Long-term evaluation of qualitative EQA results

United Kingdom National External Quality Assessment Service for Microbiology

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UK NEQAS

Qualitative Data

- Categorical measurement expressed by means of a natural language description
  - Nominal e.g. organism name/identity, genotype, presence/absence, positive/ negative
  - Ordinal e.g. 1+, 2+, 3+ (can be ordered)

- *'There is no such thing as qualitative data. Everything is either 1 or 0'*
  - Fred Kerlinger, Quantitative researcher, Miles and Huberman 1994; Qualitative Data Analysis

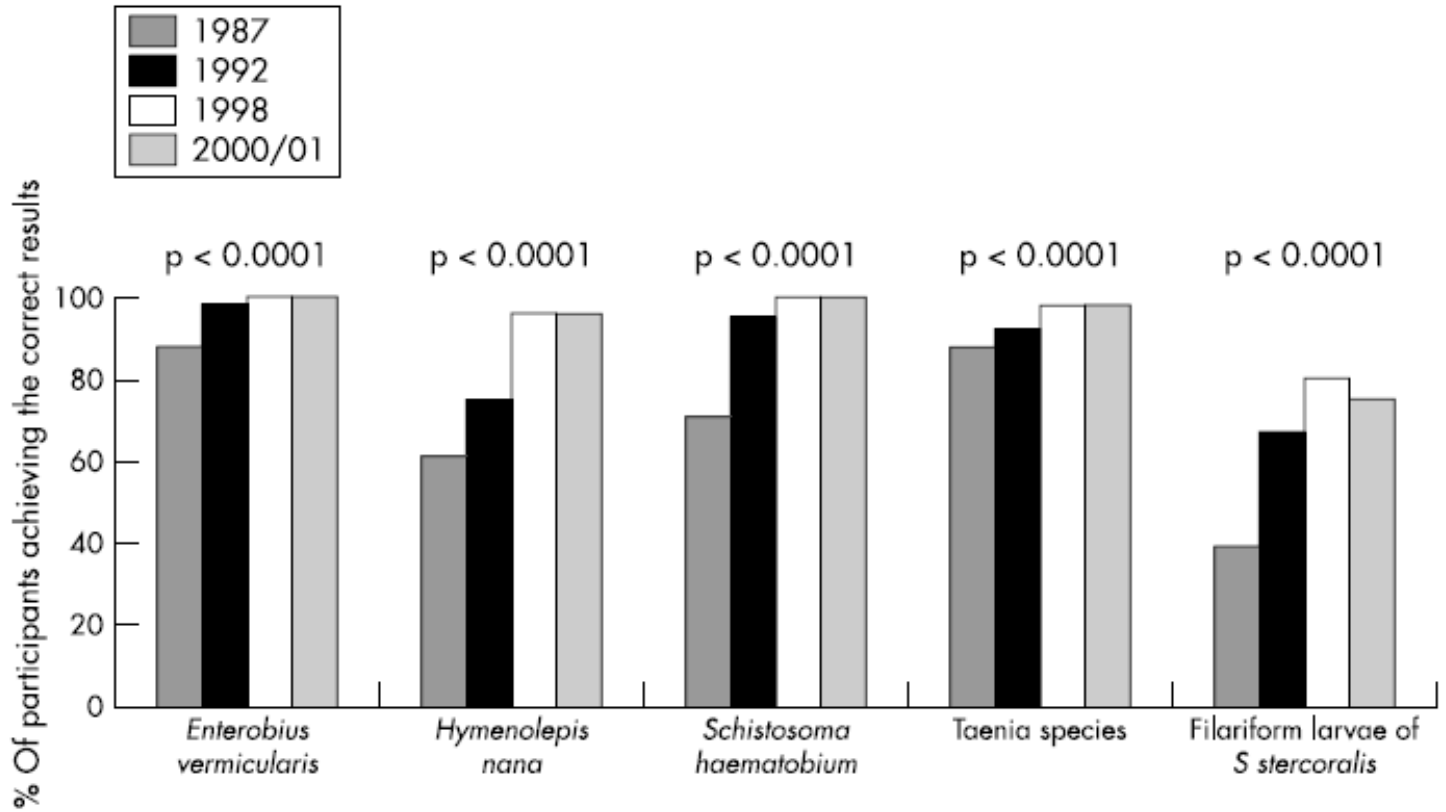
Ways of handling qualitative data

- Use of surrogates
  - Number of participants
  - % laboratories making the correct identity
- Identify significant patterns
  - Changes in practice
- Compare categories
  - Changes in categories
- Apply a numerical score

Review of the Parasitology schemes: 15 years

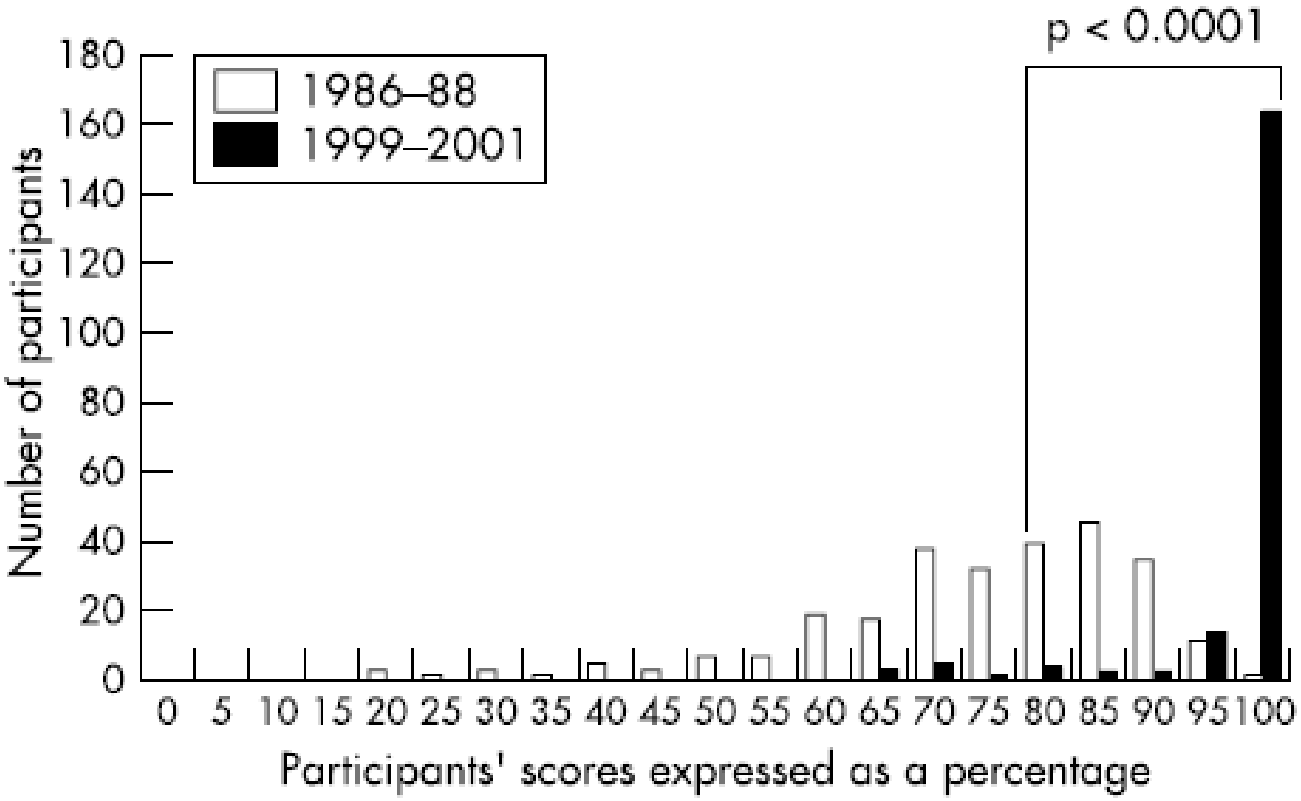
- Faecal and blood parasitology schemes introduced in 1986
- Identification of parasites and stage as ova, cysts, larvae
- Comparison of reported result with the assigned value/identity
- % of participants reporting the correct result

Faecal parasitology: examining for helminths

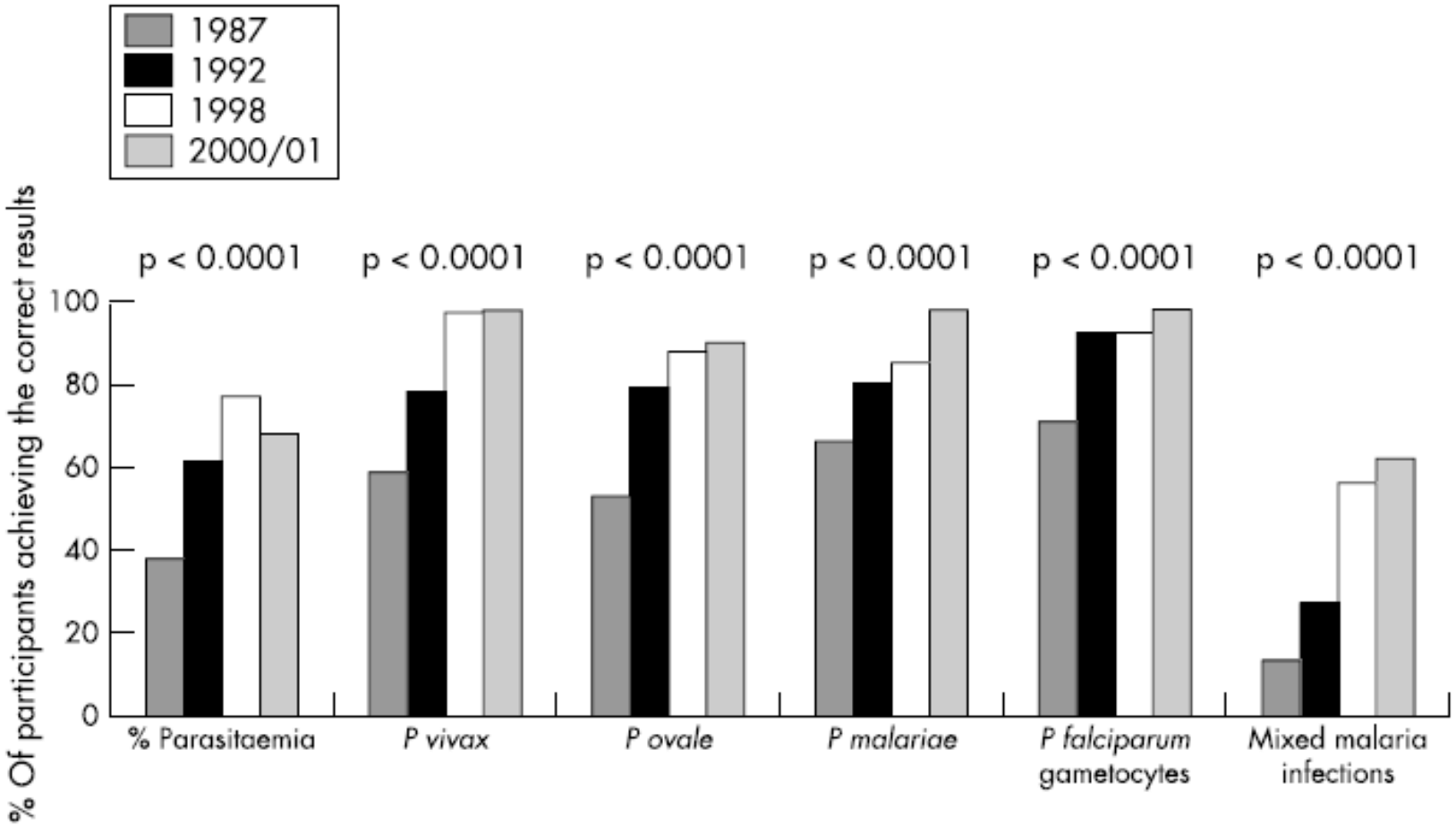


Kettelhut *et al.* Journal of Clinical Pathology 2003

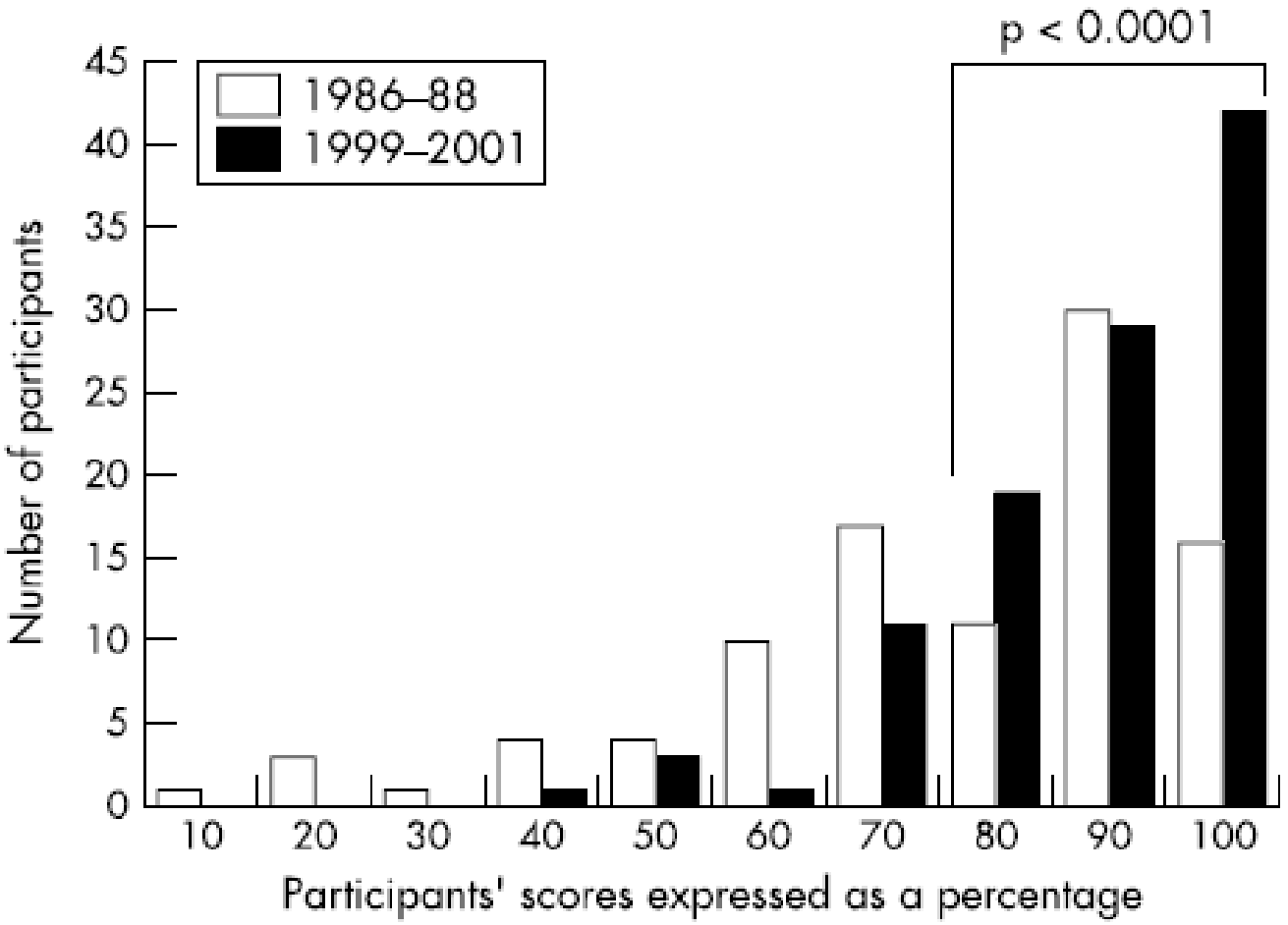
Faecal parasitology: overall performance UK participants subscribing since start of scheme



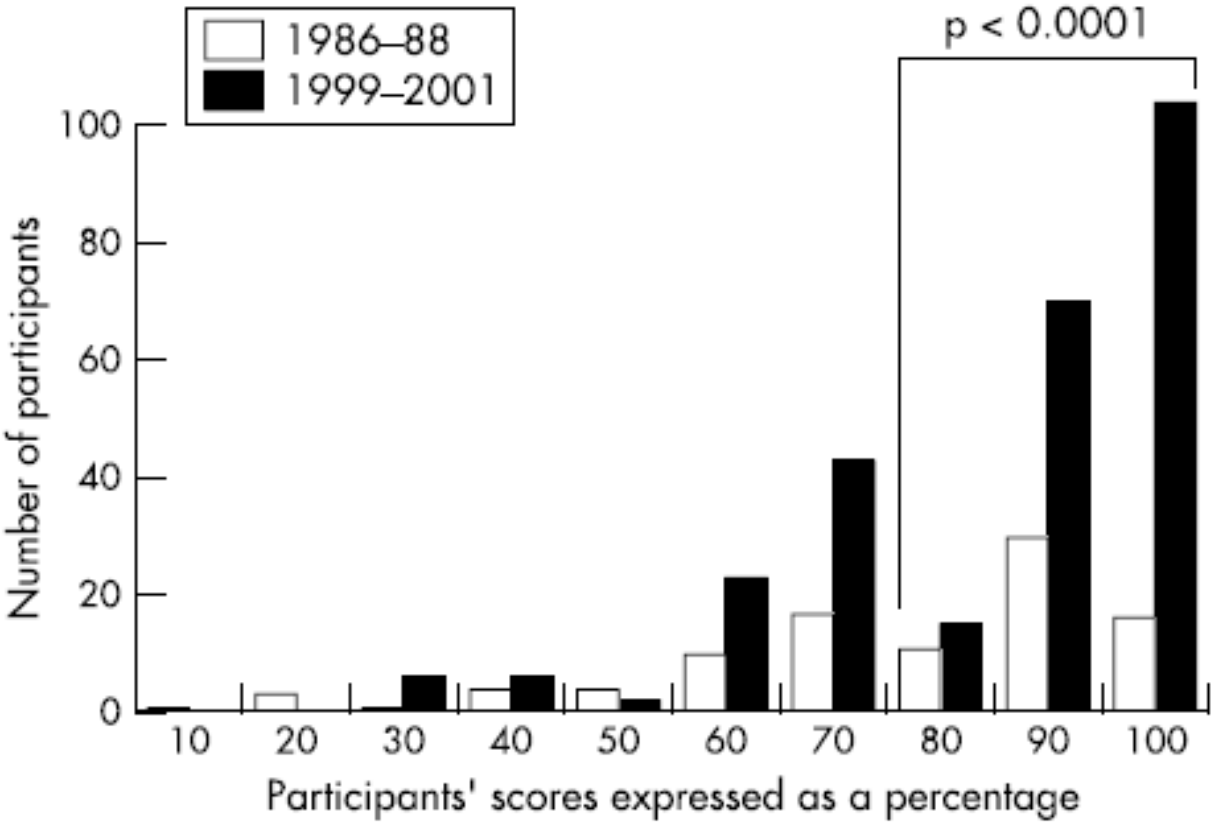
Blood parasitology: comparison of participant performance



Blood parasitology: overall performance of UK participants subscribing since start of scheme



Blood parasitology: overall performance all UK participants



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Review of mycobacterium culture scheme

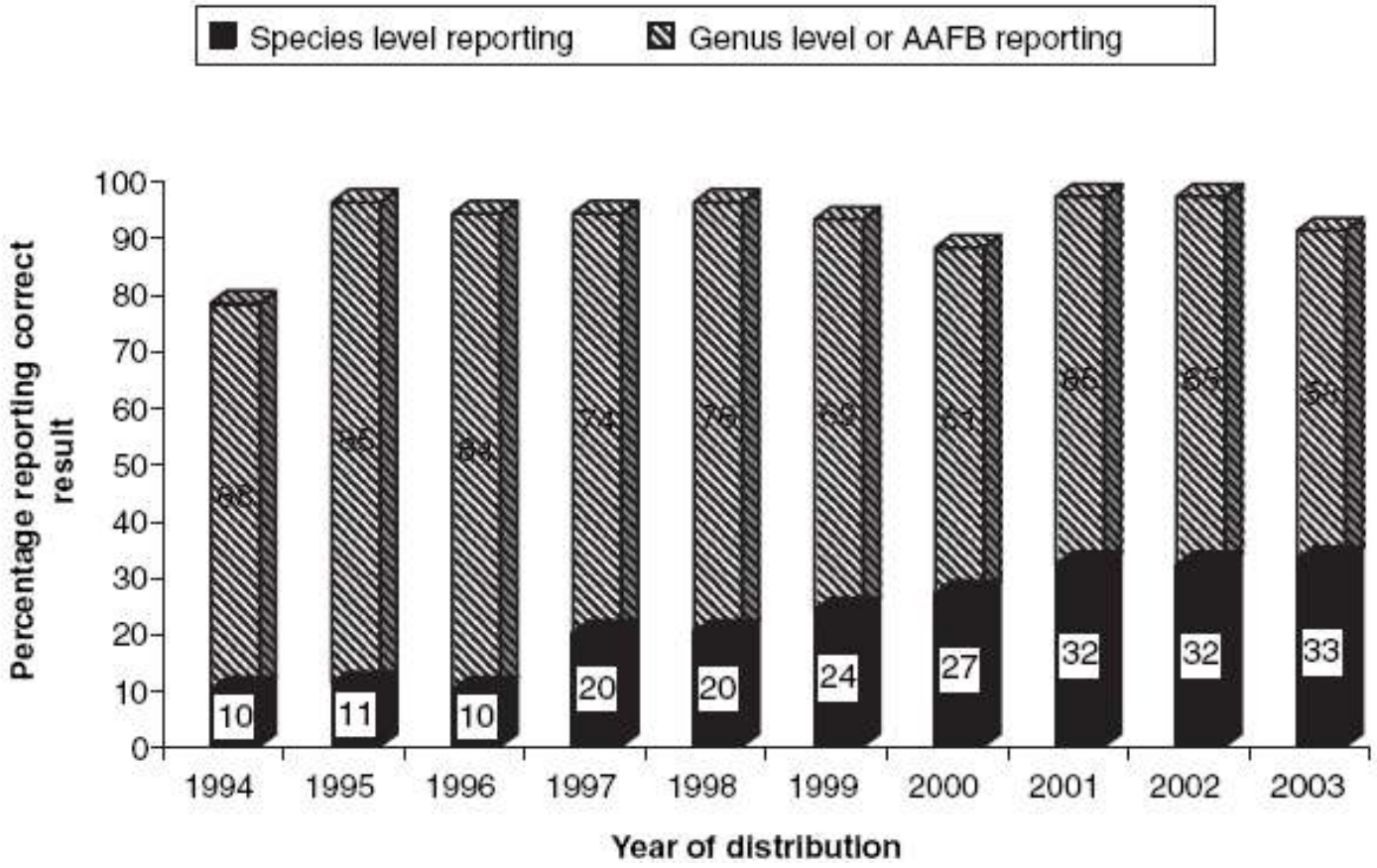
- Introduced in 1993
- Participants report on the culture results and identify to genus or species level
- Range of different culture media used
- UK standard method recommends culture for 12 weeks to have confidence in correct report of a negative result
- Time to identification of culture positive dependant on
  - Species
  - Strain
  - Bacterial load
  - Method

10 year review

- % participants reporting correct results
- Centre for Disease Control recommendation
  - Time to reporting

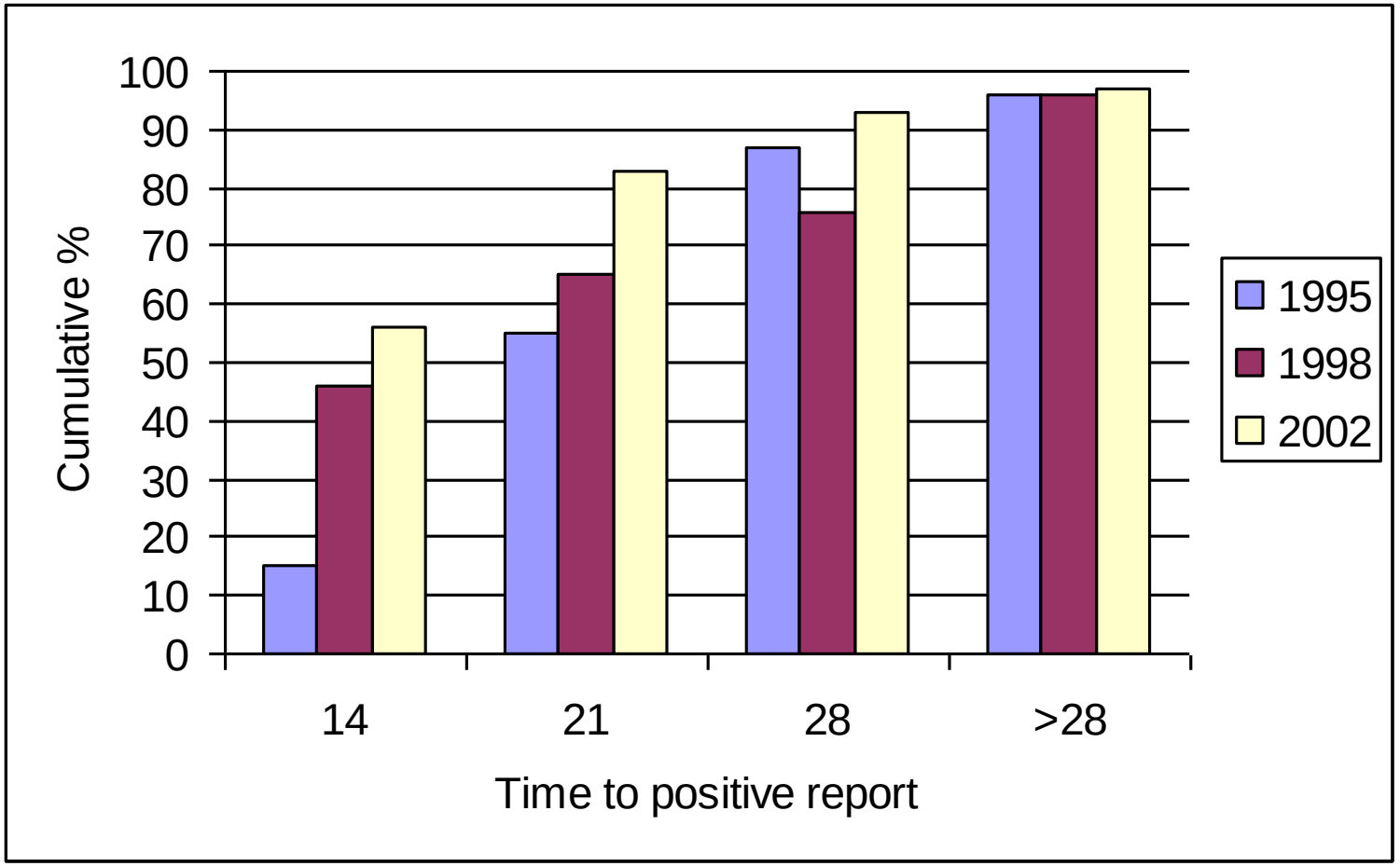
Walton *et al.* Clinical Microbiology and Infection 2005

Mean percentage of laboratories correctly reporting *Mycobacterium tuberculosis*



Walton *et al.* Clinical Microbiology and Infection 2005

Time to positive reporting



Mycobacterium culture scheme Summary

- % participants reporting positive result by 21 days rose from 55% in 1995 to 83% in 2002 and 87% in 2009/10
- Increasingly liquid culture systems have been used
- Proportion of non-UK laboratories has increased from 20% in 1995 to 44% in 2002 and 58% in 2009/10

Susceptibility to Rubella

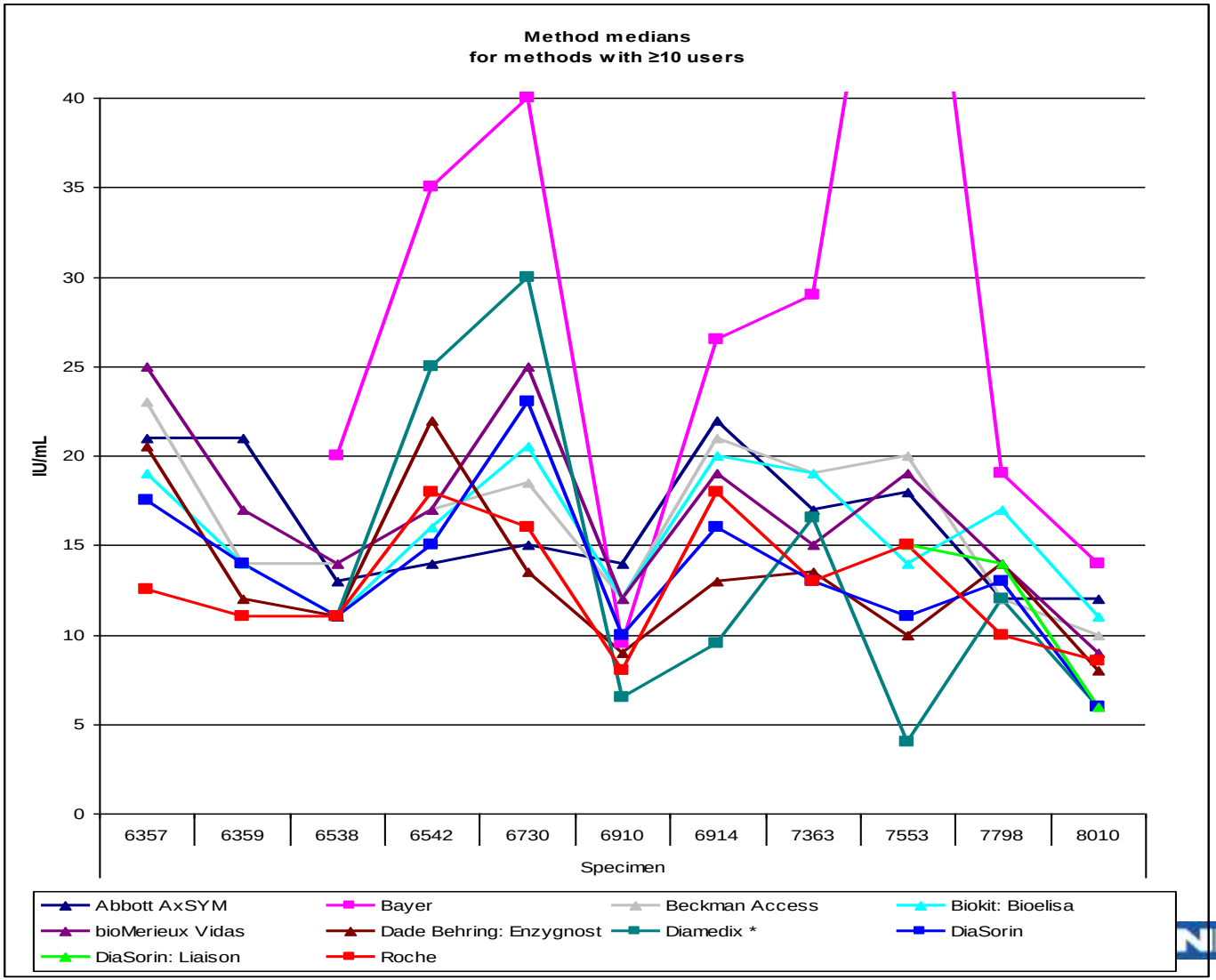
- Historically immunity to rubella was set at the limit of detection of the diagnostic assays
- Changes in practice from Radial Haemolysis through to Reverse Passive Haemagglutination to ELISA resulted in the introduction of a low level positive category where initially clarity about protection from infection was not clear
- In 2001 10 IU/mL cut off set
- Comparison of kits made
  - Implications to management of rash in pregnancy

Low level positive rubella reporting

Spec no.	No. >10 IU/mL	% pos	No. <10 IU/mL	No. numerical data sets	Range	Median for all kits	5% CI	95%CI
6357	363	97.6	9	329	0-70	21	12	29
6359	353	94.6	20	332	0-147	17	10	26
6538	333	91.0	33	342	2-118	13	9	19
6542	364	98.6	5	339	7-71	16	11	25
6730	365	98.7	5	344	0-55	18	12	33
6910	291	82.7	61	348	2-33	12	7	18
6914	360	97.8	8	341	0-150	20	12	29
7363	370	98.4	6	375	2-55	16	11	27
7553	349	93.6	24	373	0-162	17	9	27
7798	337	90.8	34	395	4-38	13	9	21
8010	209	56.2	163	402	0-500	10	5	16

Fagan *et al* 2006

Rubella IgG serology



Rubella IgG serology

- 56.2% to 98.7% of participants reported a positive (>10 IU/mL) result
- Linear regression, taking DiaSorin as the baseline (due to its fairly low mean and large-enough frequency of usage), showed that Bayer produced the highest results (2.1 fold > DiaSorin, 95% CI (2.0-2.3)).
- Overall Roche followed by Diamedix and DiaSorin produced the lowest results.
- However a more recent analysis (3 low level samples) has shown that Roche now gives high results, Bayer (now Siemens) now gives lower results, DiaSorin remains consistently low.

Monitoring performance

General Bacteriology report: Page 1 formats

UK National External Quality Assessment Service for Microbiology

UKNEQAS for General bacteriology	Laboratory :
Distribution : **2169**	Page 1 of 2
Dispatch Date : 07-May-2007	

Intended Result		Your Report	Your Score
Specimen 8366	*Bacillus cereus*	*Bacillus cereus*	2
Specimen 8367	*Neisseria meningitidis* serogroup B	*Neisseria* sp.	0
Specimen 8368	*Shigella flexneri* serotype 1b	*Shigella flexneri*	2

Cumulative score information

Total number of specimens sent to you for **UK NEQAS for General bacteriology** over the last 6 distributions is 18
Specimen numbers 8170 8171 8172 8206 8207 8208 8244 8245 8287 8288 8289 8333 8334 8335 8366 8367 8368 have been analysed and scored.

Number of reports returned and scored 17
Number of specimens reported as not examined (not scored) 1
Number of specimens received too late for analysis (not scored) 0
Number of specimens for which no report was received (scored as 0) 0
Your cumulative score for these specimens was 23 out of a possible total of 32

The mean score calculated from the reports returned by **ALL** laboratories was 28.54 (with a standard error of 3.13).
Cumulative scores may change if participants' results are amended.
Your performance rating for **UK NEQAS for General bacteriology** (i.e. the number of standard errors by which your cumulative score lies above or below the mean for) ALL laboratories is -1.77.
A performance rating of more than 1.96 standard errors below the mean indicates possible poor performance.

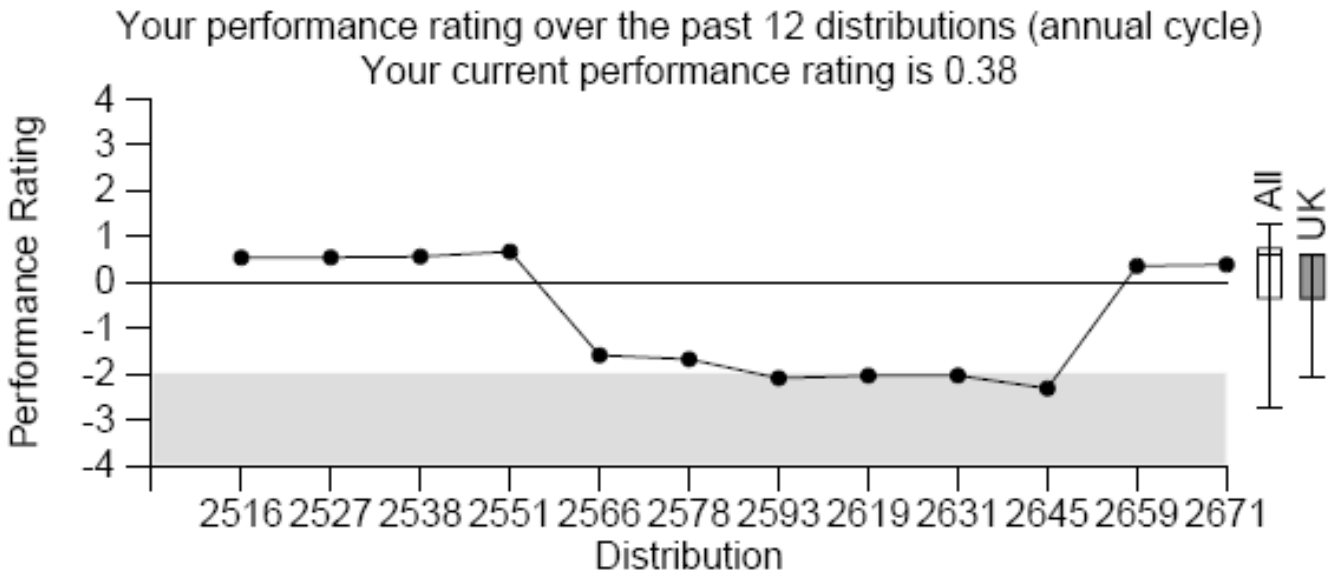
Cumulative score is less than mean score

PR – a form of ranking

Compares other labs examining the same specimens

Country specific if over 10 labs

Performance graphs



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Performance Governance

A brief summary of the relevant analysis is given below and a print-out of the details of your results for the relevant specimens is attached.

	Your total score	Total possible score	Average Score	Your performance rating
Antimicrobial susceptibility	221	230	227.64	-2.50

I realise that Quality Assessment results may not reflect the total performance of a laboratory but they are designed to help the head of the laboratory to assess the accuracy of the procedures carried out by his or her staff…….

Summary

- Raw descriptive data can be categorised and comparison made between the categories
- Comparisons can be interpreted
- Changes to the categories can be monitored over time
- Applying a numeric score allows ‘hard’ statistical analysis

Thanks

UK NEQAS for Microbiology team

National Quality Assurance Advisory Panel

Monika Manser and Peter Chiodini

Scheme participants