Influence of postmenopausal state, solar radiation, drugs and comorbidities on serum calcium and phosphate in 13,000 hospital admissions

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AIMS
Our goal was to determine the relative contributions of demographic variables, drugs, comorbidities, and weather conditions on serum calcium (Ca) and phosphate (Pi) in patients admitted to a tertiary referral center.

METHODS
For 12,667 consecutive patients admitted to the Kantonsspital St. Gallen, drug history on admission, age, sex, body weight, ICD-10 diagnoses, and laboratory data were extracted from electronic medical records. Weather parameters prior to hospital admission were also integrated in a regression analysis.

RESULTS
Serum Ca was normally distributed with a median (interquartile range) of 2.3 (2.2/2.4) mmol/L. In contrast Pi showed a right tailed distribution of 1.0 (0.9/1.2) mmol/L. Ca was increased in postmenopausal women. Solar radiation prior to admission was associated both with higher Ca and higher Pi. Lower blood pressure was associated with lower Ca and higher Pi. In addition Ca increased by 0.017 mmol/L per g/L increase of albumin (p < 0.0001).

CONCLUSIONS
Serum Ca and Pi at hospital admission are highly dependent on patient characteristics, drugs, and comorbidities. In particular, we found higher Ca in postmenopausal women. The commonly applied albumin correction formula of Payne (0.025 mmol/L Ca per g/L albumin) may overestimate the effect of albumin; we propose using 0.017 mmol/L Ca per g/L albumin or measurement of free (ionized) Ca.