

Trial Test Paper 2 -June 2019**Instructions**

Do not open this test booklet until you are told to do so. There is one correct answer for each question.

You must answer each question by putting a circle around the correct letter, A, B, C, D or E on the ANSWER SHEET.

There are four parts and 22 questions.

Please be aware that in the February 14th test, this part will be made of 30 questions to be answered in 60 minutes.

The February 14th test will be computer based.

Part 1

You are going to read an article about the measles vaccination. For **questions 1–4**, choose the answer (**A, B, C, D** or **E**) which fits best according to the text.

Measles vaccination

The Centre for Disease Control (CDC) estimates that measles antibodies develop in approximately 95 percent of children vaccinated at 12 months and 98 percent of children vaccinated at 15 months or older. It is estimated that about two to five percent of children, who receive the vaccine at 12 months of age or younger or who only get one dose of Measles Mumps and Rubella vaccine (MMR), fail to be protected. A second dose of MMR is thought to stimulate a protective immune response in about 99 percent of vaccine recipients.

Following the introduction of the measles vaccine in 1963, until December of 1989, public health officials recommended only one dose of measles vaccine for all children. However, by 1989, following multiple outbreaks, including several occurring in fully vaccinated populations, the CDC's Advisory Committee on Immunization Practices (ACIP) updated its measles vaccination recommendation, and recommended that a second dose of measles vaccine, preferably the MMR vaccine, be administered to all children prior to school entry.

Currently the CDC states that vaccine-induced immunity "appears to be long-term and probably lifelong in most persons". However, studies have shown that vaccine failure due to diminishing immunity can occur. In 2015, infectious disease experts reported that approximately one in ten measles-vaccinated individuals may be at risk of measles due to **this effect**. In 2011, news reports from India publicly stated that only one child in five vaccinated for measles was actually protected from getting the disease, even after being fully vaccinated. Measles vaccine-acquired immunity is reported to wane in at least five percent of cases, within 10 to 15 years after vaccination. Outbreaks of measles can still occur in highly vaccinated populations. In 2017, an outbreak of measles occurred among young soldiers in Israel. The primary patient involved in the outbreak had documentation of having received three doses of measles vaccine and the additional eight cases of measles were found to have occurred in persons who reported having, or provided documentation of having, at least two doses of a measles-containing vaccine.

The use of a third MMR vaccine dose to boost low measles vaccine-induced antibodies also does not appear to be effective. A recent study found that administering an additional dose of MMR vaccine in an attempt to boost antibodies in persons found to have low vaccine-induced measles antibodies was ineffective, leaving this particular population at risk for developing measles infection.

According to the Merck product information insert, there is some evidence that if infants born to mothers who have experienced natural measles infection, are vaccinated at less than one year of age, they may not develop long-lasting vaccine-acquired antibodies because natural maternal antibodies interfere with vaccine-induced antibodies. Research on maternal antibodies has also found that infants born to mothers who were vaccinated

against measles had lower levels of maternal antibodies and lost them sooner in comparison to infants born to mothers who had developed natural immunity from prior infection. As a result, babies born to vaccinated mothers may be at a greater risk of developing measles due to the poor quality and short duration of maternal antibodies. The number of vaccinated people infected with measles and who show few or no symptoms but transmit measles to others is also unknown as vaccinated individuals are not routinely surveyed to determine whether they are experiencing asymptomatic or atypical measles and transmitting it to others. As well, researchers have found exposure to natural measles to be necessary for the maintenance of protective antibodies in vaccinated persons.

<https://www.nvic.org/vaccines-and-diseases/measles/measles-vaccine-effectiveness.aspx>

1. Which statement most accurately expresses the main conclusion of paragraphs 1 and 2?
 - A) The measles vaccine was unsuccessful until a second dose of the vaccine was introduced.
 - B) A single dose of the measles vaccine was shown to be successful in up to 99% of all cases.
 - C) The measles vaccine and subsequent reviews of its effect on the population have resulted in up to 99% of recipients developing measles antibodies.
 - D) The CDC changed its guidelines on the number of doses needed to stimulate an immune response in up to 95% of pre-school children.
 - E) Children who are vaccinated before the age of 12 months are unable to develop measles antibodies.

2. What is the author's main point in paragraph 3?
 - A) Immunity to measles can decrease over time in more people than expected by the CDC.
 - B) In order to have life-long immunity to measles, you need to take three doses of measles vaccine.
 - C) In 2011, in India, children were not vaccinated properly, as a consequence only 20% of them were actually protected against measles.
 - D) Soldiers in Israel must have documentation to show that they have been vaccinated against measles at least three times
 - E) Measles outbreaks can occur only if the population is not completely vaccinated.

3. What is **this effect** in paragraph 3?

- A) a reduction in the overall number of children vaccinated
- B) an increase in support for anti-vaccine campaigns
- C) a decrease in the effectiveness of the measles vaccine
- D) a lack of records about whether people have been vaccinated
- E) a relatively low level of vaccine use, particularly in India

4. Using information in paragraphs 4 and 5, choose the correct option to complete this statement:

Research based on the hypothesis that natural maternal antibodies interfere with vaccine-induced antibodies indicates that infants vaccinated under 12 months

- A) may lose their long-term resistance to measles.
- B) were less likely to develop measles if their mothers had been vaccinated.
- C) would benefit from a third MMR booster.
- D) had low levels of maternal antibodies.
- E) kept their maternal antibodies longer if their mothers had been vaccinated.

Part 2

You are going to read an article about navigation in young fish. For **questions 5–9**, choose the answer (**A**, **B**, **C**, or **D**) which fits best according to the text.

Navigation in young coral reef fish

Like many aquatic organisms, coral reef fish show a dual life stage, where adults produce larvae which then disperse. At hatching, planktonic larvae drift away from the reef to spend a species-dependent time, known as larval dispersal duration, in the open ocean – probably to avoid high predation in the reef. These millimetre-sized larvae quickly (within a few days of dispersal) turn into relatively powerful juvenile swimmers, reaching swimming speeds of several centimetres per second.

Until recently, the distribution and settlement of coral reef fish were assumed to be purely driven by currents and unpredictable storm events. However, the persistence of marine populations at small isolated oceanic islands requires that a significant number of juveniles return to their place of birth, or natal habitat, after their initial dispersal phase. Here, and even in less isolated habitats, natal homing has been assumed to be far greater than purely planktonic dispersal would predict from modelling approaches.

Mark-recapture studies, tagging and microchemistry studies have confirmed natal homing of coral fish species including clownfish juveniles. Genetic analysis has been used to demonstrate that up to 60% of juvenile cardinalfish, could be assigned to the adult reef population where they were about to settle. As it is not possible to track larvae in the ocean, dispersal distances are based on catching larvae and by modelling approaches using the pelagic larval duration as a proxy. Dispersal distances of coral reef fish larvae are assumed to be shorter than 150 km depending on the species. Despite a potentially wide distribution, the number of homing coral reef fish juveniles is far higher than expected by random movement. Orientation capabilities could help them to find their way back to their natal reefs.

Finding the way back to a natal reef, river or beach after week- or year-long dispersal might require a learning and memory process involving time-dependent specific parameters of this natal place. For orientation-guided homing to natal reefs, coral reef fish larvae must remember sensory parameters that they experienced directly after hatching, which is the only time in which they can obtain reliable 'home cues', as larvae – with fully developed olfactory and visual sensory systems – start dispersing into the open ocean on the night of hatching.

To explain navigation over long distances, there is evidence that the juvenile cardinalfish can use sun compass orientation during the day and a magnetic compass at night. For orientation at closer distances, there is evidence that reef fish larvae can also respond to acoustic cues for orientation. Additionally, the pronounced importance of olfaction in the homing of coral reef fish larvae has recently been documented. Coral reef fish were shown

to prefer the smell of water collected from a reef to that of open ocean water. The fish were capable of distinguishing between chemical cues from reefs within one reef group and preferred the smell of water from the reef where they were caught over that of other nearby reefs. This further demonstrated that the preference for home reef odour did not switch even when larvae were exposed to other reef odours for several days. Therefore, it can be concluded that coral reef fish larvae had olfactory cues of their home reefs imprinted on them, similar to the well-known olfactory imprinting of chemical cues of natal rivers on salmon. However, the robust experimental manipulations that demonstrate an ability of reef fish to make use of odours in a similar way to salmon have yet to be performed.

https://jeb.biologists.org/content/222/Suppl_1/jeb189746

5. The variation in time spent away from the reef by fish larvae is known as the
 - A) dual life stage.
 - B) larval dispersal duration.
 - C) pelagic dispersal phase.
 - D) species-dependent time.

6. The distribution and location of coral fish has been shown to be affected by
 - A) currents and storms.
 - B) natal homing.
 - C) predators.
 - D) planktonic dispersal.

7. The proportion of coral fish returning to the reef where they hatched has been quantified using
 - A) genetic analysis.
 - B) modelling approaches
 - C) mark-recapture studies.
 - D) microchemistry studies.

8. The ability of juvenile fish to return to the reef where they hatched is dependent on
 - A) the species of fish.
 - B) remembering sensory cues.
 - C) the speed they swim.
 - D) the distance to the reef.

9. Further research is required to show how coral reef fish

- A) disperse after hatching.
- B) navigate at night.
- C) recall sensory parameters.
- D) use acoustic cues.

Part 3

You are going to read an article about the impact of hospital design on dementia patients. For **questions 10–17**, choose the answer (**A, B, C or D**) which fits best according to the text.

The impact of hospital design on dementia patients

Hospitalisation is hazardous for frail older people and particularly for those with dementia, and hospital design may influence clinical outcomes of acutely ill frail patients. Dementia-friendly environments have been proposed to promote patient well-being, mobility, independence, and meaningful interaction with other patients, staff and family members. Hospitalisation is associated with higher adverse outcomes for those with dementia, who are at a 2.5 times higher risk of inpatient falls (IF). Another recent study reported a higher incidence of such falls in dementia patients occupying single rooms as compared to those in traditional multi-bed wards (MBWs). Furthermore, for people with dementia, the risk of sustaining a serious injury following a fall is three times higher than amongst fallers with no dementia.

Most studies of hospital environments have centred on issues such as patient satisfaction, quality of sleep, privacy, and dignity. Few have sought to empirically address the impact of hospital design on patient safety and clinical outcomes. Although some studies have reported a higher incidence of IF and other associated adverse outcomes in single rooms, and nursing staff do express concerns over loss of wider patient surveillance, **others** have found that a majority of patients express a preference for private rooms. Other literature has focused on the effect of single rooms in acute settings, predominantly addressing the impact on younger patients and those without cognitive impairment. There is very little literature, however, concentrating specifically on the impact of ward environments on outcomes for acutely unwell frail, older patients with dementia, many of whom have prolonged hospital stays due to acute illness.

The aims of a new study undertaken in South Wales were to broadly describe acutely unwell patients with dementia admitted to two different hospitals environments — single rooms and traditional MBWs — and to study the clinical outcomes and predictors of adverse outcomes in these two environments. A total of fifty patients were observed at two hospitals. Most of these (73%) were admitted from their own homes, whilst others were admitted from residential care homes (17%). Significantly more patients in single rooms (88%) were admitted from their own homes compared to those in MBWs (58%) and they also had significantly better levels of independence as measured by pre-admission BI. Besides the source of admission, however, there were no significant differences in baseline characteristics of acutely unwell patients with dementia admitted either to single rooms or MBWs.

In this study, it was observed that acutely unwell older people with dementia admitted to single rooms and MBWs had a largely similar demographic profile and clinical characteristics. The reasons for acute admission varied widely, though falls were the most common reason for admission to both sites. Sepsis, urinary tract infections, loss of

consciousness, and confusion were other common presenting complaints. However, acute patients with dementia admitted to single rooms had a significantly longer length of stay (62.23%) than those admitted to traditional MBWs (42.47%). Besides this, no other significant differences were observed in clinical outcomes between patients in single rooms and those in MBWs. This study builds upon similar findings reported in a previous one, which attributed such **discrepancies** to a higher incidence of IF in patients with dementia in single rooms.

Interestingly, no significant difference was found in the incidence of IF between single rooms and MBWs. This could be due to the introduction of quality initiatives to minimise inpatient falls in single rooms. A systematic nurse training programme on the understanding and correct use of existing multifactorial falls risk assessment (FRA) tools in the single-room hospital has demonstrated a significant and sustained reduction in the mean incidence of IF. Similar rates of IF between single rooms and MBWs may therefore be looked upon in an encouraging light.

The study focused on the impact of hospital environments on quantitative, measurable clinical outcomes. As such, the researchers did not explore the experiences of older people with dementia in single rooms. In light of the reduced social interaction and relative isolation reported by some older adults in single rooms, it is possible that some older people with dementia may not always feel they benefitted from single-room hospital accommodation, even where this was their preference. This is a point which could have been investigated further because various personal, cultural, socioeconomic, and medical factors may affect preferences.

This observational study suggests hospital environments may affect clinical outcomes, with a significantly higher length of stay for acutely unwell patients with dementia admitted to single rooms as compared to those in MBWs. However, no other significant differences were observed in clinical outcomes in terms of inpatient mortality, inpatient falls, discharge to a new care home, or thirty-day readmission. The study considered potential confounding factors such as age, delirium, pain on admission, depression, and severity of dementia, but found no significant association. It did, however, observe associations between length of stay and advancing age. Further study to explain this is also warranted.

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10. In the first paragraph, what point is made about the falls risk of patients with dementia?
- A) It is easier to manage in specialist wards.
 - B) It can be higher if there is a history of similar events.
 - C) It may be reduced if they are made more aware of it.
 - D) It is greater than that of the general hospital population.
11. The writer feels that research into hospital design tends to focus on
- A) patient attitudes towards it.
 - B) the implications for staffing levels.
 - C) how well it caters for patients of different ages.
 - D) the needs of patients facing long-term hospitalisation.
12. What does the word others in the second paragraph refer to?
- A) research studies
 - B) adverse outcomes
 - C) the majority of patients
 - D) concerns expressed by nurses
13. In the South Wales study, patients admitted from residential care homes were
- A) at a more advanced stage of dementia.
 - B) less likely to be accommodated in single rooms.
 - C) more interested in their immediate environment.
 - D) no less independent according to standard measures.
14. The discrepancies referred to in the fourth paragraph involve
- A) different reasons for acute admission.
 - B) variations in how long patients remained in hospital.
 - C) the higher number of falls amongst certain patients in the study.
 - D) the proportion of patients in the different types of accommodation.

15. What does the writer find encouraging about the findings of the South Wales study?

- A) A training initiative seems to have been effective.
- B) Certain wrong assumptions have now been corrected.
- C) Recommendations of a previous study have been followed.
- D) A downward trend in the number of falls has been confirmed.

16. In the sixth paragraph, the writer suggests that the South Wales study should have

- A) taken more account of the opinions of patients.
- B) paid more attention to the patients' background.
- C) investigated how aware patients were of their choices.
- D) explored whether patients regretted opting for a single room.

17. In the final paragraph, the writer is suggesting that further research should

- A) consider the reasons why readmissions often occur.
- B) look more carefully at the issue of patient mortality.
- C) ensure that confounding factors are fully explored.
- D) monitor what happens to patients after discharge.

Part 4

You are going to read an article about evaluating a stop smoking service in pharmacies. For **questions 18–22** match the **paragraphs (1 to 6)** to the **information (A to H)** below. The first paragraph is done for you as an example.

Evaluating a Stop Smoking Service in pharmacies

Example

Support to encourage people to stop smoking is known to be highly cost-effective in reducing tobacco-related disease and mortality. In recent years, there has been an increased range of behavioural support projects as part of routine healthcare delivered by pharmacy staff. One example of this is the national Stop Smoking Service (SSS) in the United Kingdom, which offers smoking cessation treatment including nicotine replacement therapy (NRT) to smokers trying to quit, alongside weekly consultations. Data shows that smokers engaged with this service are four times more likely to stop than those using NRT alone.

Paragraph 1

The SSS can be delivered by pharmacies which have at least one staff member who has completed relevant training, often known as a 'stop smoking advisor'. There is strong evidence for the success of this pharmacy-based service in cost-effectiveness and good abstinence rates – providing behavioural change training to community pharmacy staff is an effective way of helping people to stop smoking. However, use of the service in pharmacies is low. While the recent decrease in smoking in the UK may be a factor, there is also a general lack of awareness of the public health role of pharmacies. There is also a lack of confidence among some pharmacy staff in their ability to deliver this initiative and a concern about the reaction from some customers.

Paragraph 2

Previous studies which looked at the impact of stop smoking training for pharmacy staff suggest a range of benefits for smokers who want to give up. These include the increased levels of counselling provided and higher quit rates. While previous projects have shown these benefits, their focus was mainly on the stop smoking consultation itself rather than the initial conversation with the smoker. An additional programme was established to improve the Stop Smoking Service by targeting smokers' self-belief in their own ability to give up and by developing the skills of pharmacy staff to increase their engagement with smokers.

Paragraph 3

This additional programme was tested in 12 community pharmacies across London in an initial pilot study. Specifically, 20 specialist advisors from these pharmacies attended training sessions focused on communication and behavioural change. Study results confirmed that the programme was suitable in terms of overall structure and training content, with some participants reporting the successful use of newly learnt skills in practice. However, organisational issues such as lack of finances to cover absence pharmacists, the inconvenient location of training venues and unsuitable times for training resulted in poor attendance. Another key finding was that very few people who actually worked at the pharmacy counter attended these training sessions. This limited the effective delivery of the service because those staff were not able to engage in smoking-related conversations with their customers.

Paragraph 4

To address the logistical barriers highlighted in the first pilot study, a focus group was conducted with six pharmacy-based staff. As a result, several changes were made to improve attendance. Training was changed from two sessions to a half-day session on a Sunday morning with an option for on-site training if this was more convenient for participants. Also, both experienced stop smoking advisors and their colleagues new to this subject were trained within the same session to facilitate shared responsibility and focus on initial discussions with the customer.

Paragraph 5

The focus of a second pilot study in November 2016 focussed on the stop smoking skills of pharmacy staff in practice. This involved assessing the extent to which the core intervention components are delivered as intended and how well they are received by customers. The assessment was designed to highlight how successfully the intervention was working and aspects that could be improved. This study used the 'simulated client' method as a way of assessing the effectiveness of pharmacy staff engaging with potential Stop Smoking Service clients. This method provides a strong model to measure key elements of the project and evaluate the impact of pharmacy staff training and their engagement with customers who may wish to stop smoking.

<https://bmjopen.bmj.com/content/9/5/e026841>

In which paragraph can you find the following information? Match the **paragraphs (1 to 5)** to the **information (A to H)**. There are **two** additional letters which you do not need to use. The first one has been done for you.

Example paragraph: = C

- A) Ways in which information about SSS was made more accessible to pharmacy staff
- B) Different stages of interaction between pharmacy staff and people who want to quit smoking
- C) Statistical evidence which justifies multiple approaches to help people stop smoking
- D) Negative attitudes of pharmacy staff towards people who continue to smoke
- E) Factors which have limited the involvement of pharmacy staff in training opportunities
- F) A requirement to save money by increasing the number of people who give up smoking
- G) The approach taken to evaluating how well the programme worked in pharmacies
- H) Low take up of some services designed to help people who smoke

That is the end of the test.