

Urinary qualitative organic acid analysis: Differing analytical approaches and performance

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Scheme design

- Nine heat treated urine samples per year from real patients with differing metabolic disorders
- Participants are asked to:
 - Identify the major analytical findings
 - Indicate the most likely diagnosis
 - Suggest any further investigations needed to confirm or clarify the diagnosis

Samples circulated

- Maple syrup urine disease
- Propionic aciduria
- Medium chain acyl CoA dehydrogenase deficiency
- 4-hydroxybutyric aciduria
- DOPA metabolites
- 3-methylcrotonyl CoA carboxylase defn
- Glutaric aciduria type 1
- Primary hyperoxaluria type 1
- D-glyceric aciduria
- Malonic acidria
- Methylmalonic aciduria
- Urea cycle disorder
- Fumarate hydratase deficiency

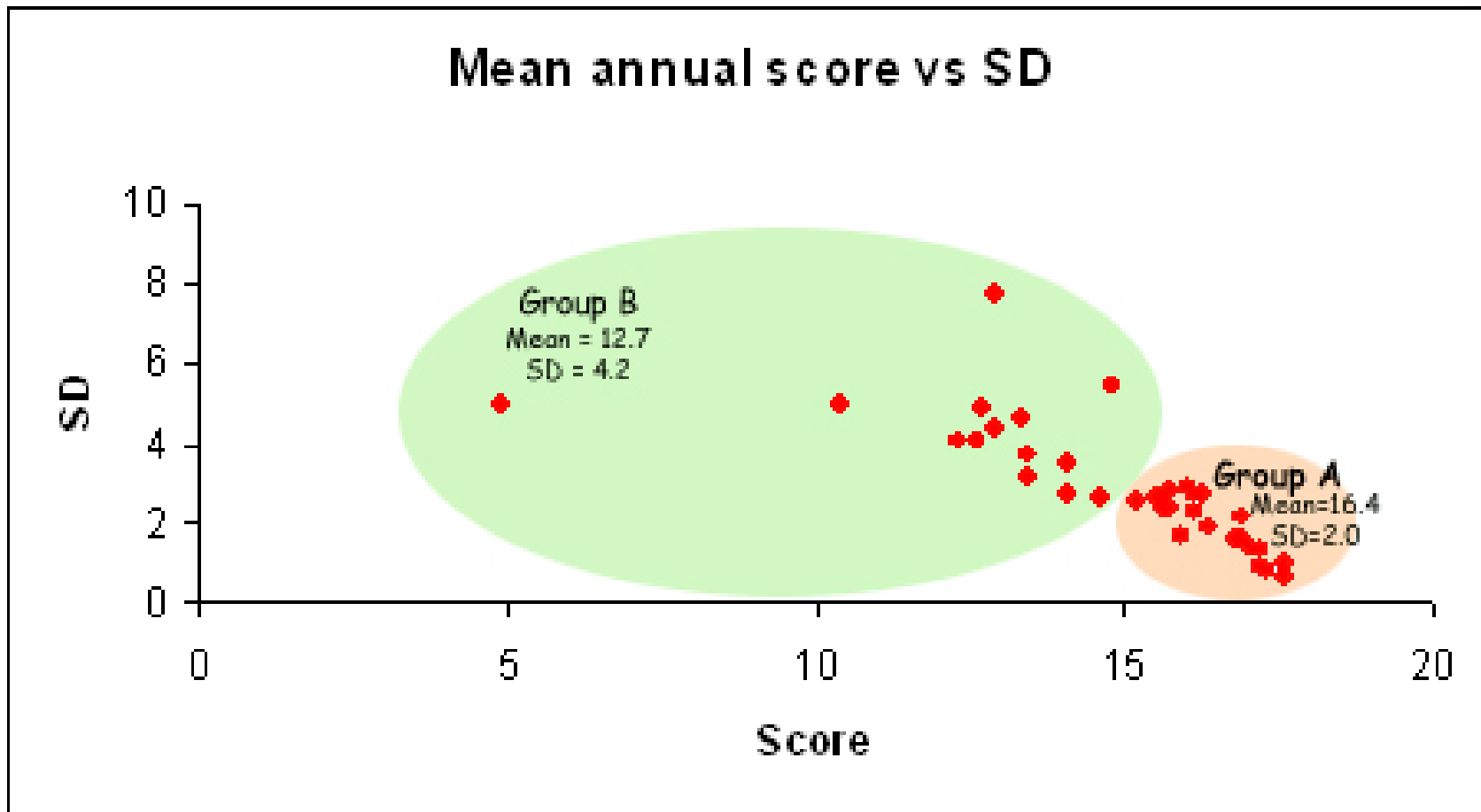
Samples circulated

- Isovaleric aciduria
- Mevalonic aciduria
- Multiple acyl CoA dehydrogenase deficiency
- 2-hydroxyglutaric aciduria
- Methyl glutaconic aciduria
- Ethylene glycol poisoning
- Phenylketonuria
- Pyroglutamic aciduria
- Dihydropyrimidine dehydrogenase deficiency
- Holocarboxylase synthetase deficiency
- Beta ketothiolase deficiency
- Valproate therapy

Scoring

● Satisfactory	2
● Helpful but incomplete	1
● Unhelpful	0
● Slightly misleading	-1
● Misleading	-2
Total annual achievable	18

Score and variation in performance – 10 years experience



Methodological approaches

- **GCMS** 82/84
- **Ethylacetate extraction or similar** 79/84
- **TMS derivitisation** 83/84
- **Oximation** 50/84
- **Int std used** 82/84
- **Int QC used** 50/84
- **Average age of equipment** 7.2 y
- **Average number of peaks annotated** 47

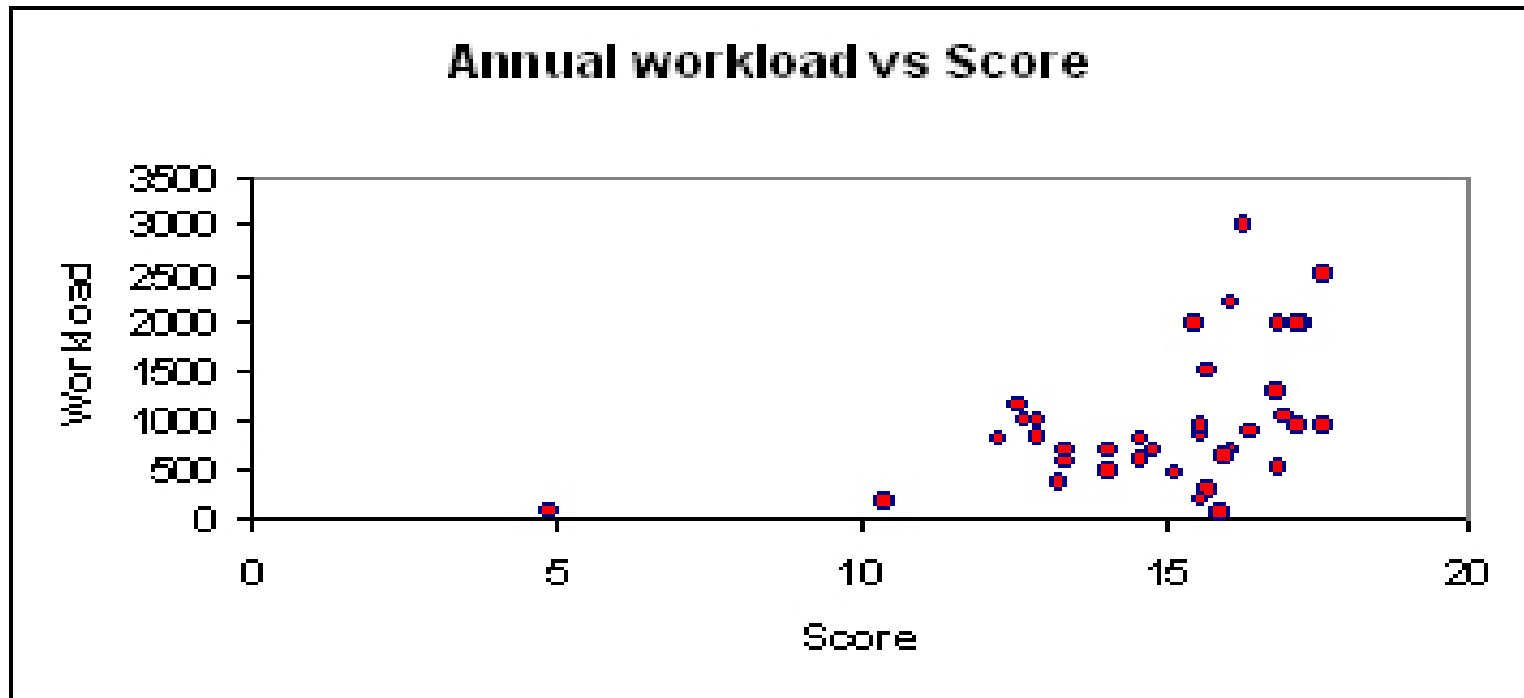
Interpretative approaches

- **Extracted ion chromatograms used to aid identification** 71/84
- **Auto-naming software used** 40/84
- **Grade of staff used to annotate**
18 non graduate
66 graduate
- **Regular staff rotation** 25/84
- **Grade of staff used to interpret**
2 non graduate
82 graduate
- **Regular staff rotation** 8/84
- **Group vs Individual interpretation** 29 vs 55

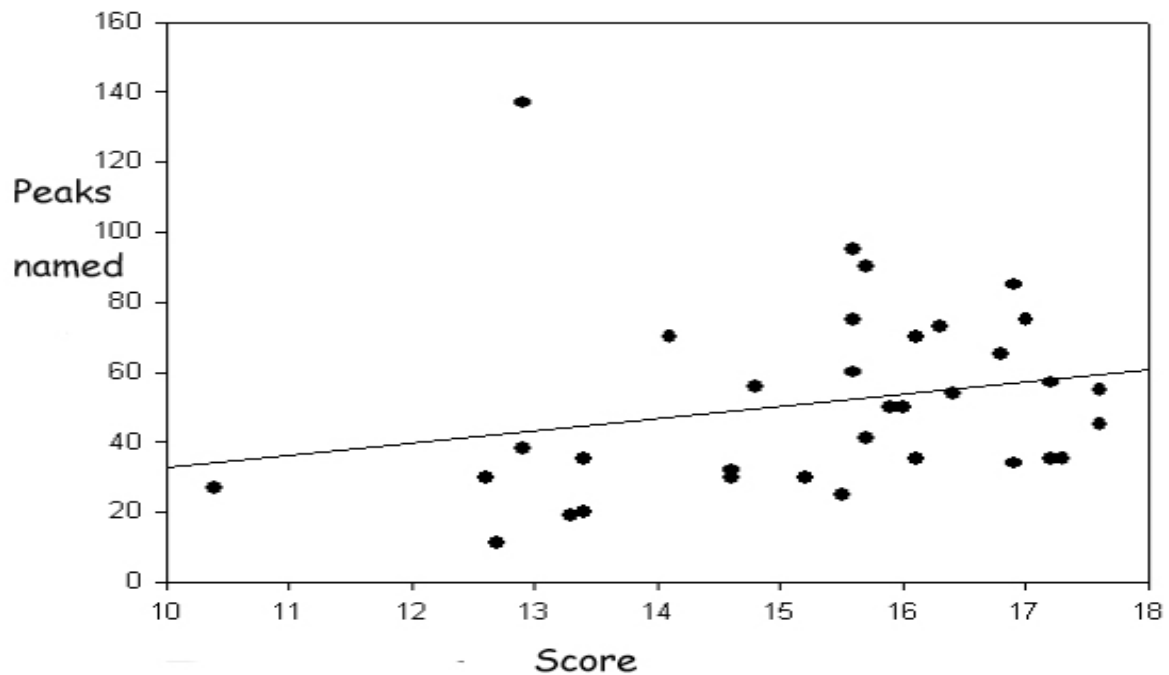
Other analytical factors

- **Average length that the service has been offered** 16 y
- **Average annual workload (samples/y)** 1046
- **Average sample turnaround time** 8d
- **Out of hours service available** 26/84
- **Average cost (where stated)** 113 Euro

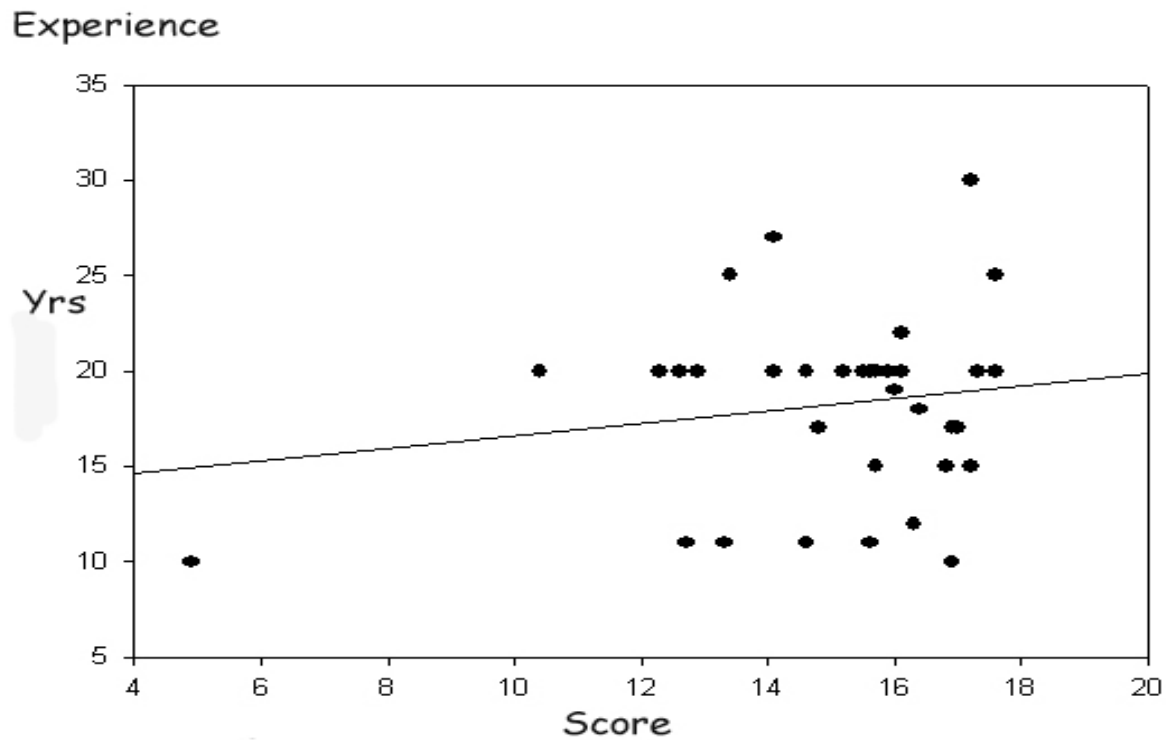
Workload vs Score



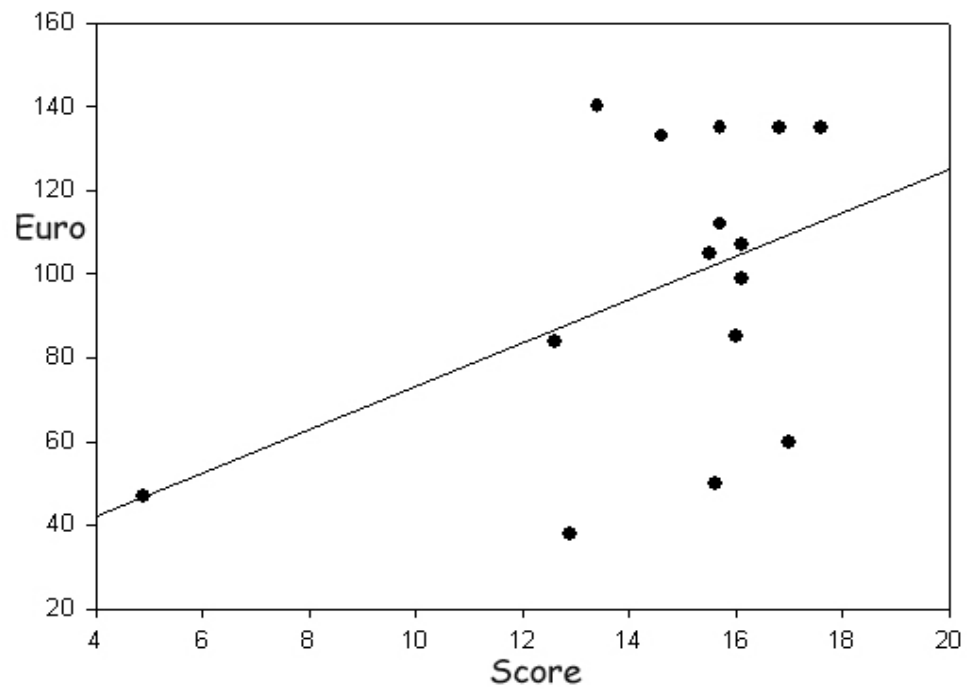
Number of peaks named vs Score



Years service offered vs Score



Assay cost



Factors without association

- No association with oximation
- No association with grade of staff or rotation
- No association with use of auto-naming software
- No association with group or individual interpretation
- No association with the spectral library used
- No association with the use of extracted ion chromatograms
- No association with the turnaround time offered

Conclusions

- There is a great deal of consistency of approach
- It is possible to do consistently badly
- Belong to an EQA scheme and take the results seriously
- Consider the need to offer a service very carefully if the annual workload is less than 500/annum
- Annotate exhaustively
- Do worry too much about the subtleties of approach but do whatever you do thoughtfully and carefully

SSIEM attendance

SSIEM attendance

