



Faculty of Public Health

of the Royal Colleges of Physicians of the United Kingdom

Working to improve the public's health

PART A EXAMINATION FOR MEMBERSHIP OF THE FACULTY OF PUBLIC HEALTH

Of the Royal Colleges of Physicians of the United Kingdom

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EXAMINATION QUESTIONS WITH KEY POINTS AND EXAMINERS' COMMENTS

N.B. Please note that these are key points, not model answers

Paper IA

Question 1

An observational study examined recurrence-free survival of 1536 patients with malignant melanoma according to the specialty of the practitioner who performed the first treatment. Hazard ratios were presented for recurrence adjusted for age, sex, tumour thickness, lesion site, histology and ulceration using Cox regression. Differences between the 4 groups were statistically significant ($p=0.003$).

Specialty	Number of cases	Hazard ratio for recurrence	95% confidence interval
Dermatologist	663	1.00	(reference group)
General surgeon	486	1.90	1.41 – 2.57
General practitioner	257	1.88	1.31 – 2.71
Plastic surgeon	130	1.60	0.97 – 2.64

(a) Explain what is meant by the hazard ratio and why it is used here. What assumptions are made by the Cox method? (30% of marks)

(b) What should be inferred from the hazard ratios quoted, in particular for
(i) General practitioners?
(ii) Plastic surgeons? (40% of marks)

(c) It has been suggested that guidelines for the management of melanoma should recommend that GPs do not treat melanomas themselves but refer them to dermatologists. Comment on the evidence that this study provides in support of this contention. (30% of marks)

KEY POINTS

Most or all of the following would be required for a pass:

- A hazard ratio is the measure of what is effectively 'relative risk' which is used in the analysis of data where the comparison being made is time to an event eg time to death, or in this example time to recurrence.
A hazard ratio is calculated in situations where there is censoring of data (that is individuals are lost to follow-up or their outcome status was only known some time before the end of the follow-up period). It is used in this example because censoring will almost certainly have occurred.
The Cox method makes several assumptions the most important of which is that of proportional hazards, that is the ratio of the hazards of the two groups which are being compared is constant over time. The other assumptions are that explanatory variables act multiplicatively and that the failure times (event times) of individuals are independent (mention of these latter two assumptions would attract additional points)
- Overall there is evidence of a statistically significant difference between the four groups being compared $p<0.003$. Compared to the dermatologists who

are the reference group the other three groups have moderately raised recurrence risks.

- (i) General practitioners treated individuals are 1.88 times more likely to have a recurrence of their melanoma compared with individuals treated by dermatologists. The 95% confidence interval around this estimate is 1.31 to 2.71, thus the true recurrence risk may be a little as 1.31 or as large as 2.71. This relatively wide confidence interval reflects the relatively small numbers in the GP treated group (n=257). However, the 95% confidence interval does not include the value 1 and thus the result is statistically significant at the 5% level and thus is unlikely to be due to chance.
 - (ii) Individuals treated by a plastic surgeon are 1.60 times more likely to have a recurrence compared with those treated by a dermatologist. The 95% confidence interval around this estimate is 0.97 to 2.64 thus the true risk of recurrence in the plastic surgeon treated group may be 3% less than the dermatologist treated group or 164% higher. Again the confidence interval is wide, again reflecting the relatively small number (n=130) treated by plastic surgeons. Furthermore the 95%CI does not include the value 1 and thus the result is not statistically significant at the 5% level and therefore could have occurred by chance.
- c. Notwithstanding the adjustment for confounders which is clearly necessary (and has been done for age, sex, tumour thickness, lesion site, histology and ulceration) the interpretation should bear in mind that these are highly selected groups of patients – that is it is unlikely that only chance has a role to play in which clinicians treats your 'mole' first. Factors related to case-mix, referral practices health service organisation and practice (for example biopsy versus definitive treatment at first presentation) need to be taken into account which is effectively residual confounding before a causal link can be assumed here. Other residual confounding might arise from tumour-related factors not already adjusted for such as tumour spread and metastatic disease.

EXAMINERS' COMMENTS

Question 1

- a) Part (a) of this question required a clear understanding of survival analysis methods using Cox regression. To attract full marks for this section, candidates needed to demonstrate that they understand that the hazard ratio is the measure of, what can be interpreted, as relative risk derived from a Cox model and is used when the outcome is time to event. Simply saying that the hazard ratio is a ratio of hazards did not attract credit. Cox modelling is specifically necessary when data are censored and candidates needed to mention the word censored with preferably an explanation of what censoring is and the fact that the data in this study are very likely to have been censored. The Cox model makes several assumptions the most important of which is the proportional hazards assumption, that, is the ratio of the hazards is constant overtime. This does not mean that the hazard is constant, the

important element is that the ratio between the two groups is constant. Correct mention of the other assumptions attracted extra credit.

- b) To attract full credit this part of the answer required mention of the fact that the overall difference between the groups was statistically significant ($P < 0.003$); what the HRs for the GPs and plastic surgeons meant in terms of risk compared with the dermatologists, eg, for the GPs 1.88 times more likely to have a recurrence when first treated by a GP compared with first treatment by a dermatologist; the width (wide due to the relatively small numbers in the GP and PS group – and the numbers were given in the table); and interpretation of the confidence intervals; interpretation of statistical significance. Several candidates incorrectly interpreted the result which was not statistically significant as showing no difference whereas the correct interpretation is that this result showed an increase in risk (1.6) which may have been due to chance. This was the straightforward section of the question and with a full answer it was possible to get 40% of the credit for this question from this section thus only one further point was needed for a pass on the whole question.

Several candidates used as their primary comparison the results for the GPs and compared them with the results for the PS and as a consequence were unable to make much sense of the data. Several people also misunderstood that the $P < 0.003$ value related to an overall comparison of the data in the table and this further added to the difficulty some people had in interpreting a direct comparison between GPs and PS.

- c) Many people only interpreted the results as showing a causal link and discussed guidelines and quality standards. We were looking for a discussion of the likelihood of a causal link and other possible explanations of why these results might have been found. This would include such issues as the fact that the groups would be highly selected – where you are first treated is not a random event, thus the case-mix of the four groups would be very different; differences in health service organisation and practice eg biopsy versus definitive treatment and where and when this is carried out; and other potential confounding factors leading to residual confounding (all of the above) and other tumour related issues eg spread, localisation versus metastatic disease etc all need to be considered.

Question 2

Incidence and prevalence are both used as measures of morbidity. Write short notes on the use of each type of measure in the interpretation of data from primary care in a named country, with reference to:

EITHER

a) Type II (non insulin dependent) diabetes mellitus

OR

b) Low back pain

KEY POINTS

Most or all of the following are required for a pass:

Incidence is a measure of new cases of disease arising (or presenting) whereas prevalence is a measure of the total number of cases in the population under observation and so includes new cases and old cases and indicates the total disease burden. Period prevalence is a measure of the occurrence of one or more episodes of illness in a specified time period. This is often the measure most readily derived from primary care data. Both incidence and prevalence will be influenced by changes in diagnostic criteria.

a) **Diabetes mellitus** – an increase in incidence could indicate changes in the presentation and diagnosis of new cases which might indicate better case finding or a true increase in the underlying occurrence of the disease in the population. The former is important since the majority of cases of type II DM in the population are undiagnosed and a practice with active case finding may have a high incidence as a consequence. Practice workload could be indicated by 'episode incidence' which would give a measure the impact on workload of the number of visits to the surgery involved in looking after patients with DM(II). Prevalence (either point or period) indicates the total burden of DM(II) in the practice population and can be used to indicate the amount of resources required to manage the patients – if there are a lot of diabetics the practice might consider setting up a specific DM surgery session. Estimates of both incidence and prevalence ignore subclinical disease, limiting validity, but are likely to be statistically precise as DM(II) is a relatively common condition. There may be some value in stratification by age, sex and ethnicity if the data are used for comparative purposes, especially between practices, to reflect differences in case-mix between practices and thus likely differences in incidence and thus prevalence of DM(II).

Points for extra credit:

Provided that any register established is kept up to date (ie deaths and migrants are identified and indicated or removed) a DM register provides a good starting point for establishing both incidence and prevalence.

Prevalence is affected by the incidence, duration of the disease state, death and migration. For DM(II), since the disease is not 'cured' by treatment the prevalence will be closely linked to incidence, ie high incidence = high prevalence.

Extra credit will also be given for a further elaboration of the factors involved in ascertaining incidence and the effect of under-ascertainment on both incidence and its interpretation and prevalence and its interpretation.

b) **Low back pain** - an increase in incidence could indicate changes in patient behaviour with changes in the presentation of new cases or a true increase in the underlying occurrence of the disease in the population. The former is important since, if for example a new service is established presenting behaviour might change whilst in fact the true population incidence is unchanged. Practice workload could be indicated by 'episode incidence' which would give a measure the impact on workload of the number of visits to the surgery involved in looking after patients with LBP. Prevalence (either point or period) indicates the total burden of LBP in the practice population and can be used to indicate the amount of resources required to manage the patients. Estimates of both incidence and prevalence ignore episodes of low back pain that people manage for themselves, limiting validity, but are likely to be statistically precise as LBP is a relatively common condition.

Points for extra credit:

Prevalence is affected by the incidence, duration of the disease state, death and migration. For LBP, the disease can be cured by treatment and also often self-limiting, although does tend to be quite long lasting. Thus the prevalence, whilst closely linked to incidence will also be influenced by the duration of disease, ie a high incidence = moderate to high prevalence.

Extra credit will also be given for a further elaboration of the factors involved in ascertaining incidence and the effect of under-ascertainment on both incidence and its interpretation and prevalence and its interpretation.

EXAMINERS' COMMENTS

Question 2

This question was primarily about the two basic measurements of morbidity - incidence and prevalence, their interpretation and the limitations of a data source (primary care data) which might affect the interpretation of incidence and prevalence estimates. The two diseases of diabetes and low back pain were there just for the purposes of a concrete illustration, the first being a chronic disease and the second which might present as an acute short-term problem but more often a chronic condition.

We were looking for a comprehensive, clear and correct definition of incidence and prevalence, some mention of point and period prevalence and preferably an indication of the relationship between the two. A surprising number of candidates were unable to correctly define these two quantities, few people distinguished cumulative incidence from a person-time based incidence rate and few people mentioned that prevalence is a ratio and not a rate. A complete and correct discussion of these points would have attracted 40% of the marks.

The use of incidence data is primarily in order to estimate disease risk and to enable comparison between subgroups eg age-specific risks, and comparison between other groups eg, adjacent practices. The latter might lead to an analysis of the risk structure of the two practice populations (eg one might have a high risk population

and the other not) and an analysis of the data collection methods of each practice – is the apparent difference spurious and due to poor data in one practice and good data in the other? One might also be interested in time trends of disease incidence especially if new interventions have been introduced and one wishes to undertake an evaluation.

The use of prevalence, especially for a chronic disease such as DM and longstanding back pain, is as a measure of the population burden of disease and is useful in planning services. Prevalence should be used for this rather than incidence. Even if incidence were relatively low, prevalence will be high because both are chronic conditions.

A number of candidates mentioned the types of primary care data available, however, in order to attract credit it was necessary to say how incidence and prevalence estimates could be derived from these sources and factors that might affect the interpretation of these estimates. For example, diabetic registers were mentioned as one source. To attract credit it was necessary to say that in order to estimate incidence that the number of new cases added to the register in a period of time could be counted and then divided by the mid-year estimate of the size of the practice population to give an incidence rate. In order to estimate prevalence one would count the total (newly added and old cases) number of individuals registered on the register and again divided by the mid-year estimate of the size of the practice population. We expected a discussion of the need to maintain the register as up to date with, in addition to, the addition of new cases, also the removal of individuals who have died and those who have moved away in order for valid numerator data to be derived. A discussion of the problems of 'case' definition for both diseases attracted credit as also did mention of the fact that it is possible that different practitioners may use different definitions thus rendering comparison of data between practices difficult. The incidence might increase because the disease risk is rising and one might expect this to be the case with the increasing incidence of individuals with risk factors for DM in the population. Incidence estimates can also rise if for example someone comes along and tries to improve the quality of the diabetic register data (eg might happen in the context of Quality Outcomes Frameworks) or introduces screening or opportunistic case findings. Incidence estimates might be low estimates of the true incidence because lots of cases of DM are undiagnosed.

Answers which relied heavily on describing the epidemiology of either diabetes or back pain attracted little or no credit. Several candidates wrote long essays about the epidemiology of DM and just mentioned incidence and prevalence as a short note in the final paragraph – this approach attracted little credit. Similarly lists of sources of primary care data did not attract credit unless the answer involved how incidence and prevalence can be used in their interpretation and perhaps the limitations of the estimates derived. Several candidates seemed to think we were interested in which of incidence or prevalence is the 'best' measure of morbidity when in fact they measure different aspects of morbidity and are useful for different purposes.

On the whole this was not a well answered question and demonstrated the need for candidates to read carefully the question as set out to ensure that they are answering the question asked and not an alternative version.

Question 3

Briefly describe the main epidemiological features and control measures in the UK, or in one other named country, for environmental exposure to any two of the agents listed below:

- a) airborne particles
- b) lead
- c) excessive ultraviolet light

KEY POINTS

a) *Airborne particles*

Occurrence: historical trends, particle types, variation with seasonal and meteorological conditions, notion of "safe level". National reports (e.g COMEAP)

Consequences of exposure – Limited short term associations, longer term CVS, respiratory, hospital admissions and premature mortality, confounded by deprivation, vulnerable groups e.g elderly and predisposing illness/prior occupational exposure at greater risk

Control. Appears to be limited evidence base but measures might include air pollution monitoring and management (with targets and penalties), transport emission control and related policies, other regulation (e.g. industrial and other related installation licensing (in UK IPPC consultations including partners such as health)).

Effects on hospital admissions e.g respiratory admissions and cardiovascular, effects on premature deaths from respiratory disease. Links to deprivation etc.

b) *Lead*

Occurrence

Lead is present in storage batteries, industrial paint, solder, electric cable covering, pottery glaze, rubber, petrol (gasoline) additives and other industrial products. Exposure may arise directly or from its presence in the atmosphere and in potable drinking water or occupational exposure .

Consequences of exposure

Short term high dose exposure leads to toxic effects including abdominal pain, headache, irritability, coma and death.

The effect of long term low dose exposure is less well known, the main routes being inhalation and ingestion, but there is concern linking blood lead concentrations in children with behavioural and learning difficulties.

Control:
Water

Maximum permitted level of lead in potable water is 50/ug/l in random daytime samples of water taken from taps without prior flushing.

Water leaving reservoirs is virtually lead free, but lead may appear in drinking water after passing through lead pipework.

This is most likely to arise in areas such as Scotland, the North of England, Wales and West country, where source waters tend to be acidic and plumbosolvent, and in properties built prior to 1945 which traditionally used lead water pipes.

Where water companies identify plumbosolvency as a problem they may treat, e.g. with phosphate to diminish the property, and replaced lead pipework in the distribution system as far as the consumer's boundary stop-tap.

Property owners are responsible for replacing lead pipework on the property side of the boundary stop-tap.

Flushing taps and use of some water filters utilising ion exchange resin may remove some of the lead but should be regarded as temporary measures only.

Bottle fed babies have a diet which is 90% tap water and especially should not have to drink water containing high levels.

Air

The use of lead free fuel can substantially lower exposure to lead by inhalation.

The widespread introduction in the United States and in Japan of catalytic converters, which can only work with lead free fuel, resulted in dramatic reduction of lead in the air by 96% between 1970 and 1987. Average blood levels fell by more than 1/3 between 1976 and 1980.

Controls on practices such as burning batteries have further reduced atmospheric level.

Other sources

Stringent controls have been introduced in the area of household items such as paints and toys.

c) *Ultra violet light*

Occurrence

Atmospheric ozone absorbs ultraviolet light from the sun and protects plants and animals from its damaging effects. Destruction of the ozone layer has resulted in increased amounts of ultraviolet B reaching the earth's surface.

Consequences of exposure

This is one of the health problems specifically referred to in the White Paper 'The Health of the Nation'.

Apart from an adverse effect on some sensitive crops, our main concern is with the effects on the skin and eyes. In the former it causes direct damage to DNA.

Sunburn and snow blindness result from acute exposure to intense sunlight. Long term exposure is associated with skin cancer and cataract formation.

Immunosuppression may follow ultraviolet B irradiation of experimental mammals.

Basal cell and squamous cell carcinomas are commoner in fair-skinned people in areas, such as head and neck, exposed to the sun for long periods.

Malignant melanoma is much less common, but affects younger people and has a higher mortality. The incidence is rising worldwide and age at diagnosis is falling, possibly due to progressive ozone depletion.

Incidence of both types of cancer is high amongst white Australians.

In England there are about 28,000 cases of skin cancer (non-melanotic cancer and malignant melanoma) each year, and about 1500 deaths. Numbers have been rising in recent years.

Prevention

An effective ban on chlorofluorocarbons (CFCs) would eventually reverse ozone layer depletion.

Protect skin with hats and other clothing, sunscreens.

"Flash-frying" is thought to be more dangerous than exposure over long periods, and should be avoided.

Look for early signs of cancer.

EXAMINERS' COMMENTS

Only a few candidates defined the meaning of Airborne Particles and some of them even got it wrong. There was also much confusion about airborne particles, pollution and other environmental hazards.

Question 4

You are responsible for public health in an urban area with a population of 250,000. The local "Accident Prevention Task Force" has asked for your advice in developing a health promotion programme targeted at children under 16 years old. For a named country, outline what advice you would give.

KEY POINTS

Most of the following would be required for a pass:

- Needs assessment. Include a discussion of the epidemiology in giving reasons for choice of programme content eg in younger people, traffic accidents, fires, choking and falls are important causes of death.
- Discussion of models of health promotion. The traditional focus was on the individual. Now the importance of recognising the source of danger, creating safer environments and encouraging alternative safer choices eg public transport are recognised.
- Educational measures alone do not have a significantly measurable impact upon accidental injury rates. Engineering measures that create safer environments can be effective (eg traffic calming measures, providing window locks to those living in high rise housing). Legislation requiring safety protection (e.g. restraints in vehicles, child resistant packaging of harmful products).
- Make the group aware of the association between childhood accidents and deprivation.
- Discussion of which agencies can be involved in the programme.
- Discussion of public participation approaches and importance of lobbying.

The following are additional points which might improve the answer to "good" or "excellent":

- Reference to sources of information and needs assessment eg home accident surveillance, special surveys.
- Evidence based advice. International studies indicate that community wide initiatives that embrace a range of initiatives and multi-agency community involvement can have an impact upon accident rates.
- Include description of at least one type of accident.

EXAMINERS' COMMENTS

Many candidates' answers were theoretical without answering the question. A number of candidates talked about analytical studies rather than an intervention programme.

Question 5

Healthcare associated (nosocomial) infection rates may be used as a measure of the quality of services.

- a) Outline suitable sources of data that could be used to indicate healthcare associated infection rates in a hospital setting. (40% of marks)
- b) What are the main problems in comparing infection rates between hospitals, and what steps can be taken to ensure that valid comparisons are made? (60% of marks)

KEY POINTS

The importance of healthcare associated infections (HAIs) as a cause of preventable illness and death has been recognised increasingly in recent years, and the prevention and control of these infections has become a priority.

Surveillance or monitoring of these infections involves the collection, collation, analysis and dissemination of data on cases of infection.

Suitable sources of data :

- Laboratory-based surveillance of "alert organisms" detected in clinical specimens (e.g. methicillin-resistant *Staphylococcus aureus* [and other bacterial isolates with patterns of resistance that may cause concern], *Clostridium difficile*, *Legionella*, rotavirus)
- Other laboratory-based surveillance –vascular catheters, postoperative wound swabs, etc.
- Surveillance by ward staff of "alert conditions" such as diarrhoea and vomiting, soft tissue infections, childhood exanthemata etc.
- Targeted surveillance by infection control teams through liaison with special units and wards or particular subgroups of patients.
- Continual surveillance or periodic surveillance / prevalence survey
- Infection rates may be calculated using appropriate denominators (admissions, discharges, procedures, patient days, etc.) and for different types of infections (e.g. surgical wound infections, UTIs, etc.)

Problems in comparing rates:

- It is tempting to compare one hospital with another, but hospitals are not always comparable.
For example, hospitals may have different specialties and units, affecting their case-mix, and some types of patients (e.g. immunocompromised patients, renal patients) are more susceptible to HAI than others.
- An infection reported by a hospital has not necessarily been acquired in that hospital. (Ideally, identification of patients with infection on admission allows separation of these infections from those acquired following the admission.)
Some hospitals will have a higher proportion of patients transferred from other healthcare facilities than others.
- The introduction of a formal surveillance system for a specific infection (whether mandatory or voluntary) will have an impact on the ascertainment and reporting

of that infection, and would be expected to lead to an increase in the reported numbers of that infection (i.e. the harder you look, the more you will find)

- With a tendency to earlier discharges from hospitals, some HAIs may not become apparent until after discharge. It may be desirable for HAI surveillance systems to extend into the community.

Steps that can be taken:

- Case-definitions should be agreed for infections of interest
- Methods of identification should be agreed (i.e. standardised methods of measurement)
- Standard methods of data collection and reporting (e.g. Nosocomial Infection National Surveillance Scheme [NINSS])-i.e. a standard dataset on each episode of infection

EXAMINERS' COMMENTS

This question was answered poorly by many candidates. Many candidates were not specific enough in their chosen data sources, for example including Health Protection Agency surveillance data, rather than going back to the hospital laboratory data that makes up this source. Many candidates included mortality data as a suitable source. This is not really a 'suitable' measure for healthcare associated infection rates as coding is an issue, there is no indication of whether any infection was acquired in a healthcare setting, and timeliness is an issue. In the same way hospital episode statistics are unlikely to be a 'suitable' source.

Many candidates have failed to understand the specificity of the question i.e. it is about comparing hospitals rather than all healthcare organisations.

Question 6

You are a public health practitioner with responsibility for stroke services in your resident population. Concern has been expressed about the relatively high rate of hospital admissions for stroke in your district (district 7 in the table below). The number of admissions for stroke and the admission rates (per 100,000 population) in 2004 for seven districts in your region, the region and the country are shown below.

District	Number of admissions	Rate per 100,000
1	193	150.5
2	250	163.4
3	342	170.7
4	171	189.2
5	282	228.9
6	304	248.6
7	489	275.2
Region	10,506	196.9
Country	122,100	242.1

Source: Hospital episodes statistics and population census data

- Briefly describe what the data in the table show. Comment on any limitations of the data as presented. (30% of marks)
- Identify three additional analyses that you might wish to make from the data sources used to prepare this table, and briefly explain how each analysis would help you interpret the data more fully. (30% of marks)
- List four additional data sources that you would like to access in order to build a wider picture of stroke and stroke care in your district. Highlight each source's usefulness or weaknesses. (40% of marks)

KEY POINTS

Most or all of the following would be required for a pass:

- (3 marks total; ½ mark for each sensible point or limitation. There must be at least 2 limitations to score the full 3 marks)

Data show:

- District 7 has the highest admission rate in a below country average region;
- Over 2 fold difference in stroke admission rates between the districts, district 7 being the highest;
- The regional rate is lower than the country rate;
- 2 districts (including district 7) have admission rates above that of the country;
- 3 out of 7 districts (including district 7) have admission rates above that of the region;
- Confidence intervals around the rates are not presented;

- The number of admissions within each district are not small;
- Assume that the rates are calculated using the total population but they could have used only the adult population figures;
- No indication of whether the stroke are first or recurrent strokes;
- No time trend data presented

b) Further analyses could include: (3 marks total; ½ mark for each additional analysis up to 3; and ½ mark for each one with a reason why)

- An examination of historical data or 3 year rolling averages to see if there are constant differences between districts over time, or trends up or down in rates.
- Presentation of confidence intervals on data – are any of the differences significant?
- Standardized rates for the age structure of populations – do different age groups have a different experience of stroke?
- Standardized rates for the sex structure of populations – do the sexes have a different experience of stroke?
- The possibility of coding error should be considered.
- Statistical test for heterogeneity in the rates for each district within the region
- Statistical test of whether district 7 is an outlier compared to the region as a whole.
- Graphical presentation of data with confidence intervals

c) Other data sources could include: (4 marks total; ½ mark for each additional source up to 4; and ½ mark for each one with usefulness or weakness)

- Proportion of people with suspected stroke referred for diagnostic CT scan within 24 or 48 hours of symptom onset – more accurate diagnosis of underlying cause will direct specific treatment – anti-coagulation, or thrombolytic drugs
- Number of admissions to general wards as opposed to specialised acute stroke wards
- Number of admissions to specialised stroke rehabilitation wards – evidence that stroke wards are more effective than general rehabilitation
- Number of deaths and SMR from stroke – were they outside hospital, in hospital, or post-discharge from hospital – compared to the other districts and the country
- Breakdown by risk factors e.g. socio-economic, previous heart disease, hypertension, smoking etc. by district – could it explain the differences between districts?
- Numbers of residents having rehabilitation services in the community – physiotherapy, speech therapy, occupation therapy
- Local audits of stroke care done by local clinicians – may not be comparable between districts

The following are additional points which might improve answers to “good” or “excellent”:

Candidates would be expected to provide a logical and coherent approach throughout, and to demonstrate an understanding of the importance and limitations

of examining variations in health care intervention rates within an overall picture of the situation for a given condition across the primary and secondary care interface.

EXAMINERS' COMMENTS

It was possible to score high marks on this question. Some candidates did not get the maximum marks in section (a) because they did not interpret what the table showed but just re-stated the column and row headings and general contents. Some candidates used additional data sources that were not specific to stroke care in your district e.g. the General Household Survey or the Health Survey for England, and a few candidates appeared to have run out of time.

This question is also a good example to show that how candidates could drop marks by not addressing the question properly and not being systematic in covering all the points.

Question 7

Discuss the impact of financial incentives on the organisation and delivery of health care services.

Key Points

The organisation and delivery of health services is predominantly directed by national policies. These are influenced by national history and culture, prevailing political ideologies, local geography, as well as national wealth and economic stability.

Components of a healthcare system include preventive services, therapeutic services, caring services and social support. Care is generally provided at four levels; self care, primary professional care; secondary general specialist care, and tertiary super-specialist care. Care is increasingly more expensive as it becomes more specialist, both in terms of health care personnel (doctors) and the treatment decisions they make.

Practice at both the individual level and at the system level can be influenced by financial incentives. Financial incentives are a powerful management tool but have to be used with care as they also have perverse impacts, resulting in unintended patterns of care.

Influence on individual's practice

- Item of service payments as a means of increasing or improving health service coverage, e.g. immunisation and screening programmes. These systems generate more work (prescriptions, home visits, surgical interventions, consultations) and cost 10-40% more than pre-paid practices. This system encourages supplier induced demand which can be curbed by expenditure caps.
- Target payments to reward provision of a specified percentage of the population with a particular clinical intervention. This results in increase in procedures but can also act as disincentive if target is unachievable e.g. screening in very deprived communities. Studies of quality target payments show improvement is on documentation rather than on delivered care e.g. Quality Outcomes Framework - many targets related to register creation.
- Special payments e.g. for working in deprived areas, or for higher than average numbers of elderly or very young in primary care.
- Performance related pay - this has only limited impact on practice, possibly because of lack of consensus between doctors and managers over what constitutes good performance. In addition, amounts of additional pay may be too little to stimulate interest. Perversely, may result in inordinate amount of effort on data collection and administrative work.
- Capitation payments - doctors prospectively allocated a fixed sum of money to spend on the health of patients registered with them. No incentive to carry out tests / procedures of dubious value, and preventive activities will be increased. Perverse effects include registering only low risk patients, providing a minimal service, and increasing list size over capacity to deliver quality care.

- Shared risk - popular in Health Maintenance Organisations (US). Doctors pay may be capitation, fee for service or salaried but there are additional mechanisms to encourage doctors to cut costs. Benefits as well as risks can be shared, with bonuses paid to those with low use of hospitals and expensive ambulatory care.
- Prescribing incentive schemes effectively reduced costs of drug bill and proportion of generic prescribing when practices allowed to keep a proportion of the savings.
- Salaried doctors have no incentives to create work. There may be incentive to do as little as possible or to rely more on technology to reduce the personal effort required.

Influence on patients

- Financial incentives for patients to achieve treatment related goals is effective for chronic disease management programmes - associated with improved disease control.
- Financial incentives improve patient adherence to medication regimen.
- Payments for blood donation / organ donation affects availability.
- Recent efforts to get people back to work and off Incapacity Benefit - links continued payment of benefits to co-operation with assessments or treatment programmes.

Influence on system development

- Ring fenced budgets force focus on specific disease / conditions or topic areas e.g. former HIV budgets; Choosing Health 'spearhead PCTs'.
- Local Area Agreements encourage partnership working at local level between different agencies, which could gain financially if the jointly agreed targets are met.
- Commissioning models which include 'tariffs' e.g. HRGs and Payment by Results - encourage volume of work at expense of quality. Perverse incentives include selection of less severe case-mix,
- Recruitment incentives (Golden Handshakes, higher salaries) have been used in various shortage specialities or deprived geographical areas.
- Health personnel contracts designed to shift balance of autonomy and power towards management e.g. Consultant Contract with negotiated job plans, theoretically allowing flexible provision of services at evenings and weekends. GP contract with structured payments.
- Primary care commissioning / HMOs to shift balance of care from secondary to primary - incentive for primary care to increase their role as providers of care.
- Use of market mechanisms and competition to reform services - can have positive and negative effects on quality. (e.g. UK Systems Reform agenda - multiple providers, Foundation Trusts, 'Choice', PBR). Perverse incentives include the need for surplus service capacity - leads to supplier induced demand; fragmentation of care and continuity for those with chronic conditions; new providers carving out profitable activities leaving remaining hospitals struggling.

Excellent answers will recognise perverse incentives associated with each point.

EXAMINERS' COMMENTS

In general the quality of the responses were poor to average. Many responses lacked structure and would have been improved if candidates had tackled the effects of financial incentives on the organization and the effects on the delivery of care separately. The responses would have been benefited from more examples as the examples given were extremely limited.

Question 8

Write short notes on three of the following:

- a) stigma
- b) social disadvantage
- c) self help
- d) advocacy
- e) social support networks

Key Points

Most or all of the following would be required for a pass

(a) (1) Stigma is a term used to denote actual, or potential, devalued status for an individual. Erving Goffman called stigma 'spoiled identity.'

(2) Stigma may arise from physical disease or disability, mental illness or learning disability, or other features (such as sexual orientation, race, income) may be the focus.

(3) Stigma is often an accompaniment of processes which handicap a person and rehabilitative efforts need to acknowledge its influence.

(4) Stigma may itself influence behaviour ('enacted stigma') or remain concealed, known only to the stigma bearer ('felt stigma').

(b) (1) Social Disadvantage is a term which may be used to describe a relative lack of opportunities which would enhance social status or secure/increase control over material resources. Various indicators may be used and applied to individuals, groups or populations (the latter identified, for example, by geographical criteria).

(2) Indicators of social disadvantage include: low income, rented accommodation, non-possession of goods (e.g. car), unemployment, lower occupational social class and, depending on cultural context, gender, religion, race or other stigmatising features.

(3) Social disadvantage is associated with higher risks of many diseases (increased morbidity), and, in many diseases, with increased mortality (e.g. Black Report/Health Divide).

(c) (I) Self-help may refer to membership of a group primarily originated, developed and maintained by sufferers of a disease or illness. The intended purpose of the self-help group may be one or more of the following: sharing of information, mutual psychological support, campaigning for better services; raising money for research; individual advocacy.

(2) Another sense of self-help emphasises self-reliance in the face of a problem (e.g. personal or family illness, stigmatised status, social disadvantage). Consequently, self-help may include: self-medication, seeking alternative therapy, reliance on informal ('lay') networks, political action.

(d) (1) Advocacy is a term used to denote a situation in which the claims of an individual, group or population to goods or services is articulated by a person or institution (the advocate). The advocate may be a professional or a lay person, an institution or self-advocacy (where the advocate belongs to the group whose claims are forwarded) is possible.

(2) Professional advocacy in public health occurs in the context of, for example, health promotion and decisions regarding allocation of resources. Advocacy usually follows the identification of unmet needs.

(3) Advocacy can (but need not) conflict with self-help and this highlights the needs to involve potential beneficiaries in advocacy strategies.

(e) (1) Social support networks include primary groups (spouse/partner/family) and secondary groups (e.g. neighbours/colleagues). In its usual usage health professions are not included in such networks.

(2) Social support may refer to psychological and/or material dimensions. Confiding family or friends (who are perceived to be supportive) have been shown to reduce risks of a variety of diseases (e.g. CHD, anxiety, depression). Social support networks can therefore act as buffers' against adverse life-events and can enhance coping responses.

The following are additional points which might improve answers to "good" or "excellent".

(a) Stigma varies from culture to culture and from time to time. Stigma that is felt may be even more of a perceived problem than any action on the part of others in reaction to stigma.

(b) The increased awareness of social disadvantage as a determinant of health makes it imperative that public health physicians take an interest in the distribution of resources and opportunities within populations. Advocacy on behalf of groups that are disadvantages is a legitimate public health role.

(c) Self-help fits into the classification of Kleinman. It is (in some cases) explicitly against the medicalisation of problems. Ideas and procedures developed within self-help groups are often innovatory and medical services have often incorporated such developments.

d) Advocacy other than self-advocacy can involve a disempowerment of client groups. Consequently advocacy should involve the clients in the articulation of the needs' or 'rights that are claimed.

e) Studies such as those on suicide by Durkheim, depression in working class women (Brown & Harris) and from the Alameda County study show the influence of social support networks, There is still controversy over the mechanism(s) or effect - is the effect 'independent' or does it modify adverse influences (e.g. 'life events')?

EXAMINERS' COMMENTS

These in general were answered better than Question 7 but there was still a lot of variation in quality. There were some good answers to the section on stigma and most people who completed this section scored well. The self help and social networks sections were not so well answered with many responses being sketchy. The advocacy section was very variable with responses ranging from very good to very poor.

Question 9

- a) Outline the differences between power and authority. (30% of marks)
- b) In the context of EITHER a city-centre bomb blast OR explosion of a large chemical factory, compare the roles of the police and fire emergency services with those of public health professionals. (50% of marks)
- c) Comment on the sources of power and authority for each profession in this emergency context. (20% of marks)

KEY POINTS

To avoid a bad fail: one difference between power and authority; three key steps for both the emergency services and public health groups

Borderline pass: two differences between power and authority; mention of emergency planning; four key steps for both emergency services and public health at the time and after the incident

Good pass: mention of relevant management theory; most of the key steps for each group

Authority

- is legitimized power – a voluntary submission to authority
- conceptualized by Weber in the 1940s (psychological equivalent in brackets)
 - tradition
 - rational-legal authority (position power)
 - charisma (personal power)
 - pure rational authority (expertness)

Power

- a much broader concept than authority
- is possession of controlling influence
- may refer to non-legitimized authority
- is the capacity to overcome resistance
- may be subtle or overt within a group or organisation
- French and Raven in 1986 also identified (in addition to the above) different power types
 - Resource or reward power, eg. granting or withholding high grades by professors
 - Coercive power, the power to punish, eg. firing a staff
 - Negative power, capacity to stop things happening

Emergency services

Immediate and short term

- casualties
- evacuation
- de-contamination of potentially exposed
- reduction/elimination continuing risk – maintaining cordons
- media – informing public in regular briefings
- members of high level decision making group (*Strategic Gold Command*)
- authority stems from its position power

Long term

- review of response and lessons learnt

Public health

Immediate and short term

- advice re the health effects of the plume contents and identifying at-risk groups
- timely advice for the protection of emergency personnel, employees, and the public
- member of Joint Health Advice group of Strategic Gold Command
- liaising with and advising health service providers and senior management colleagues
 - ambulance staff
 - secondary care – A and E capacity, trauma, burns and ITU facilities, mortuary capacity
 - primary care – advice
- media – ensuring agreement on public health messages, agreeing spokespersons, answering media questions
- authority stems mainly from expert power, ie. Power of knowledge, although directors of public health may act on behalf of NHS Chief Executives and thus hold delegated position power in emergency planning functions.

Long term

- investigate possibility of any long-term health effects using appropriate epidemiological investigation
- contribute to interagency groups to advise and mitigate the effects of the incident on the local community and prevent recurrence

EXAMINERS' COMMENTS

Marks for this question tended to cluster in the middle of the range. The better answers showed evidence of a structured approach, with the answer to part (b) clearly related to the concepts of power and authority required for part (c).

Question 10

Discuss the impact of external influences on the organisation of health care with reference to a public health or health care agency of your choice.

KEY POINTS

To avoid a bad fail: name one agency and one external influence demonstrating a positive and a negative impact on this organisation

Borderline pass: name agency and three external influences demonstrating their positive and negative impacts on this organisation s

Good pass: identify one agency with a brief outline of its purpose and the extent to which at least 3 external influences may have positive and negative impacts, detailing their potential consequences in terms of the organisational objectives; description of examples and/or reference to relevant management theory

Organisational purpose and context

Examples include a Primary Care Trust, Health Protection Agency, Acute Hospital
The consequences of the impact of external influences can be demonstrated with practical examples related to the specific agency selected

Economic

Positive:

- Ring fenced funding for the development of a specific service of public health benefit
- Clear strategic priorities set based on explicit resource allocated for a particular purpose
- Availability of skilled staff able to fulfil organisational objectives

Negative

- Insufficient financial resource to achieve organisational objectives
- Poor financial governance or poor adherence to financial and accounting standards; lack of good communication of financial position within the organisation
- Lack of skilled, committed workforce capable of delivering the corporate agenda

Political

Positive:

- National governmental policy set which facilitates the organisation in achieving its objectives
- Local stakeholder support for particular community based priorities in accordance with the organisational goals

Negative:

- Lack of strategic direction being set at Board level and/or by external stakeholders
- Clear external political impetus contrary to organisational purpose

Societal

Positive

- Support for specific organisational objectives eg evidence based priority, community pressure
- Media interest/concern as a positive driver

Negative

- Societal perception (local/national) that the organisational objectives are not worthwhile and/or outmoded
- Lack of requirement by a population for a particular service offered by the organisation eg provision of a specific service

Technological

Positive

- Development of technological advances which support the organisation in achieving its objectives
- Incorporation of innovative approaches shown to be effective elsewhere into local implementation processes

Negative

- Resource requirements of training workforce in new techniques
- Cultural antipathy to the implementation of challenging new developments

Environmental

Positive

- Warm sunny climate can make people feel better
- Accessibility; transport links; urban planning

Negative

- Ambient daily temperature affects heating and air conditioning expenditure
- External air pollution affects indoor air quality
- Risk of natural disasters (floods, quakes etc.)

Industry

Supply chain

Positive

- Efficient supply chain can improve quality and save money

Negative

- Food poisoning and poor quality goods can be introduced

Legislation

Positive/negative implications of

- Private financing initiative arrangements: destabilising Vs opportunities
- Health & Safety and infection control legislation: resource requirement to meet standards

EXAMINERS' COMMENTS

This question attracted a wider range of marks than Question 9. The better answers showed evidence of lateral thinking, bringing in a wide range of potential influences, rather than concentrating unduly on one group of factors (eg. sociopolitical, legislative or environmental). Answers which considered both positive and negative impacts tended to gain higher marks.

Paper IIA

You are a Director of Public Health working in a primary care organisation that has financial problems which are being addressed through a financial recovery plan. Your Chief Executive has been approached by a group of local General Practitioners who have read a recent BMJ article which, they say, shows that there is good evidence that the primary care organisation should be commissioning a screening and treatment service for *H pylori*. The BMJ paper they refer to is:

'Impact of Helicobacter pylori eradication on dyspepsia, health resource use, and quality of life in the Bristol helicobacter project: randomised controlled trial". J Athene Lane, Liam J Murray, Sian Noble, Matthias Egger, Ian M Harvey, Jenny L Donovan, Prakash Nair, Richard F Harvey. *BMJ 2006; 332: 199-204*

1. Write a critical appraisal of the paper. (45% of marks)
2. Your Chief Executive has asked you to write a letter of response to the local General Practitioners keeping in mind the organisation's financial position. Write this letter. (35% of marks)
3. Your letter has been discussed by the General Practitioners and a patient participation group (a group concerned about dyspepsia, peptic ulcer and related disease). The patient participation group have asked you to give a short presentation to their group. What are the main issues you would like to cover in your talk? (20% of marks)

KEY POINTS

1. Critical appraisal

This should demonstrate a systematic approach which covers the following areas:

- Did the study ask a clearly focussed question
- What type of study was this and was the choice appropriate
- Were participants appropriately allocated to the intervention and control groups
- Were participants, staff and study personnel 'blind' to participants study group
- Were all the participants who entered the trial accounted for at its conclusion
- Were all the participants in all groups followed up and data collected in the same way
- Did the study have enough participants to minimise the play of chance
- How are the results presented and what is the main result

- How precise are the results (confidence intervals)
- Were all important outcomes considered so the results can be applied to a local situation

2. Letter to local General Practitioners

Using suitable language the letter should demonstrate:

- recognition of the local situation (GP interest)
- acknowledgment of findings of BMJ paper
- reference to PCT financial situation and the need to balance conflicting demands
- a suggested way forwards (further debate, setting up local clinical advisory panels etc)

3. Talk to local patient participation group

Need to show suitable approach for the audience. Expect to cover similar points to question 2. May also make reference to issues such as:

- usefulness of local people contributing to the debate
- NHS has limited resources
- how priorities are set locally

An excellent answer may also make reference to:

- Longer follow-up in the Bristol Helicobacter screening project would be useful.
- The impact of antibiotic treatment on microbial resistance both at individual and global levels
- Priority setting / needs assessment / programme budgeting and marginal analysis as ways into debate about deciding levels of healthcare spending.

EXAMINERS' COMMENTS

Performance on this question was disappointing, with over one-third of candidates obtaining "bad fail" marks (20/50 or below). This was unexpected, given that the format of paper IIA has been similar for many years and the requirements in terms of critical appraisal and report writing were to a large extent predictable.

The examiners noted that performance on questions 1 and 2 of paper I was also weaker than in many previous sittings, suggesting that many candidates would have benefited from refinement of their quantitative and critical appraisal skills.

Because of the unusually poor performance on this question, detailed feedback is provided below.

Question 1: Critical Appraisal

A majority of the candidates did not critically appraise the paper but rather re-wrote large sections of the paper over many pages. The examiners have read the paper and do not need the candidates to simply re-write it with no critical insights.

Where candidates made an attempt to critically appraise many simply followed a checklist e.g. 'was double blinded', 'sample size calculation was done', 'analyses were undertaken were appropriate', or sometimes listed sources of bias with no explanation e.g. 'the blinding would ensure that there was no performance bias, measurement bias or observer bias'. This simple description does not adequately demonstrate an ability to critically appraise to the standard required to pass this examination.

Of those who attempted to critically appraise the paper, many made it clear that they did not understand basic principles such as selection bias, how confounders are controlled for in randomised controlled trials, the difference between internal validity and external validity (generalisability). Many candidates failed to be able to demonstrate they understood the differences between generalisability, confounding and bias, typically confusing them. The very small number of candidates who mentioned the placebo effect on the whole demonstrated that they did not understand what this was.

Many candidates commented on whether they thought the instruments used to measure outcomes were valid or not – in particular comments were made that the questionnaire on symptoms might not be valid. However, none discussed how (or if) this would bias the findings. In a well-conducted randomised controlled trial the extent of any measurement error should be the same in both groups, so the issue of validity of the way the outcome is measured relates to how well (or not) it assesses the outcomes the research aims to address. No candidates demonstrated understanding of this.

No candidates at all discussed whether they considered the minimal effect estimate used in the sample size calculation to be adequate or whether they would have considered weaker effects to be of public health importance. The effect estimate used in the sample size calculation was a relative reduction of 50%. An important question is whether one would consider a smaller effect (say a relative reduction of 30% or 40%) to be clinically or of public health importance. If one did then the study is not adequately powered to detect what might be considered the minimal effect of importance. In the event the relative reduction of the primary outcome (on what the sample was based) in this study was weaker than 50% - this is likely to have been why this effect was imprecisely estimated with wide confidence intervals (see below).

A small number of candidates suggested that because the number of participants included in the final follow-up was slightly lower than the result of the sample size calculation the study was under-powered – thus demonstrating that they do not understand that a sample size calculation is a guide and not an absolute. Only a handful of candidates discussed the possible lack of power for secondary outcomes or sub-group analyses (such as the test of difference in association by gender).

Very few candidates attempted to interpret 95% confidence intervals or p-values and many who did, interpreted these incorrectly. Many candidates were over-impressed with p-values rather than discussing the clinical / public health relevance of the point estimate and how precisely this was estimated.

Many candidates did not discuss the numbers needed to treat or realise that this was a measure of absolute (as opposed to relative) effect.

The context of this question was that of local GPs asking the PCT to commission a new screening and treatment service at a time of the PCT undertaking a financial recovery plan. Despite this the appraisal of the cost-consequence analysis of this study was poorly undertaken.

Some candidates simply ignored it.

Few candidates spotted the absence of screening programme costs.

Most did not demonstrate an understanding of a cost consequence analysis and how these might be used. Only two finding of a cost consequence analysis are any use.

Assuming there are some clinical benefits, as here, then only if there are cost savings or the programme is cost neutral can we draw useful conclusion, ie to implement. If there are additional costs, as here, but ill-defined benefits (ie no benefit utilities measured) as here, we are stuck with inadequate information.

Again where candidates did attempt to appraise the cost consequence analyses simple descriptions such as 'the investigators appropriately discounted', 'no sensitively analyses were done' without any demonstration that the candidate understood the issues they were describing.

A substantial minority of the candidates stated that the results could not be trusted because the study was part funded by a drug company, others suggested that because the paper was published in the BMJ by reputable authors the study must be good. With respect to the drug company funding it was clearly stated that they did not have a role in the design of the trial, the analyses and the interpretation of the results. More importantly candidates must critically appraise the methods and interpret the results in a neutral way and not make conclusions on the basis of authors, journal or funders.

A good answer is one in which a brief summary (1/2-1 page) of the paper is provided. Here key features to highlight were that this was **not** a randomised controlled trial of the effectiveness of a screening programme. It was a randomised controlled trial, with cost consequence analysis, of the effectiveness in reducing consultations from dyspepsia, of a particular treatment for the eradication of H Pylori in individuals identified as screen positive using a C-Urea breath test.

This should be followed by a correct critical appraisal of the study methods that demonstrates candidates understand key concepts and how potential sources of bias might influence the findings. A description of the process by which bias might occur is better than using terms such as 'measurement bias', 'selection bias' without actually explaining what you mean by these terms. Examples of excellent comments are: 'This is a randomised controlled trial which is the best study design for testing the effectiveness of a treatment because if it is well-conducted potential confounding factors will be evenly distributed between the randomised arms and therefore the results of a well-conducted randomised controlled trial could not be explained by confounding.'; 'The allocation to treatment or placebo was concealed by being done by individuals who were independent of those enrolling participants into the study.'

This is important since it means that those who are enrolling participants cannot influence which arm of the trial they go into. If they could influence which arm participants go into allocation would not be random and the results would be biased. In general it has been shown that failure to adequately conceal random allocation biases results away from the null (an exaggerated effect). In practice the bias could occur in either direction.'

Candidates should describe the key findings in quantitative and qualitative ways, taking account of the 95% confidence interval, and making sure that units, comparison groups and whether the effect is relative or absolute are clearly described. Thus, in this example a good description of the results would be 'Participants who were allocated to active treatment compared to those who were allocated to placebo had a relative reduction in primary care consultations for dyspepsia, such that they were 35% less likely to have consulted for dyspepsia (odds ratio 0.65). The 95% confidence interval for this estimate was 0.46 to 0.94, suggesting that in the population to which we would want to make inferences from these results we are 95% confident that the relative reduction would be between 54% and 6%. The wide confidence intervals make it difficult to be confident that this treatment would have a clinically important effect and imply that a larger study is required to obtain a precise estimate of the treatment effect. In absolute terms, if we assume that the relative reduction is causal, 30 participants would need to be treated in a population with a similar prevalence of H pylori-related dyspepsia to that of the study sample, in order to prevent 1 primary care consultation for dyspepsia. Findings from the cost consequence analyses should also be described in an equivalent level of detail. Finally, the candidate should briefly summarise the key findings of their critical appraisal and consider whether they would change practice on the basis of this study and if not what further research would be required to do this.

Question 2: Letter to local GPs

This question was testing a candidate's communication skills, specifically their ability to communicate key findings from the paper, together with other relevant information, to a professional colleague in a letter.

This was in general poorly answered. Common mistakes were (i) candidates simply re-writing the paper again or writing a very similar answer to question 1; (ii) not acknowledging that the GPs being addressed know of the paper and have read it (the question clearly states that the GPs brought the paper to the attention of the PCT); (iii) simply too long, inappropriate language, giving detailed information that GPs would know in a patronising way – in short a basic failure to realise that the question was not asking you to appraise the paper again or testing your knowledge of Wilson and Jungner screening criteria, but was looking for an appropriate written response to the letter from the GPs.

Very very few candidates highlighted the key issues from the paper of relevance here i.e. that the paper had not tested the effectiveness of a screening programme, that the numbers needed to treat were high, that there was insufficient information to determine cost-benefit, but the authors themselves had pointed out that their results suggested that a targeted eradication strategy might be more cost effective than a population screening approach (thought they do not actually test this). These key issues could be summarised in one clear and concise paragraph, using factual language.

Not enough candidates mentioned the issue of over use of antibiotics. Not enough mentioned guidelines, national, from NICE or the National Screening Committee, or local, nor the mechanism by which they might be created. More details of the processes by which decisions are or should be made were needed, with excellent answers including the concept of displacement of (ie disinvestment in) less cost effective treatment to make way for a better one (rather than NICE's absolute cost effectiveness thresholds).

Many candidates simply dismissed the paper on the basis that it did not apply to their PCT population which was more socioeconomically deprived or had a higher minority ethnic group than the study population. This was so frequent it felt like a common cop-out by candidates to discuss any further issues. As with the appraisal statements such as this need to be justified. There are two issues here to do with clinical and cost effectiveness. To suggest that the eradication therapy used in this trial would not work in the same way in groups who are more socioeconomically deprived or of a different ethnicity or different age to those in the trial implies that the drugs work differently in people of different age, ethnicity, socioeconomic position, this in turn implies important biological differences between these groups. Whilst this is possible, in reality it is rare for drugs to work differently in different groups of the population. Candidates need to explain on what basis they think a treatment might work differently because someone is from, e.g. a different social class (remember the study that demonstrated that smoking caused lung cancer was done in British male doctors – no one suggested that these results would not transfer to women and other occupations). With respect to the cost-benefit then the paper gave some clues that would suggest there might be more cost-benefit in lower socioeconomic groups because these groups are likely to have higher prevalences of H pylori. The bottom line is that candidates cannot simply dismiss the relevance of any results to their population without giving a clear reason for why this might plausibly be the case.

Question 3. Talk to local patient participation group

The third part of the question was on the whole the best answered, though still a number of candidates repeated their answer to question 1 and focused only on the paper and a small number of candidates did not mention the paper at all (the question clearly states that the patient group have discussed the letter you wrote in part 2 (which is about the paper) with local GPs).

A good answer to this part of the question would cover the following: introduction to the PCT (its purpose in general and how this is achieved) and your role in it; brief description of the epidemiology of H pylori and its role in dyspepsia, peptic ulcer and other diseases and other risk factors for dyspepsia; description of current local management of these conditions; discussion of the paper – its main results and how these do/don't support a change in current treatment; how new treatments are assessed locally and nationally; time for questions and means of initiating further contact.

Paper IIB

You are the public health advisor to a local government authority responsible for municipal services for 200,000 people. Concerns were raised at a recent public meeting about two recent reports in the medical literature, suggesting that swimming in indoor chlorinated pools may increase the risk of asthma in children. You have been asked to respond to these concerns.

The first report correlated the lifetime prevalence of asthma, as reported by parental questionnaire in surveys of schoolchildren in two age groups, with the number of public indoor chlorinated swimming pools per 100,000 inhabitants in 33 towns and cities throughout Europe (figure 1, overleaf).

1. Describe graphs and the results shown in the two parts of figure 1. (10% of marks)
2. What further information about this study would you seek to aid in the interpretation of these findings? (10% of marks)

The second report, by the same authors, compared 43 children who had followed a programme of infant swimming lessons before 2 years of age, with the remaining 298 children in a cross-sectional survey of 10-year-olds in suburban Brussels. The lifetime prevalences of asthma in the two groups were 23.3% (10/43) and 11.1% (33/298), and the lifetime prevalences of recurrent bronchitis were 60.5% (26/43) and 36.9% (110/298), respectively.

3. Perform an appropriate test to evaluate the statistical significance of these associations of infant swimming with asthma and recurrent bronchitis. (20% of marks)
4. Prepare a briefing paper of 500 words for the local government officer responsible for the management of municipal swimming pools in your area, evaluating the strengths and limitations of the two reports, as evidence of a possible respiratory hazard related to indoor swimming pools. (30% of marks)

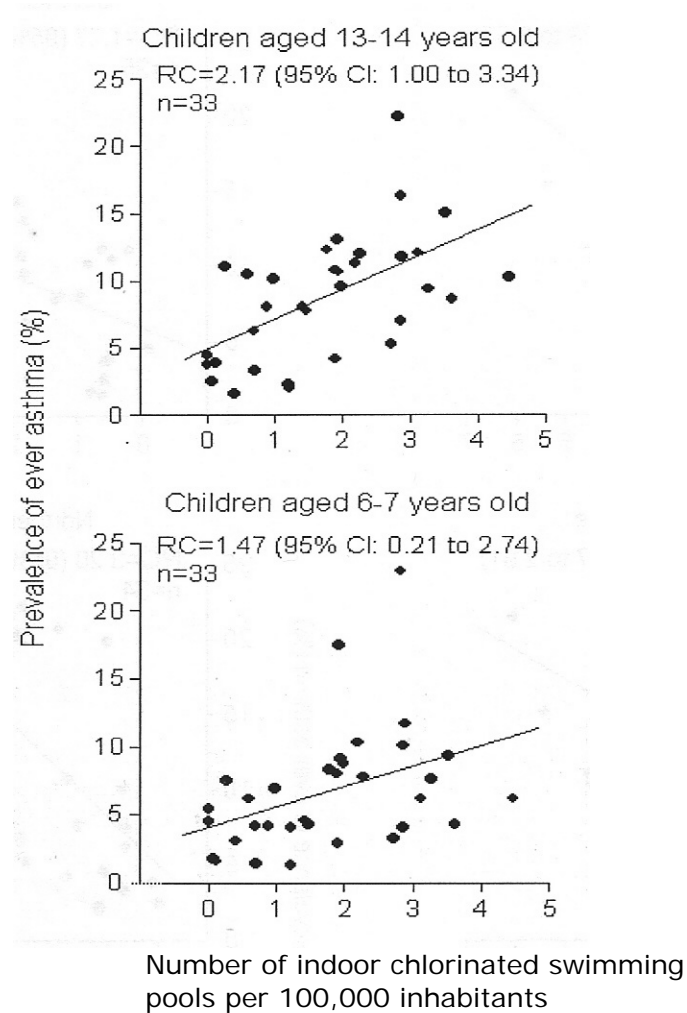
An on-line search of the medical literature reveals that trichloramine (nitrogen trichloride), an irritant gas released when chlorine reacts with sweat or urine, has been implicated as a possible cause of occupational asthma in lifeguards. Trichloramine is also responsible for much of the typical "chlorine smell" in indoor swimming pools.

5. Outline the design of a study to investigate in greater detail the hypothesis that exposure to chlorinated swimming pools, and specifically to trichloramine, in early childhood is a cause of respiratory disease among children of school age. (30% of marks)

Figure 1:

Lifetime prevalence of asthma in children of two age groups in relation to the number of indoor chlorinated swimming pools in 33 centres across Europe.

(RC = regression coefficient, 95%CI = 95% confidence interval)



KEY POINTS

1. Briefly describe the results shown in the two parts of figure 1. (10% marks)

For a pass:

- Scatter plots with each dot representing a study centre (city or town)
- Describe Y-axis and X-axis
- Similar pattern of positive correlation for the two age groups
- Two outliers (age 6-7) and one outlier (age 13-14) do not seem to be “driving” the overall association.
- Explain the regression coefficient and its 95%CI.

Additional credit given for:

- The data are “ecological”: not based on the same individuals within each centre.
- The graphs are not independent: prevalences in 6-7 and 13-14 year olds would be expected to correlate strongly across study centres.
- Steeper regression line for 13-14 age group but wider range of prevalence figures.
- Interpretation of RC should not be causal.
- Generally higher lifetime prevalence of asthma in 13-14-year-olds (as would be expected) but some anomalies (eg at 2 per 100,000 pools) with higher lifetime prevalence in younger age group – possible cohort effect.

2. *What further information about this study would you seek to aid in the interpretation of these findings? (10% marks)*

- Centres: How were the cities selected? How were children selected within centres?
- Prevalence data: Definition of asthma. Wording and translation of questionnaires.
- Swimming pool data: How were pools ascertained? Population denominator.

3. *Perform an appropriate test to evaluate the statistical significance of these associations of infant swimming with asthma and recurrent bronchitis. (20% marks)*

For a pass:

- Test for difference between proportions, or chi-square test on 2x2 table. (Odds ratio and variance of log OR would be OK if appropriate formula stated even if no formal calculation due to logs not being available on calculators provided)

Additional credit given for:

- Calculation of 95%CI
- Comment on statistical significance, given 95%CI or chi-square value

4. *Prepare a briefing paper of 500 words for the local government officer responsible for the management of municipal swimming pools in your area, evaluating the strengths and limitations of the two reports, as evidence of a possible respiratory hazard related to indoor swimming pools. [30% marks]*

For a pass:

- Explain the “ecological” design of report 1. Children who have asthma are not necessarily the ones using the indoor pools. Very crude measure of swimming pool exposure. Numerous other factors could differ between centres, causing ecological confounding.

- Contrast with the “individual-level” design of report 2. Same children exposed as developing asthma/bronchitis. However, no adjustment for potential confounders, and relatively small numbers. No information on later swimming pool exposure, so critical period of exposure not identified.
- Overall assessment of quality of evidence, which is poor. Emphasise need for further studies, rather than action solely on the basis of these reports.

Additional credit for:

- Clarity, structure, style, balance.

5. *Outline the design of a study to investigate in greater detail the hypothesis that exposure to chlorinated swimming pools, and specifically to trichloramine, in early childhood is a cause of respiratory disease among children of school age. (30% marks)*

For a pass:

- Justify choice of case-control, cross-sectional or cohort study.
- Case definition
 - asthma alone, or broader group of respiratory disease?
 - symptoms, diagnoses, lung function measures?
- Exposure definition
 - non-specific if retrospective, could be more specific if prospective
 - ambient air monitoring in swimming pools
 - time-weighted exposures from diaries or other documentary evidence of pool use
- Confounders – family history of asthma / respiratory disease, allergy, parental smoking

Additional credit for:

- Ethical approval
- Power and sample size calculations
- Analysis – odds ratios or logistic regression

EXAMINERS' COMMENTS

This question attracted a wide range of marks, although the performance was generally better than on paper IIA.

The best answers were those which were legible, well structured and showed evidence of original thinking, particularly in the study design. The poorer answers simply paraphrased the data given in the question and offered little by way of critical comment.