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

Obstetric haemorrhage during labour and delivery remains a leading cause of maternal mortality in both developed and developing countries. Some women require a hysterectomy (removal of the uterus) to control the bleeding in a procedure known as a peripartum hysterectomy. A recent case-control study of peripartum hysterectomy (to control obstetric haemorrhage) was conducted in a developed country. One of the main findings related to a history of previous caesarean section which was associated with an odds ratio of 3.52 (95% confidence interval 2.35-5.26) when cases were compared with controls. The population attributable risk fraction (sometimes referred to as aetiological fraction) of peripartum hysterectomy associated with previous caesarean section was 28%.

a) Had you been designing this study:

(i) What case definition would you use? (10% of marks)

(ii) Which women would be suitable controls? (10% of marks)

b) What information do you need to determine an appropriate sample size for a case-control study? (30% of marks)

c) Explain what the odds ratio and 95% confidence interval associated with a previous history of caesarean section mean. (30% of marks)

d) Explain what the population attributable risk fraction associated with a previous caesarean section of 28% means (20% of marks)

Key points

a) Had you been designing this study:

(i) What case definition would you use? (10 % of marks)

Cases in a case-control study are the individuals defined as having the outcome/disease of interest which in this study is any woman who had the particular operative procedure, peripartum hysterectomy.

A case in this study would therefore be defined as: any women in this country in whom, during the study period, a unplanned peripartum hysterectomy was carried out (in the same clinical episode as labour and delivery). (1 mark)

(ii) Which women would be suitable controls? (10% of marks)

In case-control studies the controls are generally individuals who have not experienced the outcome/disease of interest.

Controls, in this study, would be women who laboured and delivered in the same country, during the study period, who did not have a peripartum hysterectomy (in the same clinical episode as their labour and delivery). (1 mark)

b) What information do you need to determine an appropriate sample size for a case-control study*? (30% of marks)*

The information required for a sample size calculation for a case-control study includes:

- An estimate of the prevalence of one of the primary exposures of interest in the controls which in this case could be interpreted as being previous caesarean section in the controls but might relate to other exposures.
  (10% of marks)

- The odds ratio you wish to be able to detect in this study also needs to be set. The odds ratio needs to be what would be clinically important and would need to relate to the primary exposures of interest. (10% of marks)

- The level of power would need to be set and conventionally is set at a minimum of 80% but could be set higher (this is 1 – ß). Similarly the two-sided statistical significance level would need to be set and by convention is set at 5%. (10% of marks)

(Marks may also be attracted if a confidence interval approach to estimation is alternatively offered)

In the example given, the study is undertaken over one year which automatically fixes the number of cases, therefore, we need to know the potential number of cases occurring in one year in this country. The only variable in this case-control study that can be adjusted to increase the power of the study is the number of controls. An excellent answer may include discussion of this point but this is not crucial to gain the marks.

c) Explain what the odds ratio and 95% confidence interval associated with a previous history of caesarean section means. (30% of marks)

The odds ratio associated with previous history of caesarean section was 3.52 (95%CI 2.35-5.26). Since we can assume that PH is rare (i.e. rare disease assumption) then the odds ratio can be regarded as a robust estimate of relative risk and therefore this can alternatively be phrased as previous caesarean section is associated with a 3.5 fold increase in the risk of PH associated with obstetric haemorrhage. (10% of marks)

The 95% confidence interval implies that if a large number of similar studies were conducted, the result would be expected to lie in the range 2.35 to 5.26, 95 out of 100 times. (10% of marks)

Since the 95% confidence interval does not include the value 1 then this result is statistically significant at the $p<0.05$ level of statistical significance and this result is unlikely to have occurred by chance or will have occurred by chance less than 1 in 20 times. (10% of marks)

An excellent answer might state the odds ratio is a robust estimate of a relative risk (as rare disease) but this is not crucial to gain the mark.

d) Explain what the population attributable risk fraction associated with a previous caesarean section of 28% means (20% of marks)

Assuming that the relationship between previous caesarean section and PH is causal then the PARF is an estimate of the proportion of cases of obstetric haemorrhage requiring PH attributable to previous caesarean section. (10% of marks)

The PARF takes into account the relative risk (or odds ratio in this case) and the prevalence of exposure (to previous caesarean section in this case) such that even modest relative risks can be associated with a high PARF if the exposure is common. (10% of marks)

EXAMINERS' COMMENTS

This question was answered moderately well by candidates. However, most candidates failed to provide a complete enough definition of cases and controls as they failed to consider the sampling frame; the definitions of controls were often confused with some candidates assuming the controls needed to have had obstetric haemorrhage or have had a pregnancy free of any complications. When outlining the information needed for a sample size calculation, most candidates were able to discuss statistical significance, power and effect size but relatively few discussed the effect size with respect to the minimally important odds ratio and some identified the need for information on the prevalence of the outcome rather than the exposure. Simple explanations of an odds ratio were largely missing, particularly in relation to the example. Confidence intervals and PARF were reasonably well understood by candidates.

Question 2

Amongst other information, the revised CONSORT (Consolidated Standards of Reporting Trials) statement asks authors of reports of randomised controlled trials to provide information on the methods used to generate the random allocation sequence and on the methods of allocation concealment.

a) What is the CONSORT statement and what are its benefits? (20% of marks)

b) Why is randomisation important, and why is it also important to know how the random allocation sequence has been generated? (40% of marks)

c) What is meant by the term allocation concealment? What methods are recommended to achieve adequate allocation concealment? (40% of marks)

KEY POINTS

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

a) The CONSORT statement is a set of recommendations on the information which should be provided in reports of randomised controlled trials. It has been agreed by journal editors and the academic community and has been implemented by a number of major medical journals. It comprises a checklist of items describing the design, implementation, results and conclusions of the trial, which must be included in different sections of the manuscript, and a chart documenting the flow of participants through the different stages of the trial, which should also be included in the trial report. This information allows readers to judge the internal and external validity of the trial. Therefore, it is of benefit for critical appraisal.

b) Random assignment eliminates selection bias and reduces the risk of confounding bias. These advantages are threatened if the person who recruits subjects to the trial can (or thinks they can) predict to which group the subject will be assigned. Therefore reports of randomised trials need to show that the allocation sequence was generated on the basis of chance and are unpredictable e.g. through computer random number generators or by random number tables.

c) Even if the allocation sequence is unpredictable, the benefits of randomisation may still be subverted if the person recruiting subjects to the trial is aware of the next assignment on the allocation sequence before they enrol the patient because it could sway their decision on whether to include or exclude the patient from the study. Allocation concealment is the method used to ensure that the recruiter has no knowledge of the allocation sequence. Allocation concealment can be achieved through using an independent party to undertake the random assignment e.g. telephone randomisation by an off-site office or through an automated process. Sealed consecutively numbered identical containers are also used for interventions such as drugs. Sealed opaque envelopes have also been used but candidates should be aware that these types of systems should be well monitored.

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

a) outlining of some of items included in the checklist and flow chart. Awareness that the statement relates to parallel group trials but has been extended for other types of trial designs e.g. cluster randomised trials and equivalence studies.

b) discussion about methods of restriction such as block randomisation, stratification or minimisation to achieve balance of numbers in study groups or balance in baseline characteristics and how unpredictability might be maintained when these methods are used.

c) Discussion about the need to ensure that the process of generation of the allocation schedule and the study enrolment process are clearly separated. Clarification of the difference between allocation concealment and blinding.

EXAMINERS' COMMENTS

This question was not well answered. This was disappointing given that the assessment of evidence on effectiveness is a critical public health skill. Relatively few candidates had a clear idea about the CONSORT statement –some confused it with protocol development, Cochrane reviews and ethical review. Most candidates understood about the benefits of randomisation. Many candidates failed to distinguish between allocation concealment and blinding and assumed that they were one and the same.

Question 3

Discuss the factors to be considered in deciding whether a population based vaccination programme should be introduced nationally in a named country. Illustrate your answer with reference to one or more specific infectious agents or communicable diseases.

KEY POINTS

Most or all of the following would be required for a pass:
The answer needs to be in an essay format and must include:

- Size of the problem through the epidemiology of infectious diseases. A significant health problem?
- Is a vaccine available which is safe and effective?
- Effectiveness of vaccination programmes in different age groups
- Experience of programmes in other countries of uptake, safety profile (often other countries have longer running programmes e.g. MMR, HPV)
- Identification of age groups for vaccination, e.g. children
- Availability of vaccines and vaccine delivery infrastructure.
- Costs-benefits of the vaccination programme.
- Consideration of best service to deliver (e.g. school based, primary care based, or other)
- Side effects of individual vaccination.
- Transport and storage of vaccines.
- Primary health care provision, particularly for children.
- Availability of trained professionals.
- Acceptability to public/parents.
- Awareness and education campaigns for public and health professionals.
- Surveillance of vaccine – preventable disease to monitor effectiveness of vaccine strategy.
- Implementation issues – training and informing, central funding, call recall or database issues, cold chain
- Mechanism for decision (e.g. a national or central committee who reviews evidence and makes decision and recommendations on implementation)

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

- Vaccination of ‘at risk’ groups. i.e. laboratory workers.
- Selective vaccination.
- Surveillance of adverse reactions.
- User/carer views (e.g. if older school age do they prefer to see primary care professionals or at school)
- Vaccine coverage.
- Consideration may be given to enhanced surveillance of disease being vaccinated against to determine efficacy of vaccination programme in the vaccinated population.

EXAMINERS’ COMMENTS

Many candidates answered this question reasonably well, covering factors relating to both epidemiological aspects and implementation, which as the key points show, were necessary to answer the question. Many candidates used the HPV vaccine as an example. Unfortunately some candidates who did so, went into far too much detail about cervical cancer, and missed key points. Candidates should be aware that examiners are looking for a reasonable number of key points, so should aim to be concise so that they can cover more points – ie breadth rather than depth is usually better – and this was the case in this question.

Question 4

Describe the principal elements of a hospital infection control service or programme in a specified type of hospital in a named country.

Key Points

- Aims and Functions of hospital infection control in specified hospital type e.g. acute and elective, in specified country
  - Surveillance, purpose and use of different types
  - outbreak investigation and control
  - prevention
- Staffing and other resources to support staff in the function (e.g. IT)
- Importance of hospital infection control committee and who should be on it
- Accountability structures and clinical governance
- Details about how infection is controlled in hospital, such as
  - development and implementation of policies and guidelines
  - teaching and training
  - advice to health professionals
  - hand washing
  - key advisors on cleaning and sterilisation of equipment
  - cleaning of hospital
  - structures e.g. isolation facilities
  - role of occupational health service and OH policies
  - role in prescribing of antibiotics
  - food hygiene/kitchens
  - audit
  - possible screening (e.g. MRSA) preoperatively for high risk interventions such as cardiac or other surgery
  - surveillance of alert organisms
- antimicrobial resistance
- understanding of some the major problem organisms e.g. MRSA, MDRTB, C Diff
- Liaison with relevant agencies/personnel e.g. public health professionals, microbiology, acute and community health professionals, specialist communicable disease agency's

The following additional points might improve the answer to 'good' or 'excellent':

- A structured answer e.g. use of structure/process/outcome model
- Demonstrated knowledge of the local implementation of national recommendations
- Discussion of the role of a hospital based infection control service in relation to the continuum of communicable disease and infection control in a geographically defined population of which hospital population is a part, Description of examples of good practice
- guidance on spongiform encephalopathies and use of disposable equipment
- Use of Service level agreements and contracts to ensure good infection control arrangements.
- Setting and achieving targets

EXAMINERS' COMMENTS

Good candidates covered both operational aspects (ie elements/ interventions included in an infection control service, the key organisms of concern and their control) and more strategic aspects – ie governance, targets, guidelines, policies. Candidates who scored low marks tended to focus on one aspect at the expense of the other.

Question 5

Compare and contrast the uses, strengths and limitations of the following tools in collecting health information:

a) Questionnaire surveys
b) National censuses

KEY POINTS
(Points marked * may indicate an excellent answer, if they are in additional to the basic answers)

* Well thought out answer that compares and contrasts the features of the two tools and that is precise, clear, comprehensive and well laid out with some use of examples.

a) QUESTIONNAIRES

Key features:
- Requires a sound choice of population and sample,
- Requires a reliable and valid instrument with appropriate questions - either pre-validated, open-ended or closed-ended
- Requires appropriate analysis, and accurate reporting of results

Uses:
- Patient satisfaction
- Service planning
- Research studies
- Lifestyle behaviour survey
- Information on many subjects
- Disease prevalence

Strengths:
- Flexible mode of administration e.g. face-to-face, telephone, postal, internet.
- Can be easy to administer
- Can be a cheap means of finding factual information
- Information can be sought on almost any topic
- Can use validated questionnaires e.g. SF-36 – standardised, reliable, valid
- Enables statistical analyses in greater depths compared to routinely available health data
- A computer could scan and generate the basic results

Limitations:
- Selection bias - may be difficult to find suitable sampling frame
- Potential for selection bias from failure to respond
- May be limited generalisability to wider population
- Poor validity, reliability and repeatability – depends on sampling, interpretation of questions and response
- Not easy to ensure appropriate questions e.g. closed/open, short, long, etc.
- Interviewer bias if administered face-to-face
- Questionnaire fatigue

b) NATIONAL CENSUS

Common key features:
- All people alive at the time of the census are counted.

- Usually organised through smaller areas – e.g. Enumeration Districts

Uses:
- Report on collected data analysis of population trends/long term illness/handicap/deprivation or associations
- Mapping
- Resource allocation – health and other services
- Provides denominator date for the calculation of various health indices e.g., mortality and incidence rates

Strengths:
- Amount of socio-economic data collected across entire country at one period of time and over time
- Comparisons - useful for health planning at national to post code level
- Information on migration
- Provides base-line information to plan services e.g. population, age groups, employment, ethnic groups
- Output and analyses can be disaggregated by smaller areas e.g. Output Areas.
- Confidential
- Information collected includes data on:
  - Living conditions – e.g. type of building, number of rooms, tenure, presence of amenities (bath, WC, CH, etc).
  - People in house - name, age, sex, birth place, marital status, usual address, relationship to head of household, country of birth, ethnic group, religion, employment, education occupation,
  - Health and provision of care – general health, long term illness, use of services

Limitations:
- Incomplete data e.g. very young infants, homeless, in-patients or living in other accommodation
- Accuracy is difficult to assess
- If done at long intervals data becomes out-of-date
- Time-lag to publication of the results of the census
- Seen as an intrusion of privacy by some, which may vary between different groups in one country, and may vary from country to country. This is also true for surveys.

***** Evidence of a compare-and-contrast approach.

EXAMINERS' COMMENTS

1. Few candidates made reference to "health information", which is clearly stated in the question.
2. Few mentioned sampling, sampling frame, data analysis and questionnaire validity.
3. Some candidates confused surveys with case control or cohort studies.
4. Some candidates included measurements and collection of biological samples; whereas the question asked about questionnaire surveys.

Question 6

One of your local Emergency Department physicians states that child accidents are more common in one part of your administrative area than another. What types of data are available to investigate this (in a named country of your choice) and what possible explanations could there be for the clinician's observation?

KEY POINTS
(Points marked * may indicate an excellent answer, if they are in additional to the basic answers)

Data sources:
- Death registrations (small numbers)
- Hospital admissions (should have ICD 'external cause' coded)
- Emergency Department attendance (cause not systematically collected)
- Vehicle accidents (can be obtained from police, but likely to be an underestimate)
- GP and primary care data (probably not systematically collected)
- Can compare to national accident surveillance data, if available
- * Ambulance service, fire service, poisons unit or coroner may hold records
- * District may have been included in national questionnaire or interview surveys

Explanation could be:
- Chance (is the difference statistically significant?)
- Bias (Is the area served by 2 departments or services with different policies?)
- Confounding (age or socio-economic structure of the population?)
- True difference
- * Difference may reflect service provision, e.g. availability of GPs. Could construct a proxy measure of severity, e.g. fractures.
- * If difference in under 5 year olds, may reflect less safe home conditions.
- * If difference in over 5 year olds, may reflect less safe traffic or playing conditions, or other environments like schools.

EXAMINERS' COMMENTS

1. Most have no problems with data sources although some candidates did not seem to understand death registration processes and the role of the coroner.
2. Many used the imprecise terms: artefact, blips, instead of bias, confounding and chance.
3. Many candidates answered the explanation part by quoting examples, not distinguishing them into bias or confounding – a 'non-epidemiological' approach to results.
4. Some candidates mentioned other relevant UK data sources such as HASS, LASS, RoSPA, NHS Direct and the local Child Death Overview Panel, and also explained the advantages of record-linking information from different sources.

Paper IB

Question 7

Write short notes on the following terms:

a. allocative efficiency

b. cost

c. health technology assessment

d. sensitivity analysis

(Marks to be split equally between all four sections)

A. Allocative efficiency

- Efficiency measures whether resources are being used to get the best value for money, and is concerned with the relation between inputs and outcomes.
- Allocative efficiency is a global measure of efficiency that allows different programmes, with different objectives (both health and non health related), and different outcomes, to be compared.
- It relates to the broader question of whether programmes are worthwhile per se, rather than the most efficient way of achieving a given health outcome.
- Questions of allocative efficiency are informed by cost benefit analysis, as this is broad in scope and allows all inputs and outcomes to be valued in monetary terms.
- Allocative efficiency is achieved when resources are allocated so as to maximize the welfare of the community.

Additional key points

- Allocative efficiency takes account both of productive efficiency – (the maximisation of health outcomes for a given cost – measured by cost effectiveness or cost utility analysis) and the efficiency with which these outcomes are distributed among the community.

B. Cost

- In economics, a cost is the value of money that has been used up to produce something, and hence is not available for use anymore. This is also known as the opportunity cost, and is the value of the best opportunity foregone as a result of engaging resources in an activity.

- There can be a cost without exchange of money, but these costs need to be quantified, for example, cost of pollution that society will have to pay for at some time in the future.

Costs may be differentiated as follows:

- Total costs - all costs incurred in the production of a set quantity of service.
- Average costs - equivalent to the average cost per unit; i.e., the total costs divided by the total number of units of production.
- Fixed costs - those costs which, within a short time span, do not vary with the quantity of production; e.g., heating and lighting.
- Variable costs - those costs which vary with the level of output and are proportional to quantities produced, e.g. fuel, power.
- Marginal cost - the change in total cost of producing one extra unit of a service. Also known as incremental cost.

In considering health problems, costs may be differentiated as follows:

- Direct costs - those costs borne by the healthcare system, community and patients' families in addressing the illness.
- Indirect costs - mainly productivity losses to society caused by the health problem or disease.
- Avoided costs - costs caused by a health problem or illness which are avoided by a health care intervention.

C. Health technology assessment (HTA)

- Health care technology covers a range of methods used to promote health, prevent and treat disease and to improve rehabilitation and long term care.
- These include drugs and vaccines; devices, medical and surgical procedures, screening, and settings of care and the systems within which health is protected and maintained.
- Technology assessment is a systematic study of the medical, social, ethical and economic implications of development, and diffusion of health technology.
- It aims to improve the quality and cost-effectiveness of healthcare by investigating whether the technology works, for whom, at what cost and how it compares to alternatives.
- HTA helps to inform policy decisions.
- Many countries have one or more structured HTA programmes and liaise through national and international databases and networks.
- Excellent answers will include examples from own or other countries.

D. Sensitivity analysis

- Sensitivity analysis is used to determine the robustness of the conclusions of an economic analysis or model.
- This is done by repeatedly running the model, while varying the underlying assumptions and the values used for the inputs and consequences, and examining the impact on the conclusions.

- Many inputs and consequences that need to be taken into account are very difficult, or even impossible to measure with a great deal of accuracy in the real world.
- A matrix of different parameter values can be created and allows the uncertainties associated with the valuing of inputs and consequences to be studied.
- Sensitivity analysis can therefore help to determine what level of accuracy is needed in estimating inputs and consequences, for a model or analysis to be sufficiently useful.
- Sensitivity analysis can also indicate which parameter values are reasonable to use in the model. If the model behaves as expected from real world observations, it gives some indication of face validity.

Excellent answers will include examples.

EXAMINERS' COMMENTS

This was a straightforward question with generally strong answers to sections on cost and sensitivity, although a number of candidates confused 'sensitivity analysis' with the screening concept of sensitivity. Discussion of allocative efficiency was rather mixed, with some candidates including a lot of irrelevant material. Answers to the section on Health Technology Assessment were less strong which was surprising.

Most candidates demonstrated little understanding of the development of HTA in the UK e.g. the HTA programme in the National Institute for Health Research, and did not clearly define the relationship between HTA and the health technology appraisal process of NICE.

Question 8

Describe the social and health needs of prisoners in a named country and why these needs are of relevance to the wider community.

Key Points

Number of people received into custody in any year is large.

Prisoners may belong to a 'hard to reach' group, and are at risk of re-offending. Prisoners may have primary care needs similar to those of the wider community but some health needs are untypical - they have a disproportionately high incidence of mental health problems, heavy alcohol use and drug misuse. They are also at greater risk of contracting communicable diseases such as Hepatitis B/C. Anxiety, depression and psychotic disorders common. Also suicides and incidents of deliberate self harm. The constraints of the prison environment to provide care may exacerbate health and social problems.

High proportion from socio-economically deprived backgrounds - an over-representation of unemployed and undereducated. Homelessness. Poor childhood experiences, with a high proportion having been in local authority care. Experience of stressful life events. Domestic violence especially relevant to women. Prisoners and their families may suffer victimisation and stigma. Families may reflect the same socio-economic disadvantage and the problems of separation from the prisoner.

Most prisoners are a transient population and return to the wider community with their social and health problems.

Increasing recognition being given to appropriate health needs assessment within the prison, with obvious advantages to the individual, family and community of such needs being resolved. May require the prison service responsible for custody and rehabilitation and health and social services available to the wider community to work together to meet the needs of prisoners and their families..

Socio-economic rehabilitation and rehabilitation of the prisoner within the family and the wider community needs special consideration.

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

Ethnic minorities over-represented in prisons in many countries. Need for better understanding of the basis for this and the specific health and social issues relating to ethnic minority prisoners.

Understanding of the organisation of prison health care and the need for better partnerships to develop a better understanding of "how to return to the community" and to avoid re-offending.

Problems occur with transfers of prisoners between prisons and delay in the transfer of medical records. This can lead to delay in, for example, completion of Hepatitis B immunisation.

EXAMINERS' COMMENTS

This was generally well answered and most candidates were able to list the health and social needs of prisoners. Weaker answers had a generic focus on 'needs' and seemed unaware of the existing knowledge base on prisoner health. The second part of the question on relevance to the wider community was less well considered.

Question 9

Describe how the organisation of the pre-hospital care of patients requiring emergency treatment could be better integrated with their subsequent care in hospital to achieve improved outcomes.

Key Points

1. **Describe the types of emergency case that may arise**
    a. Suspected medical, trauma and surgical emergencies - increasing speed of life-saving definitive treatment
        1. Take patient to emergency department for accurate diagnosis and early treatment
            i. Maternity cases (req emergency care- e.g. bleeds, pyrexia, preterm labour)
            ii. Any medical or surgical emergency e.g.
                1. Suspected heart attack cases
                2. Suspected meningococcal disease cases
                3. Leaking aortic aneurysms
            iii. Trauma- e.g. RTA, head and neck injuries
        2. Give treatment pre-hospital
        3. Transport to appropriate hospital with appropriate specialisms
    b. Mass casualties – need for triage
    c. Serious suspected communicable diseases such as acute respiratory distress syndrome / pandemic flu - assess and manage patients and avoid infection transmission
    d. Chemical incidents - assess and manage with potential for decontamination
    e. Life-threatening acute psychotic episodes - assess and manage patients in light of the law

2. **Describe the types of professional managing pre-hospital contact**
    a. Family doctor- in hours or out of hours
    b. Telephone helplines
    c. Ambulance staff
    d. Paramedic
    e. Nurse
    f. Social worker

3. **Describe the types of pre-hospital care**
    a. assess
    b. Treat appropriately
    c. Make patient comfortable
    d. Make patient and carer(s) aware of what is likely to happen next
    e. Transport safely and appropriately

4. **Describe the emergency care system**
    a. Treat emergency care organisation as a system covering and connecting key agencies and their staff
    b. Organisation of local health services to support emergency care (trauma centres, acute specialist facilities)
    c. Ensure clarity of the local organisation to all stakeholders

5. **Describe the importance of inter- and intra-agency training for all emergency care staff**
    a. Train staff to offer pre-hospital care
    b. Ensure only trained staff offer pre-hospital care

c. Knowing what to do in uncommon situations – training, exercises
d. Advanced life support, advanced trauma life support

6. Describe the importance of transport issues

a. Scoop and run versus treat in-situ
b. Reduce transport time – helicopters (sharing), numbers and locations of out-of-hours doctors, ambulances, paramedics, and fast-response vehicles
c. Urban-rural differences

7. Describe the importance of operating systems

a. Inter- and intra- agency common and shared protocols (esp. information sharing)
b. IT systems (show location of incident, common systems across agencies, common protocols)
c. Live linkages from pre-hospital setting to emergency department (telephone, investigations, pictures)
d. Communication systems (trained telephone operators)
e. Expert back-up and support

Bad fail: Two key points with no exposition of them
Borderline pass: Four key points and three of these with some exposition
Very good pass: Five key points with some exposition of all of them

EXAMINERS' COMMENTS

In general the question was answered poorly with many candidates knowing very little about how emergency care is organised. Many candidates did not answer the question set. They answered questions on the prevention of emergencies arising or the management of change. Very few candidates described the types of clinical activities comprising pre-hospital care.

The description of the types of cases arising was also poor. There was very little mention of acute mental health disorders, maternity cases, chemical incidents, communicable disease out breaks, or major incidents. Aspects of operating systems were generally mentioned. Matters missing from the original key points were the need for public and patient engagement and partnership.

Question 10

Describe the characteristics of an effective manager.

Key Points

1. Define a manager: one who achieves their objectives through 1) the organised actions /effort of subordinates, 2) the optimum use of the employing agency and partner agency systems and resources, 3) creating the right environment, organisation, and culture, 4) managing the local agency politics.
2. Has the required skills and knowledge of relevant subject area / policy field / context to do the job
3. Has leadership skills
   - 3.1 Vision
   - 3.2 Strategic thinker
   - 3.3 Inspirational communicator, able to motivate 'troops'
   - 3.4 Leads by example
   - 3.5 Accessible
   - 3.6 Approachable
   - 3.7 Clear grasp of objectives
   - 3.8 Delegates appropriately
   - 3.9 Visible
   - 3.10 Fair
   - 3.11 Integrity
   - 3.12 Good decision-making skills
   - 3.13 Evaluation skills
   - 3.14 Focus on outcomes and quality
4. Good verbal and written communication skills
5. Skilled at team building and development
   - 5.1 Empowers others to deliver
   - 5.2 Allows others to take credit
   - 5.3 Sets clear individual objectives
   - 5.4 Undertakes appraisal
   - 5.5 Manages conflict
   - 5.6 Selects staff appropriately
6. Skilled at interpersonal relationships
   - 6.1 Shows 'people skills'
   - 6.2 Gives regular and fair feedback
   - 6.3 Manages poor performance sensitively
   - 6.4 Rewards and celebrates achievement

6.5 Develops team members in appropriate areas

6.6 Coaching skills

6.7 Shows emotional intelligence

6.8 Good at office politics

6.9 Good at negotiating

7. Skilled at managing resources

7.1 Budget / financial management

8. Innovative and creative

9. Develops self

9.1 Manages time

9.2 Manages stress

9.3 Undertakes CPD

9.4 Uses IT appropriately

Bad fail: 2 key points with one of them with some exposition
Borderline pass: 5 key point with four of them with some exposition
Very good pass: 7 key points with six of them with some exposition

EXAMINERS' COMMENTS

This question was generally answered well, although some candidates had a tendency to liberally sprinkle their answer with management theory, sometimes divorced from any practical application. Very few candidates recognised the importance of subject knowledge, management and understanding of resources and self- development. Very few gave a good definition of 'effective management'. Recognition of interpersonal skills, team-building, communication skills and leadership was generally good.

Paper IIA

You are the public health advisor to a multidisciplinary group planning community health and social services for the elderly in a city with a total population of 500,000. The planning group has asked for your evaluation of a recent report on the cost-effectiveness of community-based occupational therapy for older people with dementia:

Maud J L Graff, Eddy M M Adang, Myrra J M Vernooij-Dassen, Joost Dekker, L Jönsson, Marjolein Thijssen, Willibrord H L Hoefnagels, and Marcel G M Olde Rikkert. *Community occupational therapy for older patients with dementia and their care givers: cost effectiveness study.* BMJ, Jan 2008; 336: 134 - 138; doi:10.1136/bmj.39408.481898.BE

1. Write a critical appraisal of this paper. (40% of marks)

2. The authors state (in the longer version of the paper) that the costs of "informal care" were estimated as follows: "A price for care giving in general is computed based on hours of absence because of care giving or illnesses of the care givers and which is valued at an hourly wage of a middle aged cleaning person of £6 (US$12) an hour." Discuss the assumptions underlying this method of estimation, and its implications for the conclusions drawn by the authors for the Dutch population. (10% of marks)

3. Outline the additional local information that you would require to inform a decision by your planning group about whether to introduce community occupational therapy services for patients with dementia in your city (in a named country of your choice). (20% of marks)

4. Write a briefing paper of 500 words for consideration by the planning group. (30% of marks)

Key Points

Q1. Critical appraisal (40% of marks)

Candidates will be expected to cover the following:

Importance of question

- Nature of dementia as a public health issue i.e. prevalence of dementia in aging populations - Netherlands specifically, but other countries including UK or named other home country
- Important role of care givers
- Potential for intervention; evidence of occupational therapy,
- Added value of this study: societal perspective of cost effectiveness

Study design

- PICO framework
- Single blind randomised controlled trial with cost effectiveness analysis- i.e. experimental; therefore appropriate for evaluation of cost effectiveness of occupational therapy compared with 'usual care' in improving daily functioning and competence of caregivers among patients with mild to moderate dementia
- With follow up after 3months

Single centre, would need to extend to multi-centred study to evaluate whether intervention is cost-effective in different settings.

Study population
65 or over diagnosed with mild to moderate dementia in community with a primary care giver (care at least once a week), recruited from memory clinic and day clinic of geriatric dept. Randomisation to intervention and control groups ; stratification by mild or moderate dementia. Authors state baseline analysis of characteristics showed well matched

Intervention/Control
Specify what the 'intervention group' consists of (sessions of occupational therapy at home held over a 5-week period for patients and care givers) and what the 'control group' consists of (usual care with no additional therapy). Single blind means assessors only were blinded (not patients). Assessors maintained blind in 80% of cases, so observer bias does not significantly affect the results.

Outcomes
- Describe outcomes of interest: primary outcome measure for patients was daily functioning (two scales scores) and for carers sense of competence scale scores. All primary outcomes then combined in one measure. (Assume -use of valuated measurement instruments?)
- Specification of what effect judged as 'successful', (reference to other studies but not explained).

Analysis
Cost analysis
- Description of cost analysis to evaluate cost from the societal point of view both direct and indirect costs were included.
- Use of validated instruments? diary / various national guidelines for cost measurement
- Calculation of incremental cost effectiveness ratio –total costs per successful treatment
- Sensitivity analysis conducted

Explain 'intention to treat' analysis (refers to all 132 patients-carer pairs, not only to the 105 pairs still in the study at the end of the three months, rationale: not to break randomisation)
Covariates were age, sex, relationship between patient and care giver, other care givers, and baseline scores for cognitive functioning, depression, comorbidity, behaviour and behavioural problem checklist and the outcome variable
The authors elaborate their conclusion about cost-effectiveness in the form of an acceptability curve or willingness-to-pay analysis. Essentially this is a restatement of the confidence interval around the cost differential, which is appropriate if there are alternative uses for the resource usage implied by the "cost". Candidates may be expected to explain the concepts of willingness to pay and opportunity cost even though the details of the analysis are not shown in this shortened paper.

Results
- Key points tables 1&2
- Significant differences between the C&I groups on all primary outcome variables
- Number needed to treat for a successful treatment outcome was 2.8 (95% CI 2.7-2.9)- explanation of what this means
- Average cost savings of Euro 1473 per couple successfully treated with OT (primarily reduced informal care in the intervention group)

Whereas for the assessment of clinical effectiveness, it is usual to demand significant departure from the null hypothesis (ie. confidence interval excluding no effect), for choices between treatment or policy options on grounds of cost (for options of equal effectiveness) it is sufficient to assess whether the intervention is more likely than not to reduce costs. Candidates who draw this important distinction should be given good credit.

There is ambiguity in the paper about when the costs are being calculated per patient-caregiver couple, and when the costs are per successful treatment. The calculation of Euro 1748 (£1279) per couple successfully treated ("costs", para 2) is not consistent with table 1, where the same cost

differential is shown, for cost per patient averaged across all patients in each group (of whom less than half in the OT group were successfully treated). The acceptability analysis seems to have been based on costs per successful treatment but these calculations are not detailed in this shortened paper (nor indeed in the longer version), so can't be checked.

In the discussion, the summary of results states that OT saved on average Euro 1748 over three months "with a probability of 95%". This last bit is not consistent with the 95%CI shown in table 1, which overlaps zero. There seems to be confusion here between the idea of a confidence interval and the different concept of a probability that the saving is greater than a certain threshold (whether based on all patients or on successful treatments).

Conclusion

- The authors conclude in their abstract and conclusions that the intervention is "successful and cost-effective". Candidates should be expected to critically evaluate that conclusion.

- Certainly this single-blind trial of relatively short duration provides evidence that the OT intervention is effective (at least as judged by the 3-dimensional outcome measure of "successful outcome"). All but one of the successful interventions occurred in the intervention group, and the confidence interval for the difference excludes zero by a wide margin (table 2). This is encouraging, and justifies the derivation of the NNT (which is also encouraging), but raises the question of cost-effectiveness.

- In contrast, the difference in "total care costs" in table 1 is not statistically significant (95%CI includes zero). It is not clear from the paper whether the "total care costs" include the costs of the OT intervention (which are listed separately in table 1). However, even on the more generous assumption that the total cost includes the intervention cost, it is not unequivocal that costs are reduced by the intervention. Obviously, if the intervention costs are not included in the "total care costs" (which by implication from table 1 they are not), then the cost differential is reduced, although still (on average) favourable to the intervention group, by some 565 Euros.

Strengths and limitations discussed by authors

- Use of successful treatment outcome, but not QALY-basis for comparison of cost effectiveness with other interventions
- Short follow up of 3 months-reference to one other study and assumption at six months savings would be greater and no more costs?
- Study population not representative of dementia population (i.e. subgroup)
- Acknowledge other value could have been assigned to care givers (i.e. not retired) (could have done sensitivity analysis); also assumption same effect using professional home care worker ?

Q2. Assumptions-method of estimation (10% of marks)

The assumption used to calculate the price for care giving was based on a low hourly wage, £6, which is around the minimum wage in UK. With the majority of care givers retired, i.e. spouses of the patients then this computation is likely plausible. If carers had been younger, in employment (i.e. sons and daughters of patients) then the authors might have underestimated their cost.

The generalisability of these estimates will be influenced by differences in health/social care/welfare system between Netherlands and other countries; different family structures/social norms and attitudes, role of carers etc.

Q3. Other information (20% of marks)

Candidates will demonstrate understanding of how to assess the generablisability of the findings (i.e. external validity of findings) to their specific context, and its potential role and likely effectiveness in the context the local overall strategy for dementia.

A/B candidates would refer to the following range information (most or all) as a minimum:

- Comparison of local elderly population with the study population (mild to moderate dementia): prevalence of dementia (mild to moderate dementia), and additional demographic (e.g. age profile and trends), socio economic and ethnic characteristics (including specific factors influencing risk and vulnerability such as those living alone, characteristics of carers).
- Range of dementia services and interventions; and current pattern of use and performance (process and outcome measures) against defined standards /targets. This would include specific information in relation to the role, performance and capacity of the local community occupational services with respect to dementia.

Candidates should discuss the range of sources of above data and required analyses: including:

- Use routine data sources – for the elderly with dementia by services for elderly with mild to moderate dementia (geriatrics, primary care, social services)
- Any local specific audit, review and research studies with respect to dementia
- Possible need for specific survey/ audit/review exercise
- Systemic review evidence of effectiveness and cost effectiveness for elderly with dementia (NICE, Cochrane)
- Sources of national guidance including good practice standards (especially for elderly, mental health);
- National /regional comparative (benchmarking) information against standards/targets

Candidates would show basic level of understanding of types of information and how it might be accessed and analysed

Q4. Briefing paper for multi disciplinary planning group (30% of marks)

Answers would cover the following points:

- The importance of the study-in highlighting the cost effectiveness of community occupational therapy in improving outcomes for elderly with mild to moderate dementia and their carers.
- Summarise the key findings of the study
- Comment on the strengths and weaknesses of the study
- Comment on generalisability of the findings to your local population (500,000) /country
- Data available on numbers and prevalence of elderly with mild dementia with carers (and their characteristics) and mild dementia living alone receiving
- Current services provision and costs /and performance (reference to any local /national audit/reviews)
- A/B candidates might apply the study results to estimate numbers to treat to achieve cost effectiveness (assuming study conditions apply)

Then comment on any specific features of the populations in your areas or service provision that suggest the community occupational therapy service that would influence the role and impact.

EXAMINERS' COMMENTS

Q1 The majority of candidates correctly concluded that the paper does not clearly justify the conclusions drawn by the Authors that the intervention is successful and cost-effective. A large proportion of candidates provided a well-organised critical appraisal answer. The interpretation of results re cost effectiveness was somewhat more limited. Overall, candidates need to demonstrate

clear understanding and interpretation of results presented in the paper, ie. more careful attention to the meaning of the indicators used eg. number needed to treat etc; and confidence of results, with specific reference to tables, range of confidence intervals and inclusion or not of 0. .

Q2. Generally candidates' answers were partial. Sources of under/overestimation were often identified but few were fully able to correctly comment on the implications for the results on cost effectiveness.

Q3 Most candidates were able to correctly identify the type of information needed, however they were not able to pinpoint the source of information specific for their context. Candidates who adopted a more structured approach to identifying types of information scored more highly, ie. categorised information in terms of population need; assessment of current pattern of service (including OTservice); resource/ cost effectiveness issues and other sources of evidence.

Q4 The quality of report was very dependent on the quality of the initial critical appraisal Q1. ie. ability to provide clear comment and recommendations relating to relevance of the study; and suggest/questioning of findings as basis of action

Paper IIB

Anaphylaxis (anaphylactic reaction or anaphylactic shock) is a generalised allergic reaction of sudden onset that can be fatal if not treated urgently with an adrenaline injection, which can be self-administered. There are no other licensed indications for prescription of adrenaline for self-injection in the community setting.

Following the sudden death of the daughter of a celebrity football player, which was widely publicised and attributed to an anaphylactic reaction, you have been approached by the chief executive officer (CEO) of a national charity to assist with the preparation of a report documenting the public health burden of allergic disease, with particular reference to anaphylaxis.

The CEO draws to your attention a recent review article (Sheikh et al, JRSM 2008;101:139-143) which reports that "*an estimated 1 in 1,333 of the English population have at some point in their lives experienced anaphylaxis*". This estimate was based on aggregated data from electronic primary care records of 9 million patients (about 18% of the population of England).

The following estimates of incidence and lifetime prevalence were derived from this large primary care database, and compared to the numbers of primary care prescriptions for pre-loaded adrenaline syringes throughout England over five years:

Table 1

Year	Age-sex-standardised incidence per 100,000 person-years (95% CI)	Age-sex-standardised lifetime prevalence per 100,000 patients (95% CI)	Adrenaline prescriptions in England per year
2001	6.7 (5.7 - 7.7)	50.0 (47.5 - 52.7)	10,700
2002	6.6 (5.7 - 7.6)	55.9 (53.3 - 58.7)	12,600
2003	6.8 (5.9 - 7.9)	61.8 (59.0 - 64.7)	13,300
2004	8.5 (7.5 - 9.6)	68.5 (65.6 - 71.6)	16,200
2005	7.9 (7.0 - 9.0)	75.5 (72.4 - 78.7)	21,100

Q1. How can annual incidence and lifetime prevalence be estimated from primary care records? Comment on the validity of such estimates.
[20% of marks]

Q2. What assumptions have the authors made in estimating that "*1 in 1,333 of the English population have at some point in their lives experienced anaphylaxis"*?
[10% of marks]

Q3. Describe and interpret the time trends, from 2001 to 2005, in age-sex-standardised incidence and in age-sex-standardised lifetime prevalence. Comment on the statistical significance of these trends.
[20% of marks]

A review of hospital admission data for England (Gupta et al, BMJ 2003;327:1142-5) reported the following relative increases in age-sex-standardised hospital admission rates nationally during the 1990s:

Table 2

	Relative increase, 2000-1 v 1990-1 (95%CI)
Anaphylaxis	7.5 (6.6 - 8.6)
Angio-oedema*	1.7 (1.5 - 1.9)
Urticaria*	2.2 (2.1 - 2.4)
Food allergy	5.8 (5.1 - 6.8)

(* Angio-oedema and urticaria are more localised manifestations of an acute allergic reaction)

Q4. Outline possible reasons for the increase in hospital admission rates for anaphylaxis during the 1990s.
[10% of marks]

Evidence from primary care records is not available prior to 2001, but over the period 1991 to 2001, there was an eight-fold increase in numbers of community prescriptions for adrenaline throughout England.

Q5. Interpret the trends in adrenaline prescriptions nationally from 1991 to 2005, in the context of the trends in general practice data (table 1) and hospital admission rates (table 2).
[10% of marks]

Q6. Write a 500-word section for inclusion in the charity's report which will be targeted at national health service planners. The CEO has requested that your contribution should summarise and interpret the routinely available data and comment on its implications for the planning of allergy services and the prevention of deaths from anaphylaxis.
[30% of marks]

Key Points

Q1. How can annual incidence and lifetime prevalence be estimated from primary care records? Comment on the validity of such estimates. [20% of marks]

Annual incidence- Can be defined as incidence (persons) – based on new cases – or incidence (spells) – based on episodes of illness. For anaphylaxis, either would be appropriate.

From primary/secondary care source- Episodes defined by primary care contacts/consultations - could use paper or computer records, prescriptions, visits to nurse. New cases – would require longitudinal data linkage, eg. review of entire patient record.

Population- registered patients or catchment population

Lifetime prevalence

Definition of lifetime prevalence (The total number of persons known to have had the disease (or attribute) for a part of their life). Due to its life-threatening nature, anaphylaxis is a condition that is likely to be noted on the medical record.

Need number of cases over population. Could do a cross sectional study of cases in different age groups, or look back over lifetime consultation records, though may have to take into account people moving practices with latter approach.

Validity of cases- depends on person recognising that they are unwell, seeking medical help, health care worker making the diagnosis & recording it. Mild cases may be unrecognised or self-treated. Need for standardised case definition.

Severe cases may be admitted directly to hospital or may be fatal so may not appear in primary care or equivalent records.

Validity of population at risk- migration to and from population, differences in death rates over time (does lifetime prevalence data actually reflect this if do a cross sectional study). Can data from population in study be extrapolated to other populations- differences in socio economic status, ethnicity, migration etc.

As treatment improves then survival of affected individuals increases and lifetime prevalence increases.

Q2. What assumptions have the authors made in estimating that "1 in 1,333 of the English population have at some point in their lives experienced anaphylaxis"? [10% of marks]

It assumes that data (18% of UK population) from GP practices in study is representative of other populations- are there differences in socio economic status, ethnicity, migration etc? In addition, how was the lifetime risk estimated- is it an accurate measure?

Also assumes that case definitions used, diagnostic criteria and diagnostic accuracy in study group is representative of all GP practices or populations studied.

Q3. Describe and interpret the time trends, from 2001 to 2005, in age-sex-standardised incidence and in age-sex-standardised lifetime prevalence. Comment on the statistical significance of these trends. [20% of marks]

Incidence increases from 2001-3 to 2004 and then reduces slightly in 2005. Is this fluctuation real or just a 'blip'- would need data from further years to interpret. Changes in incidence, even if real, are less marked in relative terms than changes in prevalence.

Prevalence- increases by 50% between 2001 and 2005. Confidence intervals imply that this increase in prevalence is statistically significant.

Interpretation- Some of the increase in prevalence may be due to increased incidence. In addition, the disease, although life threatening, is being successfully treated over time with more people surviving over time, which is reflected in adrenaline prescriptions (though not rate data, see below).

Statistical significance- For the age-sex-standardised incidence data, the confidence intervals overlap and therefore the differences between time intervals are not statistically significant. For the age-sex-standardised lifetime prevalence data, the confidence intervals do not overlap and therefore the differences between time intervals are statistically significant.

Q4. Outline possible reasons for the increase in hospital admission rates for anaphylaxis during the 1990s. [10% of marks]

Reasons for increase could be due to:-
Real increase- reflecting a true rise incidence in the population, which is correctly being identified. May reflect an increase in food exposure and allergies, which also rose 5-6 fold.

A description of theoretical explanations for a real increase in incidence e.g. increase exposure-environmental triggers (peanuts, foods, latex), immunological exposure in childhood etc and increased susceptibility or a combination of these.

Bias- increased awareness of disease and concern has led to more recognition and more hospital admissions for the condition, which previously would not have been admitted to hospital.

Establishment of specialist allergy and clinical immunology services has increased recognition and "created demand" for inpatient services.

Confounding- anaphylaxis is actually a symptom of another disease, which is increasing.

Chance- chance increase, though this explanation does not appear likely.

Increased survival of severe cases due to improved diagnosis and treatment may have resulted in more admissions from this group of patients.

Q5. Interpret the trends in adrenaline prescriptions nationally from 1991 to 2005, in the context of the trends in general practice data (table 1) and hospital admission rates (table 2). [10% of marks]

Adrenaline prescriptions increased 8 fold in the 1990s and 2 fold over 2001 to 2005. Data are absolute numbers so to interpret fully we would need to know the denominator population. If one assumes that denominator has remained approximately steady over time, as incidence of anaphylaxis has increased over time so has prescription of adrenaline, which has resulted in reduced deaths and so an increase in lifetime prevalence. In addition, because of the increase of those with severe anaphylaxis surviving, there are more admissions to hospital due to complications in later years.

Some of the increase in prescriptions may be due to better use of effective therapy in the at risk population i.e. more prescriptions per case, rather than more cases. This may reflect better overall management of the condition in primary care.

Q6. Write a 500-word section for inclusion in the charity's report which will be targeted at national health service planners. The CEO has requested that your contribution should summarise and interpret the routinely available data and comment on its implications for the planning of allergy services and the prevention of deaths from anaphylaxis. [30% of marks]

Although the paper refers to GPs, which are UK specific, the examiners note that the report can be based on the local system known to those taking the exam.

Summary of issue

Recommendations

Should include:
epidemiology and trends in disease
comment on quality and availability of data
current and future impact on services
consideration of costs and benefits

Should be appropriate for target audience (Health Service Planners)

Should be legible, concise and focussed.

EXAMINERS' COMMENTS

A small number of candidates answered very well but in general the quality of responses to a relatively straightforward question was disappointing. Many candidates failed to adequately address the question or only answered part of the question asked. For example when asked to

interpret statistical data, some candidates merely described the data and offered no insights into their meaning.

Many candidates failed to demonstrate understanding of basic statistical and epidemiological concepts such as confidence intervals, prevalence and incidence.

The quality of report writing was generally poor. Many candidates did not provide a structured report and did not target the appropriate audience. The quality of grammar and presentation was generally poor.