國立臺灣大學 115 學年度碩士班招生考試試題

※ 本大題請於試卷內之「選擇題作答區」依序作答。

第一大題 1～15 題單選題（1～7 題，每題 5 分；8～16 題，每題 4 分）

1. 某研究追蹤 1,000 名未罹病者 5 年，期間有 50 人罹病。罹病者平均於追蹤開始後 2.4 年罹病。未罹病者中有 150 人於追蹤 1 年後即失聯（loss to follow-up），其餘 800 人完成 5 年追蹤。請估計此研究之「發生率（incidence rate）」？
   (A) 11.7 / 1,000 人年
   (B) 10.0 / 1,000 人年
   (C) 8.3 / 1,000 人年
   (D) 12.5 / 1,000 人年
   (E) 15.0 / 1,000 人年
2. 在探討「咖啡攝取」與「冠心病」的關係時，研究者發現吸菸者較常喝咖啡，且吸菸本身會增加冠心病風險。若未控制吸菸，咖啡與冠心病的關係可能被扭曲。下列何者最符合上述現象的正確描述？
   (A) 吸菸是咖啡與冠心病之間的中介因子（mediator）
   (B) 吸菸是咖啡與冠心病之間的效應修飾因子（effect modifier）
   (C) 吸菸是咖啡與冠心病之間的對撞因子（collider）
   (D) 吸菸是咖啡與冠心病之間的吸引因子（attractor）
   (E) 吸菸是咖啡與冠心病之間的干擾因子（confounder）
3. 在鄰里配對病例對照研究（neighborhood matched case-control study）中，研究者以「居住鄰里」作為配對因子（每位病例配對 1 位對照）。若要估計暴露與疾病之勝算比（odds ratio, OR），下列何者為最適當的方法？
   (A) 將所有病例與對照合併，直接以未配對 2×2 表計算 OR
   (B) 以一般（未條件式）邏輯斯迴歸（unconditional logistic regression）估計 OR，且不將鄰里作為共變項納入
   (C) 以一般（未條件式）邏輯斯迴歸估計 OR，並將鄰里作為共變項納入
   (D) 以條件式邏輯斯迴歸（conditional logistic regression）估計 OR，且不將鄰里作為共變項納入
   (E) 以條件式邏輯斯迴歸估計 OR，並將鄰里作為共變項納入
4. 某研究者想比較 A 大都會與 B 村莊的死亡率，但兩地區年齡結構差異很大。研究者取得兩地區的年齡別死亡率，但 B 村莊部分年齡層死亡數很少，導致年齡別死亡率不穩定。下列何者是較合理的處理方式？
   (A) 採用直接標準化（direct standardization），計算直接標準化死亡率（directly standardized mortality rate）
   (B) 採用間接標準化（indirect standardization），計算 standardized mortality ratio (SMR)
   (C) 不做標準化，直接比較粗死亡率（crude mortality rate），因其最不受小樣本影響
   (D) 只限制在 20–49 歲人口數較多的年齡層進行比較
   (E) 使用病例對照研究取代死亡率比較
5. 在病例對照研究中，暴露資訊以問卷回憶方式蒐集。若病例因罹病而更努力回想過去暴露史，使病例的暴露回憶相較對照更為完整或更容易被報告，下列何者最符合此情境？
   (A) 效應修飾（effect modification）
   (B) 選擇偏差（selection bias）
   (C) 差異性錯分（differential misclassification）
   (D) 單盲（single blinding）
   (E) 干擾（confounding）

見背面

6. 研究者以傾向分數加權（propensity score weighting）估計治療效果。若某些受試者的傾向分數非常接近 0 或 1，造成權重極大，估計不穩定。下列何者最符合此問題的正確敘述與常見處理？
   (A) 這常見於共同支持區不足（overlap/positivity 問題）；可考慮權重穩定化或截尾，並限制於共同支持區進行推論
   (B) 這表示處置分派已完全隨機化（exchangeability 成立），因此不穩定主要來自抽樣誤差
   (C) 這表示未量測干擾影響很小（E-value 高），因此權重極大可提升估計品質
   (D) 這屬資訊偏差（information bias），應改用雙盲法（double blinding）以避免誤差
   (E) 這屬中介效應（mediation）問題，應改用中介分析（mediation analysis）
7. 一項隨機分派臨床試驗比較新藥與安慰劑。部分受試者未依分派用藥（新藥組有人停藥，安慰劑組有人自行購買新藥）。若研究者希望保留隨機分派在估計因果效應上的優點，下列何者是最合適的主要分析原則？
   (A) 依實際用藥分析（as-treated analysis）
   (B) 只分析完全遵從者（per-protocol analysis）
   (C) 依原始分派分析（intention-to-treat analysis）
   (D) 僅分析資料完整者（complete-case analysis）
   (E) 將遵從性（adherence）作為共變項調整後再分析
8. An epidemiologist is comparing the mortality rates of two cities using direct age-adjustment. City A has a younger population than City B. The "Standard Population" used for the adjustment consists of 100,000 people: 60,000 aged <50 and 40,000 aged ≥50. The age-specific mortality rates for City A are 5 per 1,000 for the <50 group and 20 per 1,000 for the ≥50 group. What is the age-adjusted mortality rate for City A per 1,000 population?
   (A) 11.0 per 1,000
   (B) 12.5 per 1,000
   (C) 15.0 per 1,000
   (D) 10.0 per 1,000
   (E) 25.0 per 1,000
9. A new diagnostic protocol for early-stage glaucoma uses two independent tests conducted in parallel.
   Test A has a sensitivity of 80%.
   Test B has a sensitivity of 90%.
   A patient is considered test-positive if either Test A OR Test B is positive.
   Assuming conditional independence of the two tests given disease status, what is the overall sensitivity of this parallel testing strategy?
   (A) 72%
   (B) 85%
   (C) 90%
   (D) 98%
   (E) 100%
10. In a cohort study of 4,000 people, 2,000 smokers and 2,000 non-smokers are followed. With complete follow-up, 20 smokers and 12 non-smokers develop asthma.
    In reality, differential loss to follow-up occurs. Among smokers, 20 individuals are lost to follow-up, including 10 smokers who developed asthma. Among non-smokers, 12 individuals are lost to follow-up, and none of them developed asthma.
    Individuals lost to follow-up are excluded from the analysis. What is the risk ratio (RR) based on the

接次頁

observed data with loss to follow-up, using non-smokers as the reference group?

(A) 0.84
(B) 1.00
(C) 1.24
(D) 1.50
(E) 2.00

11. A researcher wants to study a very rare disease with a long latency period (decades between exposure and symptoms). Which study design is generally most efficient and economical for this specific purpose, yet maintaining decent causal inference capability?
    (A) Prospective cohort study
    (B) Randomized controlled trial
    (C) Case-control study
    (D) Ecologic study
    (E) Cross-sectional study
12. When is the odds ratio (OR) a good approximation of the risk ratio (RR)?
    (A) When the disease is highly prevalent (over 50% of the population).
    (B) When the duration of the disease is very long.
    (C) When the overall incidence of the disease is low (infrequent).
    (D) Only in randomized controlled trials with perfect compliance.
    (E) When the number of cases is exactly equal to the number of controls.
13. An epidemiologist conducts a stratified analysis to determine if age is a confounder in the relationship between obesity and cardiovascular disease. The crude relative risk (RR) is 1.8. After stratifying by age, the RR for the "young" group is 1.2 and the RR for the "old" group is 1.2. According to the general rules for distinguishing confounding from interaction, what is the most appropriate conclusion?
    (A) There is interaction present because the stratum-specific RRs are lower than the crude RR.
    (B) Age is a collider.
    (C) Age is a confounder because the stratum-specific estimates are similar to each other but differ from the crude estimate substantially.
    (D) Neither confounding nor interaction is present because all RRs are above 1.0.
    (E) There is evidence of effect modification because the crude RR is not the average of the two strata.
14. An investigator studies a population at a single point in time, collecting data on both current vitamin D levels and the presence of erectile dysfunction (ED) simultaneously. The study finds an association. What is the most significant limitation of this cross-sectional study design for establishing causality?
    (A) It is susceptible to loss to follow-up bias.
    (B) The study lacks a comparison group, making it impossible to calculate a measure of association.
    (C) It is not possible to determine if the exposure (vitamin D) preceded the outcome (ED).
    (D) It cannot be used to assess the burden of disease.
    (E) Erectile dysfunction will improve over time.
15. The introduction of new, highly sensitive diagnostic methods for thyroid cancer leads to the detection of many small, asymptomatic tumors that would not have been found otherwise. What is the likely impact on the incidence and mortality rates for thyroid cancer?
    (A) Both incidence and mortality will decrease as the disease is better managed.
    (B) Both incidence and mortality will increase significantly.

見背面

(C) Incidence will remain unchanged, but mortality will decrease due to earlier treatment.
(D) Incidence will increase, while mortality remains relatively unchanged.
(E) Incidence will decrease, while mortality will increase.

16. In a randomized controlled trial (RCT), what is the primary purpose of randomization?
(A) To create treatment and control groups that are comparable on both known and unknown prognostic factors.
(B) To make the study population representative of the general population.
(C) To eliminate the need for a placebo or control group in the study design.
(D) To ensure that all participants receive the treatment that is most likely to benefit them.
(E) To eliminate loss to follow-up bias.

第二大題 17～18 題問答題 **※ 本大題請於試卷內之「非選擇題作答區」標明題號依序作答。**

17. 疫情調查（outbreak investigation）與疾病控制（control measures）時常根據疾病之 infectious period、incubation period、latent period，請針對以下問題回答：

(A) 請解釋 Infectious period、incubation period、latent period 之定義？（6 分）
(B) 如何用其中兩個期間來判斷是否存在 pre-symptomatic transmission（2 分）？
(C) 若有一病例出現，如何應用以上三個期間設計暴露源調查、接觸者追蹤範圍、與接觸者檢疫/居隔（quarantine）天數（12 分）？

18. 請以流行病學三角致病模式（epidemiologic triad）探討「冬天流感發生率較高」的可能原因（舉出三個可能原因）（9 分）

試題隨卷繳回