



## STATISTICAL QUESTION

### Non-parametric statistical tests for two related groups: numerical data

Researchers investigated the effects on the health of bar staff of legislation for smoke free workplaces implemented in the Republic of Ireland in 2004. They used a before and after study design. Participants were bar staff in public houses in the Republic of Ireland. Bar staff in public houses in Northern Ireland acted as a control group. The analyses included exposure of non-smokers to secondhand smoke. Outcome measures included the laboratory assessment of salivary cotinine concentration, which was compared before and after the law change.

In total, 111 participants in the Republic of Ireland and 20 in Northern Ireland had cotinine concentrations measured at baseline and one year later at follow-up. Non-parametric statistical tests were used, as the distribution of salivary cotinine concentration was not normal. The median salivary cotinine concentration of bar staff in the Republic of Ireland was 29.0 nmol/L before the legislation and 5.1 nmol/L afterwards (median within-subject reduction of 22.7 nmol/L ( $P<0.001$ )). The median concentration in Northern Ireland was 25.3 nmol/L before the legislation and 20.4 nmol/L afterwards (median within-subject reduction of 5.7 nmol/L ( $P=0.05$ )). The researchers concluded that the legislation in the Republic of Ireland protected non-smoking bar workers from exposure to secondhand smoke.

**Which one of the following statistical tests would most likely have been used to compare salivary cotinine concentrations of bar workers before and after the legislation in each group?**

- Kruskal-Wallis test
- Mann-Whitney U test
- Wilcoxon rank sum test
- Wilcoxon signed ranks test

Submitted by Philip Sedgwick

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## CASE REPORT

### Fever and haemoptysis in an injecting drug user

A 24 year old man presented with a 10 day history of fever, night sweats, weight loss, and a productive cough with occasional haemoptysis. He had a history of injecting drug use. He was on a community methadone replacement programme for opiate dependency. On examination, he had a fever ( $39.4^{\circ}\text{C}$ ), hypotension, and tachycardia. He had a few needle track marks in both antecubital fossae. Coarse crackles were heard throughout both lung fields, although oxygen saturation was 97% on room air.

Blood tests showed: white cell count  $19.8 \times 10^9/\text{L}$  (reference range 4-11), C reactive protein 186 mg/L ( $<10$ ), urea 15.5 mmol/L (2.5-6.7), and creatinine 210  $\mu\text{mol/L}$  (70-100). Urine dipstick was positive for blood.

Plain chest radiography showed multiple, round, ill defined areas of consolidation throughout both lung fields, with loss of the cardiac silhouette at both the right and left heart borders, as well as bilateral blunting of both costophrenic angles to the lower zones. No hilar or mediastinal lymphadenopathy was noted. He was started empirically on intravenous benzylpenicillin and oral clarithromycin for presumed severe community acquired pneumonia (as per local hospital guidance). His methadone prescription was confirmed with community drug services and the dose corrected for his renal function. Sputum culture was unremarkable and was negative for acid and alcohol fast bacilli. Serology for HIV and autoantibodies was negative. Two consecutive blood cultures grew *Staphylococcus aureus*.

- What is your differential diagnosis from the history and examination alone?
- Which single investigation would you request to confirm the main cause?
- What acute medical complications are associated with injecting drug use?
- How would you manage opiate dependency in the acute medical setting?

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## PICTURE QUIZ

### Kidney failure with a diagnostic chest radiograph



Chest radiograph

An 87 year old woman presented with breathlessness, which was worse on exertion and when she was lying flat. She had a longstanding history of hypertension, hypercholesterolaemia, and cigarette smoking. She had been referred to a nephrologist two years earlier and was found to have a creatinine of 270  $\mu\text{mol/L}$ , with 2+ proteinuria on urine dipstick, a normal albumin (45 g/L), and no oedema. She was lost to follow-up before investigations were complete. On re-presentation, she described new shoulder and lower back pain. Her pulse was 80 beats/min and regular, blood pressure was 130/60 mm Hg, and jugular venous pressure was raised with bibasal inspiratory crepitations and peripheral oedema. Urine dipstick showed 3+ proteinuria and a trace of blood (recent protein:creatinine ratio 850 mg/mmol; reference value  $<15$  mg/mmol). Her urea was 35 mmol/L (2.5-6.7), creatinine 357  $\mu\text{mol/L}$  (54-145), albumin 32 g/L (35-50), haemoglobin 80 g/L (120-150; normocytic picture), and

kidney bipolar length was 10 cm on both sides. Serum and urine protein electrophoresis was performed and immunoglobulins, antineutrophil cytoplasmic antibodies, antineutrophil antibodies, and complement components were measured. After a week of diuretics her urea and creatinine increased to 53 mmol/L and 601  $\mu\text{mol/L}$ , respectively, with ongoing oedema. She started haemodialysis. The figure shows a chest radiograph obtained at re-presentation.

- What abnormalities can be seen on the chest radiograph?
- Which parts of the renal screen are likely to be most informative?
- What is the unifying diagnosis and how can it be confirmed histologically?
- What are the possible complications of this disease?

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