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# Potential delays in myeloma diagnosis are illustrated by the relationship between pre-diagnostic routine laboratory tests and testing for myeloma: a South African context

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## BACKGROUND, PURPOSE AND METHODS

Before multiple myeloma is diagnosed, non-specific symptoms may trigger routine laboratory test requests or may be performed for unrelated reasons. This study examined trends in pre-diagnostic testing and results to characterise diagnostic delays attributable to how healthcare practitioners use tests and interpret their results.

Laboratory test requests and values 2 years before diagnosis were collected for patients referred with MM to Groote Schuur tertiary public Hospital between January 2017 and mid-2024. Values included total protein, haemoglobin, serum creatinine, and calcium. The date that myeloma was first suspected was considered the timing of a urine or serum protein electrophoresis or free light chain quantification.

## RESULTS

***Participant characteristics***

**152 available records**

**Mean age 58 years (SD 11), 49% female**

**HIV status: positive 12%, negative 69% & untested 19%**

**72% had at least one comorbidity**

**Heavy chain subclass 89%**

**Presentation at diagnosis: 15% spinal cord compression, 49% back pain**

**Median 10 (IQR 5 – 16) visits in preceding 2 years before diagnosis made**

| | % visits during which test performed | % abnormal test results |
|---|---|---|
| Haemoglobin | 43% | 94% |
| Creatinine | 50% | 59% |
| Calcium | 14% | 44% |
| Total protein | 27% | 70% |

Table. Abnormalities were defined as the first occurrence: anaemia, haemoglobin < 12.5g/dL for women, < 13.5g/dL for men; kidney dysfunction, serum creatinine > 90 µmol/L for women, > 104 µmol/L for men; hypercalcaemia > 2.50 mmol/L; hyperproteinaemia, total protein > 78g/L as per local laboratory reference ranges.

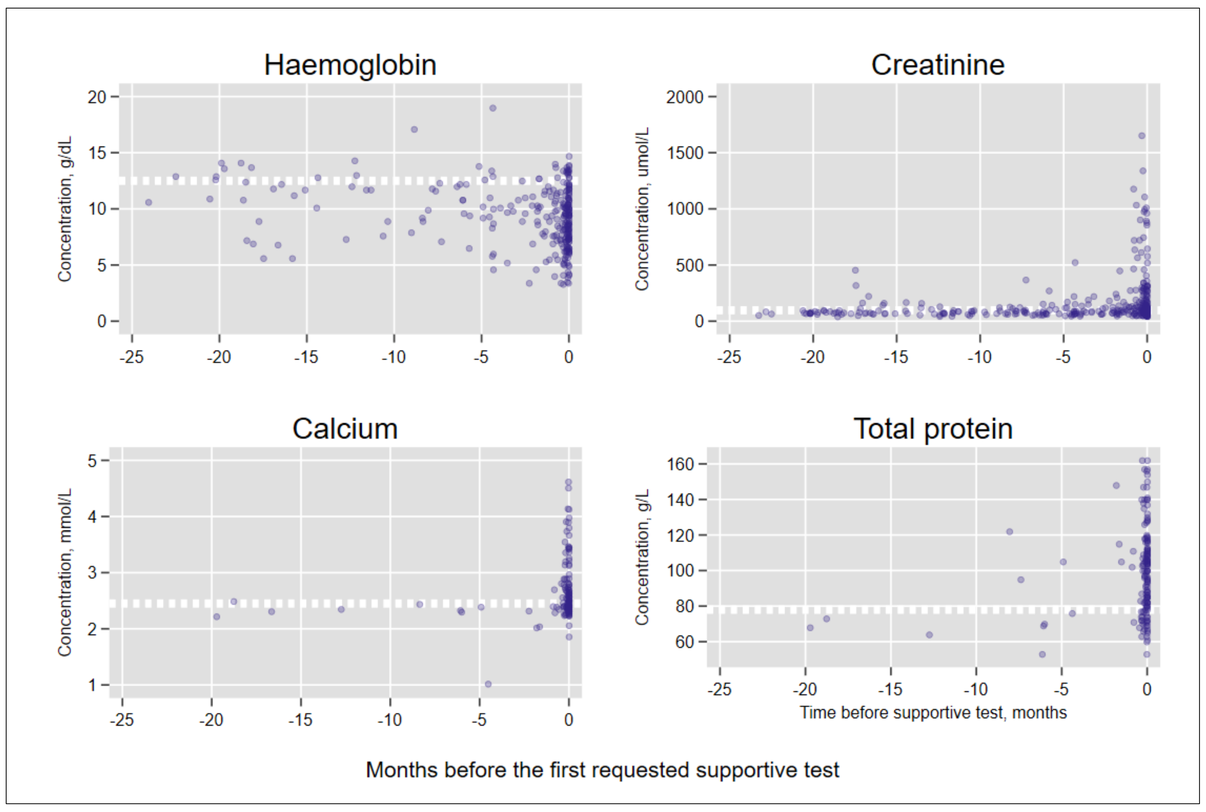


Fig. 1. These scatterplots show the pattern and degree of abnormality of haemoglobin, serum creatinine, calcium and total protein test requests before supportive testing or the diagnostic episode was reached. The dashed line shows the lower or upper limit of normal, as appropriate.

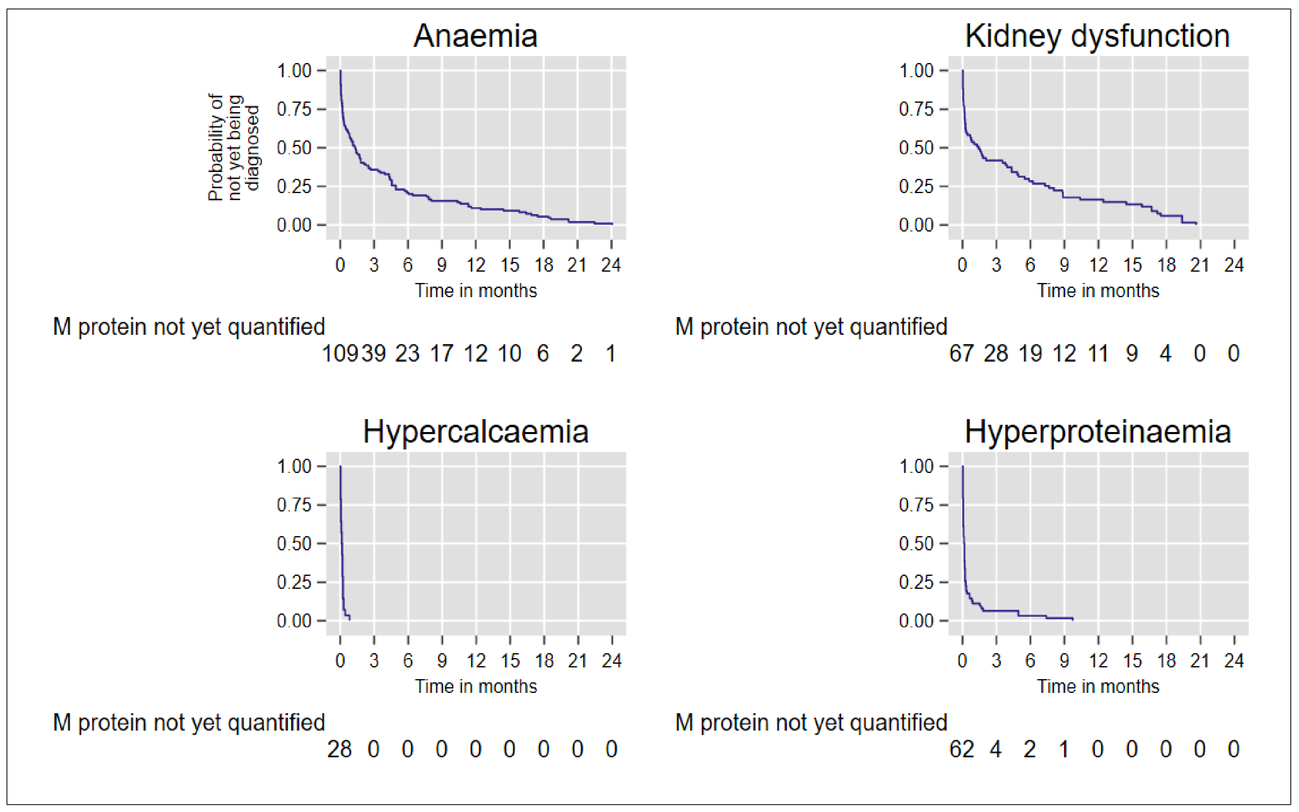


Fig. 2. Kaplan Meier curves showing the timing of routine laboratory abnormalities before myeloma was first suspected. Abnormalities were defined as the first occurrence: anaemia, haemoglobin < 12.5g/dL for women, < 13.5g/dL for men; kidney dysfunction, serum creatinine > 90 µmol/L for women, > 104 µmol/L for men; hypercalcaemia > 2.50 mmol/L; hyperproteinaemia, total protein > 78g/L as per local laboratory reference ranges.

## CONCLUSION

We demonstrate that routine laboratory tests are not often performed during public healthcare encounters, and even when abnormal, are possibly incompletely investigated or misattributed to other comorbidities. A diagnosis of myeloma might be made earlier if anaemia and kidney dysfunction were fully investigated. The timing of hypercalcaemia or hyperproteinaemia likely reflects the degree of acute illness at final diagnosis. An elevated total protein may be a useful indicator of a monoclonal protein warranting further investigation in the appropriate clinical context (e.g., someone with back pain or kidney dysfunction) and in lower-income economies such as Africa.

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