



FOLLOW ENDGAMES ON TWITTER @BMJEndgames
FOR SHORT ANSWERS See p 943
FOR LONG ANSWERS
 Go to the Education channel on bmj.com

ENDGAMES

We welcome contributions that would help doctors with postgraduate examinations
 See bmj.com/endgames for details

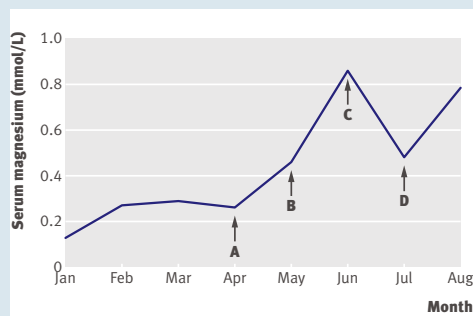
PICTURE QUIZ

Elusive cause of hypomagnesaemia

A 46 year old man presented with carpedal spasm, muscle cramps, and a prolonged QTc interval on a background of a week's history of diarrhoea and vomiting. He had a history of Barrett's oesophagus and had been taking 40 mg omeprazole daily for many years. He had severe hypocalcaemia and hypomagnesaemia, with a corrected calcium and magnesium of 1.77 mmol/L (reference range 2.15-2.65) and 0.13 mmol/L (0.75-1), respectively. Serum parathyroid hormone was low at 3.1 ng/L (8-55). Intravenous replacement of fluids and electrolytes restored the biochemical abnormalities. He was discharged on oral alfacalcidol and magnesium glycerophosphate.

At six week follow-up, calcium had normalised (2.25 mmol/L) but symptomatic hypomagnesaemia persisted, with a serum magnesium of 0.27 mmol/L. Extensive evaluation, including upper and lower gastrointestinal endoscopy and distal duodenal biopsies, failed to identify a cause for his persistent hypomagnesaemia. He was admitted for recurrent intravenous magnesium infusions because his magnesium values were between 0.27 mmol/L and 0.29 mmol/L in spite of oral magnesium supplements. An intervention (figure; arrows labelled A and B) resulted in dramatic normalisation of serum magnesium values with no need for further oral or intravenous magnesium replacement.

- 1 What are the causes of hypomagnesaemia?
- 2 What interventions on the graph (indicated by the arrows) are responsible for the fluctuations in magnesium values?



The patient's serum magnesium concentrations

- 3 What could be the underlying pathophysiology of hypomagnesaemia in the above case?

Submitted by Krishnan Swaminathan and John Wilson
 Cite this as: *BMJ* 2011;343:d5087

STATISTICAL QUESTION Derivation of hazard ratios

Researchers investigated the extent to which referral from primary care for defined symptoms of hip pain varied by age, sex, and social deprivation in the United Kingdom. A cohort study design was used. Data for individual patients registered at 326 general practices between 2001 and 2007 were extracted from the health improvement network database in primary care. In total, 23 121 patients presented with defined symptoms of hip pain, of whom 4019 (17.4%) were referred to specialist secondary care.

The primary outcome was length of time from date of first presentation in primary care until referral to specialist secondary care. The table shows the unadjusted and adjusted hazard ratios for sex, categorised age, social deprivation, and comorbidity as indicated by number of drugs prescribed. It was reported that women, patients aged older than 85 years, and patients with greater social deprivation were less likely to be associated with referral for hip pain.

Hazard ratios for referral to secondary care after presentation to primary care for hip pain according to sex plus categorised age, deprivation score, and comorbidity

Variable	Unadjusted hazard ratio (95% CI)	Adjusted hazard ratio (95% CI)
Sex:		
Men	(1)	(1)
Women	0.88 (0.83 to 0.94)	0.90 (0.84 to 0.96)
Age group:		
55-64	(1)	(1)
65-74	1.16 (1.08 to 1.26)	1.18 (1.10 to 1.28)
75-84	1.09 (1.00 to 1.19)	1.13 (1.04 to 1.23)
≥85	0.64 (0.54 to 0.76)	0.68 (0.57 to 0.81)
Deprivation (Townsend fifth):		
1 (least deprived)	(1)	(1)
2	0.92 (0.84 to 1.01)	0.92 (0.84 to 1.01)
3	0.83 (0.75 to 0.91)	0.84 (0.75 to 0.92)
4	0.79 (0.71 to 0.89)	0.80 (0.72 to 0.90)
5 (most deprived)	0.71 (0.61 to 0.81)	0.72 (0.62 to 0.82)
Comorbidity (no of drugs prescribed):		
0-1	(1)	(1)
2-4	0.85 (0.79 to 0.91)	0.86 (0.80 to 0.92)
≥5	0.83 (0.71 to 0.96)	0.87 (0.75 to 1.00)

CI=confidence interval.

Which one of the following statistical methods would have been used to derive the hazard ratios?

- a) Cox proportional hazard regression
- b) Log rank test
- c) Logistic regression

Submitted by Philip Sedgwick
 Cite this as: *BMJ* 2011;343:d6994

ON EXAMINATION QUESTION Warfarin

This week's question on warfarin is taken from the onExamination revision questions for the MRCS Part 1 exam.

Which of the following can inhibit the metabolism of warfarin?

- A Oral contraceptive
- B Omeprazole
- C Aspirin
- D Rifampicin
- E Metronidazole