the information given to the simulated patient, what do you now think this station is testing?
- Make notes or discuss your thoughts with a colleague before you turn the page.

Review your approach to this station:

Tested at this station:

1. Identifying a hidden agenda.
2. History taking from a reticent patient.
3. Physical examination.
4. Reaching a shared management plan with an adolescent.

Domain 1 – Interpersonal skills

Identifying a hidden agenda

Patients often present with a problem that is not the main reason for their attendance at the surgery. You need to be open to the possibility of such hidden agendas and allow the patient every opportunity to disclose his or her true concerns:

- It can be daunting for a teenager to see a doctor on their own. To create the right environment for her to open up you need to employ excellent communication skills through active listening, showing empathy and encouraging her to contribute as an equal partner in the consultation.
- Your attitude to anything she tells you about her health or health concerns must be non-judgemental and supportive. Patients often test you out early on in the consultation to see if you are the sort of doctor they feel happy to disclose more personal information to.
- Pick up on any clues that the patient may give, e.g. '*You seem very anxious about what has happened. Do you think there might be something else going on other than a throat infection?*'
- Stay patient-focused and if you feel there is a mismatch between your worries about the presenting complaint and the patient's, then explore her ideas, concerns and expectations further.

Domain 2 – Data gathering, technical and assessment skills

History taking from a reticent patient

There is the potential for this scenario to be challenging in terms of time management, as the patient is initially slow in giving a history. But if she feels that you have a caring and understanding manner, she is more likely to offer the information you need to safely manage the consultation while also addressing her agenda:

- You could ask whether the patient came with anyone today, e.g. she may have a friend in the waiting room. If so, would she like them to come in to give her some support?
- If during the consultation you suspect that she may want to disclose further information but seems reluctant, remind her that your discussion is confidential.
- Ask her to recap on what has happened over the last couple of weeks, as this allows you to find out her understanding of events, including last week's visit to see your colleague.
- Ask about any allergies to medication. Check that when she was prescribed amoxicillin for an ear infection earlier in the year she did not have any similar reaction.

- The clear history from the notes, together with the information about a rash starting soon after taking the antibiotics, should alert you early on to the probable diagnosis of infectious mononucleosis (glandular fever).
- However, be careful not to close down the consultation early, and ensure that you still ask questions about her health beliefs, concerns and expectations, or you will miss the key element to this scenario – namely, the patient's anxiety about possible HIV infection.
- Allow the patient time to discuss her concerns regarding having had sex and her worries about HIV infection.
- You should take a full sexual history (see Station 5) to assess HIV risk.
- Use words that the patient can understand – do not assume that what you might consider simple terms, e.g. 'vagina', are readily understood.
- Given her age it is also important to find out whether the sex was consensual. Enquire about the age of her sexual partner. If he was significantly older then you might be worried that there was an element of coercion.
- Has she been able to discuss her worries with anyone else, either friends or family?

Physical examination

If you say you would like to examine the patient, you will be told that this is not necessary and to assume that the findings are the same as when she was seen last week (see Information given to candidates).

Domain 3 – Clinical management skills

Reaching a shared management plan with an adolescent (overlap with domain 1)

In addition to reassuring the patient over her main concern – the risk of HIV infection – this consultation is an opportunity to cover wider health promotion issues:

- You should explain how the history suggests a diagnosis of glandular fever, although she would need a blood test to confirm this. You can reassure her that this is a common condition, caused by a virus (Epstein-Barr) and is usually a short, self-limiting illness, although it can run a protracted course in some cases. You can explain how it is spread – by saliva – and therefore she should avoid kissing and sharing cups and towels while she is still unwell.
- Advise rest, plenty of fluids and simple painkillers, such as paracetamol and ibuprofen, together with self-help measures such as gargling with salt water for her sore throat.
- Is she happy to have some blood taken to confirm the diagnosis (full blood count (FBC) to look for leuocytosis and monospot)?
- Reassure her that as she has just had her period and the pregnancy test was negative, she can feel confident that she is not pregnant.
- Reassure her that her risk of HIV would be assessed as low, as she had protected sex, and there would therefore be little indication for having an HIV test. What does she think about this?

- If, despite your reassurances, she feels that for peace of mind she would still like to have an HIV test, you should advise her that she should have a repeat test in 3 months as even with the standard combined antigen and antibody HIV test, it can still take up to 3 months to become positive. In the interim she should use condoms.
- Be positive about her proven ability to negotiate practising safer sex – using a condom – and encourage continued use. Advise her where she can get these herself rather than having to rely on a partner. Often there are local resources such as a Young People's Project, Teenage Health Bus, or schemes such as C-card where teenagers can show a card at genitourinary medicine (GUM) or family planning clinics to get free condoms, without the embarrassment of having to ask a receptionist or pharmacist.
- Has she considered other forms of contraception, such as long-acting reversible contraceptives, e.g. the Nexplanon® implant?
- Offer information on sexual health screening services at GUM clinics or at the surgery, e.g. swabs or a urine sample to screen for infections such as chlamydia. Does she know anything about these sorts of services?
- The GP curriculum states that every consultation with a child or young person should be an opportunity for general health promotion advice. How much exercise does she do? What is her diet like? Does she use alcohol or illicit drugs? Are there any small steps she could realistically take to make her lifestyle healthier?
- Encourage her to discuss what has happened with her parents or sister. If she does not feel comfortable speaking to her family, is there any other adult she could talk to, such as a teacher, school nurse or youth worker she trusts?
- Remember to negotiate all the above with the patient rather than simply telling her what steps she can take.
- Check her understanding at regular intervals during the consultation and ask her to explain the plan you have jointly agreed back to you.

Knowledge base – Children, consent, confidentiality and the law

References: GMC 2007, House of Lords *Gillick* case, and Family Law Reform Act 1969 – see Further reading below.

	English law
Under 16 years old	• The House of Lord's judgment in the *Gillick* case (see Further reading below) ruled that the consent of a child under 16 can, in certain circumstances, have legal effect. This applies even if the parents disagree with the child over the proposed treatment. • Lord Scarman held that a test of capacity be applied, which could determine whether the young person had 'sufficient understanding and intelligence to enable him or her to understand fully what is proposed' (*Gillick* judgment p. 423). • This has become known as *Gillick*-competence. • However, patients under 16 who are *Gillick*-competent should still be encouraged to involve their parents.

(continued)

continued

	English law
16 and 17 years old	• Although all those aged under 18 are classed as minors, the Family Law Reform Act 1969 gives statutory recognition to the consent of 16 and 17 year olds to any 'surgical, medical or dental treatment', making it 'as effective as it would be if he were of full age' (sections 8(1) and 8(3)). • In other words, those aged 16 and 17 are presumed to have the competence to give consent for themselves.
≥18 years old	• Treated as adults under the law, i.e. presumed to be competent.
Emergencies	• As with adults, if a patient under 18 is not competent, e.g. if they are unconscious, and it is an emergency situation such that it is unreasonable to wait, then you are legally entitled to treat without consent, acting in the best interests of the patient.
Consent versus refusal	• As the law currently stands, minors – namely, all those under 18 years of age – are legally entitled to *consent* to medical treatment (so long as they are *Gillick*-competent if under 16), yet they do not have an absolute right to *refuse* medical treatment. This is because anyone with parental responsibility can legally give consent on behalf of a minor. • However, in practice, it would be highly unlikely for a doctor to proceed with an intervention in the face of a competent child's refusal, even if the consent of someone with parental responsibility did technically mean that there was legal consent. This situation would require further discussion and potential involvement of the courts.
Confidentiality	• You must keep confidential any information a competent child asks you not to disclose, unless you believe doing so would put the child or others at risk of serious harm. • You should encourage the patient to involve their family, unless this is not in their best interests. • You should consult with a senior colleague and your defence organization before taking the significant step of breaking confidentiality.

Fraser guidelines	• In the *Gillick* judgment, Lord Fraser listed criteria that must be met to allow doctors to lawfully give contraceptive advice and treatment to children under 16 without parental involvement:
	  • the young person understands the advice
	  • the young person cannot be persuaded to involve their parents
	  • the young person is likely to begin or continue having sex with or without contraceptive treatment
	  • the young person's physical or mental health, or both, is likely to suffer unless they receive treatment
	  • the young person's best interests require them to have contraceptive advice or treatment without parental consent.

Take-home messages

- The key skill when dealing with adolescents and young people is treating them as real partners in the consultation.
- Picking up on cues from the patient will help identify hidden agendas.
- Signposting patients to support services and other agencies is important within primary care.

Tasks

- Re-run the scenario with the patient aged 15 years. How might this change your approach?
- Re-run the scenario with the patient aged 15 years and the male she has had sex with being 38 years old. What would now be the main focus of this scenario?
- Run a scenario where Zoë's mother has come to see you a week later. Her mother says, 'I know Zoë came to see you last week and I want to know what's going on.' How would you approach this consultation?

1-minute explanations for patients

- Explain how the contraceptive implant works.
- Explain what a sexual health 'check-up' might involve.
- Explain the limits of confidentiality (e.g. see the second task above).

Ideas for further revision

Although this station was not specifically about consent issues in children, you could easily be presented in the Clinical Skills assessment (CSA) with either a child or parent of a child under 16 years of age who has requested contraception or an abortion. Make sure you feel happy about how you would deal with such a situation and that you are familiar with the law and national guidance in this area.

Further reading

0–18 years: guidance for all doctors. GMC, London 2007 www.gmc-uk.org/guidance/ethical_guidance/children_guidance_index.asp

Gillick v West Norfolk and Wisbech Area Health Authority and another [1985] 3 All ER 402

NHS Clinical Knowledge Summaries: HIV www.cks.nhs.uk/hiv_infection_and_aids

NHS Clinical Knowledge Summaries: glandular fever www.cks.nhs.uk/glandular_fever

NICE – Prevention of sexually transmitted infections and under 18 conceptions. Public health intervention guidance 3. Quick reference guide, February 2007 http://guidance.nice.org.uk/PH3/QuickRefGuide/pdf/English

RCGP curriculum statement 8 – Care of children and young people www.rcgp-curriculum.org.uk/PDF/curr_8_Care_of_Children_and_Young_People.pdf

The Terrence Higgins Trust – the leading HIV and AIDS charity in the UK www.tht.org.uk

'*You're Welcome*': *quality criteria for young people friendly health services*. London: Department of Health, 2011 www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_126813

05: **The MRCGP Clinical Skills Assessment (CSA) Workbook**

- Chapter: Station 1.1

Station 1.1

Candidate's notes

Name	Andrew Woodhouse
Age	57
Medical history	MND diagnosed one year ago
Medication	Riluzole 50 mg bd
Allergies	Nil
Last consultation	Athlete's foot – try topical antifungal

Actor's notes

Background

- You are Andrew Woodhouse, a 57-year-old journalist.

Opening statement

- 'Doctor, I want to talk to you about how I want to die.'

History

- You were diagnosed with motor neurone disease (MND) one year ago after investigation for muscle weakness in your hands and legs. The specialist explained that your overall condition will deteriorate and eventually you will lose complete independence.
- You want to die with dignity and want to know what your options are.

Ideas, concerns and expectations

- You are struggling to type because your hands are weakening. This is extremely frustrating, because your mind is still active. You are concerned that your condition is deteriorating and you will end up 'like a vegetable', dependent on others for the smallest of things.
- You have some negative ideas and are scared about the last few days of your life because you recall how undignified your father's death was. You do not want to spend your last days in hospital, reliant on strangers who do not remember your name.
- You are especially concerned that you will become so weak in the last few days of your life that you may end up 'fighting for breath' or 'choking to death'.
- You have heard about certain medical centres that 'end your life' so you can die peacefully, and have come to discuss this with the GP, so you can die with dignity at a time of your choosing.

Further history candidate may elicit

- You were diagnosed with MND after seeing a specialist because you were finding it difficult to type and write. Your legs felt weak, and you often tripped over. Now, you are struggling with everyday tasks like buttoning your shirt and opening doors.
- You are passionate about writing but now only work part time because you are struggling to type and write – you know you will have to give up your job soon.
- Your legs are getting weaker. Last week, you were incontinent because you could not walk quickly enough to the toilet. Your wife had to help clean and wash you. You felt humiliated.
- Your father died of lung cancer 10 years ago and spent his last days in hospital, in pain. He was left incontinent for hours because the nurses were too busy to help, and the doctors would repeatedly 'stab him' with needles, 'like a pin cushion'. You remember holding your father's hand in the last few days of his life, as he said 'Please just let me die'.
- Last week, you went to the hospital for a follow-up appointment with the neurologist.

- Whilst waiting to be seen, you spoke to another patient with MND who sat next to you in a wheelchair. He told you patients with MND can 'die fighting for breath' or 'choke to death', and also mentioned that there were 'medical centres', which helped to 'end your life'. You asked the neurologist about this but he seemed reluctant to talk about it.
- You want to know more about these 'medical centres'. You did ask your family to get you some information about these centres, but they refused, saying this was an 'awful idea'.
- Your family are extremely supportive, and you have a loving wife who organises days out and special treats for you. You spend most weekends with your family, laughing together.
- You are not depressed – you just want others to respect your decision to die with dignity.

Medical history
- MND.

Drug history
- Riluzole 50 mg bd.

Social history
- You have been a journalist for a national newspaper for 34 years and now work part time.
- You have never smoked but do have the odd glass of wine on the weekends.
- You live with your wife in a house with stairs that you manage, very slowly. She helps you with washing, dressing and shopping, although you try to remain as independent as you can.
- You have two children who live nearby. They are planning to move back into the family house to offer more support to you and your wife.

Family history
- There is no family history of MND.
- Your mother died of a stroke last year and your father died of lung cancer 10 years ago.

Approach to scenario
- Your primary concern is about dying with dignity. You want the doctor to understand that it is 'my life, my death and my choice'.
- You ask the GP about the 'medical centres' that help you end your life because you feel 'this is the only reasonable option I can think of, Doctor'.
- You are disturbed by the loss of independence you face, and want to function normally for as long as possible. In particular, you want to continue writing for the newspaper – this gives you 'a reason to live'.
- You are struggling with wearing your clothes, and felt humiliated by the recent episode of incontinence when you could not get to the toilet quickly enough.
- You welcome any thoughts or suggestions the doctor has to offer to help maintain your independence, e.g. with writing and wearing clothes.
- You are particularly scared at the thought of 'fighting for breath' or 'choking to death'.
- If the doctor appears compassionate, empathic and explains that there are various ways to maintain your independence, keep you comfortable and prevent you from suffering in the last days of your life, you are willing to consider other alternatives, such as an advance directive.
- If the doctor does not come across well and does not show any understanding of your predicament, you become angry and ask 'How would you feel if you were in my situation?'

Information gathering

Presenting complaint

a History of motor neurone disease

- What symptoms did he present with?
- When was it diagnosed?
- What treatment is he having?
- Has he developed any complications? For example:
  - muscle spasms
  - difficulty swallowing
  - speech problems
  - choking sensation
  - breathing difficulties.
- Which symptoms bother him most?

b Assisted suicide

- What has he heard about assisted-suicide centres?
- Why is he considering assisted suicide?
- Does he know it is illegal in this country?
- Is he under pressure from his family?
- How does he think his family will react?
- Has he considered having an advance directive?
- What does he know about end-of-life and palliative care?

c Assess for depression

- Any thoughts of suicide or self-harm.

Medical history

- Other comorbidities.
- Previous episodes of depression.

Family history

- MND or other chronic diseases.

Drug history

- Current medications.
- Check if he has access to large quantities of drugs that could be taken as an overdose.

Social history

- Occupation.
- Marital status.
- Dependents.
- Support mechanisms.
- Home circumstances (house/flat/bungalow).
- Current activities of daily living (shopping, dressing, washing).

Patient's agenda

- Explore his understanding of MND.
- Explore the impact of MND on his personal and professional life.
- Explore his concerns regarding end-of-life care.
- Explore his understanding of assisted suicide and the implications this would have on his family.
- Explore his understanding of palliative care and advance directives.

Clinical management

1 Overview

- Explain that physician-assisted suicide is illegal in the UK, even though there are specialised centres in some countries in Europe (e.g. Dignitas in Switzerland) that people can attend to get assistance to end their life.
- Emphasise that there are many ways to manage the complications of MND to help preserve his independence as long as possible, and that it would be possible to exert his autonomy and remain in control during the last stage of life without resorting to euthanasia or physician-assisted suicide.

2 Management of motor neurone disease complications

- Explain there are a range of treatments to help manage the complications of MND, and focus on areas that concern him most of all, such as voice-activated software or use of a Dictaphone to help him continue writing, and incontinence pads, which could be useful as mobility deteriorates.
- Stress the role of multidisciplinary teams (MDTs) such as occupational therapy who could provide him with a wide range of home adaptations to facilitate independence.

3 End-of-life care

- Reassure him that terminal care has significantly changed since his father's death.
- Underline the role of the palliative care team as specialists who deal with end-of-life care.

a Place of death

- Explain that he has the option of dying at home or in a hospice (which offers personal care) with his loved ones around him – hospital is not the only option.

b Discuss fears about end of life

- Reassure and try to alleviate the patient's fear about 'fighting for breath' or 'choking to death', explaining this is rare and most people with MND die peacefully.
- **Sensitively** explain that patients with MND usually die because of a chest infection or because the respiratory muscles become 'too weak to work', leading to reduced consciousness and coma. The moment of death comes peacefully as breathing slows and finally ceases.
- Explain that there are a number of medications that can prevent him from suffering (*see* page 9).
- Reassure him that all appropriate medications can be kept in the house to prevent delay in administration, and will be available when needed.
- Inform him of the Breathing Space Kit produced by the MND Association, which provides information to guide the carer to administer the medication in an emergency.

c Advance directives

- Explain that an advance directive is a 'living will'. This is a legal document he can write in advance of the terminal phase of his illness to protect his autonomy.
- This allows him to consent to, or refuse, medical treatment when he is too ill to communicate his decisions himself. Through the advance directive, he can:
  - (i) name a proxy to express his wishes in the event of a life-threatening illness
  - (ii) request that life-sustaining treatment, such as resuscitation, is withheld when he deteriorates
  - (iii) make specific requests regarding his future treatment, e.g. he wants to be treated at home or in a hospice, and does not want to be admitted to hospital
  - (iv) express the type of treatments he would prefer in certain circumstances, e.g. if he develops pneumonia, he can request **not** to have antibiotics.
- Advise him to seek legal advice about the advance directive and to discuss it with his family.

4 Follow-up

- Offer him a follow-up appointment to discuss this further once he has had time to reflect on the choices discussed. Suggest he can bring his wife with him for you to speak to.
- Offer leaflets or information printed out from the Internet on advance directives and end-of-life care.
- Offer to give him the telephone number of the Motor Neurone Disease Association, as it can also offer help.

Interpersonal skills

- Assisted suicide and euthanasia are emotive topics. The challenge in this case is to explore the patient's reasons for considering assisted death. It is important to exclude depression and coercion from family members.
  - 'How are you and your family coping?'
  - 'Have they suggested assisted suicide to you? Is this something they want or you want?'
- In many cases of chronic or terminal illness, early referral to palliative care can help manage complications. Involvement of the MDT can provide the patient and carers with invaluable aid, providing methods for the patient to stay as independent as possible.
  - 'I can appreciate that you want to maintain your independence. There are specialised teams, such as the occupational therapists, who can help modify your home to make it more suitable for you. They have all sorts of devices to help you, such as shoe aids to help you put your shoes on easily, and special cutlery to help you eat by yourself.'
  - 'Clothes and shoes with Velcro can be easier to manage than buttons or shoes with laces.'
  - 'Would these options be useful to you?'
  - 'Could you use a Dictaphone to record your thoughts and ask someone to type up your notes? How about voice-activated software?'
- Many terminally ill patients are fearful of fighting for breath or choking to death, and it is important to provide them with adequate reassurance.
  - 'Most people with MND usually die peacefully – the "breathing" muscles become weaker, and consciousness decreases, leading to a coma or "deep sleep". Breathing reduces and finally stops. With the help of medication, this process is usually very peaceful.'
  - 'The palliative care team will work with us to take appropriate steps to make sure you have a dignified, peaceful death.'
- Advance directives are a means of a patient maintaining control over their medical care in situations where they may lose capacity.
  - 'Another alternative to these medical centres is making a "living will", or advance directive. This is a legal document that helps you keep control of your medical care if you reach a stage when you cannot communicate what you want.'
  - 'For example, one of the common complications for MND sufferers is to develop pneumonia. You can choose whether or not you would like antibiotics to treat the infection. Choosing antibiotics may lengthen your lifespan, but you may opt for withholding antibiotics, and letting nature take its course.'
- During this station, it is important to show empathy to the patient, understand his concerns, explore his ideas on assisted suicide, discuss alternatives with him and respect his autonomy.

Key summary

- Recognise that assisted suicide is illegal in this country but is legal in other countries.
- Outline methods to help a patient retain independence for as long as possible.
- Be familiar with end-of-life care and the role of the palliative and MDTs.
- Explain the purpose of an advance directive and how it may be useful.
- Involve the patient throughout the consultation and in the proposed management plan, remaining empathic and sensitive to their situation at all times.

Motor neurone disease

- MND is a progressive neurological disease that is usually fatal within 2–3 years. Death often occurs due to bronchopneumonia.
- Patients present with upper and lower motor neurone dysfunction due to the degeneration of anterior horn cells and cranial nerve nuclei.
- There are no signs of sensory loss, ocular movements are not affected and there are no cerebellar or extrapyramidal features.

Clinical features

- Muscle wasting, weakness and fasciculation causing difficulty in manipulating objects, gait disorder and a tendency to trip.
- Bulbar involvement causing dysarthria and dysphagia.
- Respiratory muscle involvement leading to dyspnoea and orthopnoea.

Clinical patterns of motor neurone disease

TABLE 1.1 Clinical patterns of MND

TYPE	DESCRIPTION
Amyotrophic lateral sclerosis	50–65% of cases • LMN signs in the arms • UMN signs in the legs • Most cases are sporadic • 5–10% of cases are familial
Progressive muscular atrophy	10–25% of cases • Affects distal muscles • Asymmetrical limb wasting and weakness • LMN signs predominate
Bulbar palsy	25% of cases
Progressive bulbar palsy	• LMN signs • Weak and fasciculating tongue • Nasal speech
Pseudobulbar palsy	• Spastic tongue • Spastic dysarthria • Labile emotions
Primary lateral sclerosis	<2% of cases • Signs progress from UMN to LMN

Investigations

- Electromyography shows a pattern of severe, chronic denervation.
- Other investigations normally include blood tests, magnetic resonance imaging (MRI) of the brain and sometimes muscle biopsy to exclude the possibility of other neurological conditions.

Management options

TABLE 1.2 Management options for patients with MND

COMPLICATION	MANAGEMENT
Writing	Voice-activated software or Dictaphone
Muscle weakness	Physiotherapy Walking aids and splints Occupational therapy to provide home aids, e.g. • Hands-free telephones • Modification of door handles, locks and switches • Can openers, modified cutlery, cups and plates
Incontinence	Incontinence pads Catheter may be useful in due course
Dysarthria and dysphonia	Speech therapy Communication aids such as speech synthesisers
Drooling	Drugs, e.g. hyoscine, glycopyrronium and anticholinergics
Dysphagia	PEG tube Dietician to consider food consistency and supplements
Muscle cramps	Quinine
Muscle spasticity	Drugs, e.g. baclofen and diazepam Physiotherapy to prevent contractures and improve joint mobility
Dyspnoea	Drugs, e.g. morphine orally or diamorphine SC/IM/suppositories to help ease fear, anxiety and breathlessness Physiotherapy to aid mobility Chest physiotherapy for breathing exercises Referral to respiratory physician to consider NIPPV
Choking	Drugs, e.g. diamorphine, midazolam, haloperidol, lorazepam and glycopyrronium bromide
Depression	Antidepressants Counselling services Input and support from the Motor Neurone Disease Association
Respite care	Referral to local hospice-based team

Treatment

- NICE (2001) suggests the use of riluzole, a glutamate antagonist, to treat amyotrophic lateral sclerosis. Treatment of complications with multidisciplinary involvement is crucial.

Further reading

- Motor Neurone Disease Association website. www.mndassociation.org/ (accessed 20 November 2010).
- Directgov. *Your Right to Refuse Future Medical Treatment.* Directgov; n.d. Available at: www.direct.gov.uk/en/governmentcitizensandrights/death/preparation/dg_10029683 (accessed 20 November 2010).
- Fallon M, Hanks G, editors. *ABC of Palliative Care*. 2nd ed. Oxford: Blackwell Publishing; 2006.
- National Institute for Health and Clinical Excellence. *Guidance on the use of riluzole (Rilutek) for the treatment of motor neurone disease* London: NICE; 2001. Available at: ww.nice.org.uk/nicemedia/live/11415/32139/32139.pdf (accessed 20 November 2010).