Developing an External Quality Assessment scheme for mumps virus IgG

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AIM

To prepare a pilot distribution for a mumps IgG EQA scheme with the intention of extending the existing UK NEQAS EQA measles IgG serology scheme.

OBJECTIVES

- To analyse values and qualitative interpretations reported by participants
- To identify different methodologies used for mumps IgG testing
- To gather information on the kits/assays used by the participants
- To determine the levels of interest for a future mumps serology EQA scheme

INTRODUCTION

Mumps is an acute infectious disease caused by a contagious Rubulavirus from the *Paramyxoviridae* family. It is spread by secretions sneezed or coughed from the nose or throat. Mumps infection is characterised by enlargement of the parotid or other salivary glands. In severe cases orchitis, arthritis, pancreatitis, mastitis, oophoritis or meningitis can also be occur. Mumps is considered as a common childhood disease but adolescents and adults can be infected if they are not immune. Though mumps during pregnancy is rare, the infection can cause embryonic and foetal death and spontaneous abortions [1].

Following the introduction of MMR (mumps, measles, and rubella) vaccine in October 1988, for children aged 12-15 months, mumps became much less common in the UK. Due to the falsified data published by Wakefield *et al* in 1998 correlating the triple vaccine to the development of autism, MMR coverage dropped by 12% in England and by 34% in London in 2003-2004[2]. In 2004 a number of mumps cases were reported among older teenagers and young adults especially those who would not have been vaccinated with two doses of MMR[3] .Due to the increase of mumps notifications and confirmed cases in UK and worldwide [4] the number of laboratories undertaking routine serological screening has increased. UK NEQAS decided to launch a pilot scheme for the detection of mumps virus IgG to support the testing laboratories and to provide evidence of the quality of testing.

METHOD

Distribution design

Thirty three specimens that had been previously tested for measles antibodies were screened in house for mumps virus IgG using Siemens Enzygnost and NovaTec Novalisa ELISA kits. Four specimens were selected for the pilot distribution based on the in house and reference laboratory results; with interpretations of negative, equivocal, positive for mumps IgG according to kit instructions. The results of the selected 4 specimens can be found in *Table 1*.

Specimen Number	bioMerieux VIDAS (TV)	Siemens Enzygnost		NovaTec Novalisa (NTU)	Siemens Enzygnost	
		Qualitative (OD)	(mIU/mL)		Qualitative (OD)	Quantitative (mIU/mL)
0905	3.37	0.60	3300	15.36	0.736	6448
0906	0.19	0.05	< 230	4.51	0.02	70
0907	0.95	EQ 0.19	EQ 540	EQ 10.63	EQ 0.11	EQ 331
0908	3.82	0.81	5800	25.10	0.962	10766
Grey zone/ * Cut off	0.35 - 0.50	0.1 - 0.2	< 230*	9 - 11	0.1 - 0.2	230 - 547

Table 1 - In house and reference laboratory results of the selected specimens for the pilot distribution

Key: **EQ** Equivocal, **NTU** NovaTech Units, **TV** Threshold Value, **OD** Optic Density, **IU** International Units.

In house results | Reference laboratory results

The specimens (500 µL) were dispatched as a part of the measles scheme, and participants were invited to test the specimens for mumps IgG. .

Participation

All 183 registered participants of the measles scheme were invited to participate in the mumps IgG pilot distribution. A reply form with instructions and a questionnaire was sent with the specimens in late April 2012. Participants were given 3 weeks to return the test and survey results.

RESULTS

Pilot EQA distribution

Of the 183 participants 125 returned the mumps reply forms to UK NEQAS. Of the 125, 19 specified they do not test for mumps IgG locally as the specimens are sent to reference laboratories. Test results sent by the remaining 106 laboratories were used to analyse the performance of the participants.

The two specimens containing higher levels of mumps IgG antibodies (0905, 0908) were reported as positive by all participants with performance at 100%.(n=106)

Overall performance for the negative specimen (0906) was 96% (n=102) with 3 participants reporting a positive and 1 participant reporting an equivocal result.

Results received for specimen 0907 were variable with 78% (n=83) reporting positive, 18% (n=19) reporting equivocal and 4% (n=4) reporting negative.

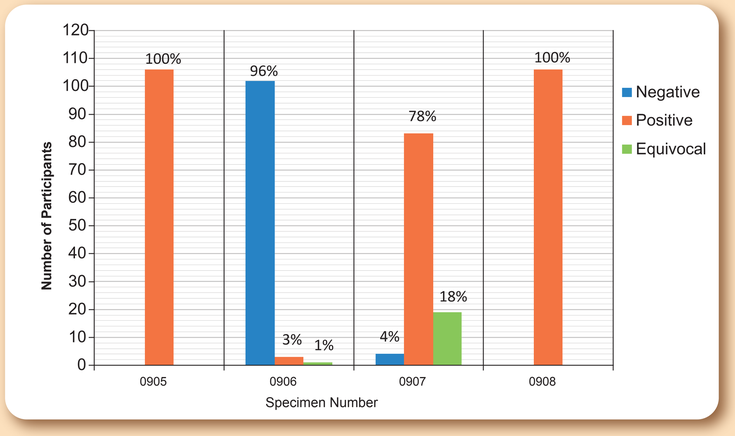

Figure 1 – Qualitative results reported by participants. The percentage shown refers to the proportion of results in each category

Participants used 13 different kits to detect Mumps IgG. The majority of them (54%) used bioMérieux Vidas, 9% used Siemens Enzygnost and 6% used Trinity Biotech Captia and Euroimmun.

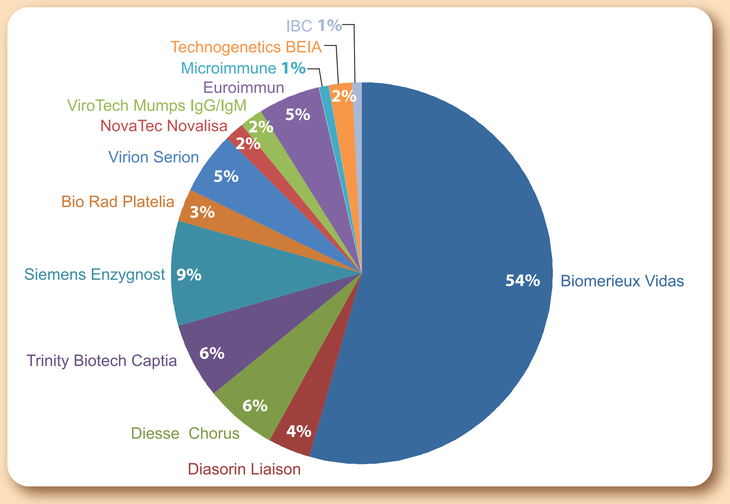

Figure 2 – Assays used by participants to test Mumps IgG. (n= 112) *some participants used more than one kit*

Participants who used Siemens Enzygnost, Euroimmun, Virion Serion,and Technogenetics BEIA were able to sent quantitative results in mIU/mL (n= 14) ***Table 2.***

	Siemens Enzygnost	Virion Serion	Technogenetics BEIA	Euroimmun	*In-house Multiplex Assay
0905	4100 - 5500	240 - 362	717 - 1000	93 - 127	677
0906	< 230	45 - 55	46 - 60	11 - 22	24
0907	500 - 720	47 - 80	100 - 160	16 - 27	136
0908	7500 - 8800	400 - 720	1000 - 1145	144 - 165	1100

Table 2 - Range of quantitative results sent by participants in mIU/ml using various kits

** One participant sent quantitative results in RiVM Units/ mL using a locally developed assay*

Low-level mumps antibody- specimen 0907

Specimen 0907 contained lower levels of antibody compared to those in specimens 0905 and 0908. Results reported were more varied (*figure 1*), Positive results were reported by 97% (57/59) of participants using the BioMerieux Vidas; 100% (7/7) using BioTech Trinity Captia and 100% (3/3) using the BioRad Platelia. Equivocal results were reported by 70% (7/10) participants using Siemens Enzygnost; 50% (1/2) participants using NovaTec Novalisa and 67% (4/6) participants using Euroimmun. Negative results were reported by 100% (2/2) participants using ViroTech and 33% (2/6) participants using Virion Serion.

Questionnaire

Participants were asked to answer five questions regarding their testing practices for mumps IgG. 111/183 participants (60%) provided feedback.

Number of specimens per annum

60% of the laboratories responding (67/111) test 500 or less specimens per annum for mumps IgG. While 500 to 2000 specimens are being tested by 24% of the participants (27/111), only 5% (6 /111) laboratories carry out mumps IgG testing for 2000 or more specimens per year.11 participants did not respond to this question.

Population Groups

'Healthcare workers' were the most tested population group with 60% (67/111) of participants testing them, followed by 'contacts' (42/111); 'occupational employment screen' (4/111); 'pregnant women' (2/111).

Standard panel

37 participants mentioned that testing mumps IgG is part of a standard panel of testing. 12/37 laboratories tested mumps IgG with measles, mumps and rubella antibodies. 13/37 participants tested mumps with measles, rubella and VZV antibodies. 12/37 did not specify which other markers were tested alongside mumps IgG.

73 commented that testing mumps IgG was not a part of standard panel.

Future EQA scheme

Overall 85 out of 111 participants were interested in participating in a future EQA scheme, including 36 participants who test mumps IgG as part of a standard panel and 49 participants who test for mumps IgG as a single marker.

CONCLUSIONS

- Participants' results reflected those obtained by our pre distribution tests.
- The specimens with higher levels of mumps IgG antibodies showed a greater concordance of results between participants (specimens 0905 and 0908). Lower-level antibodies (specimen 0907) showed more variability in results reported (as shown by data in the results section).
- As more than three quarter of the participants who contributed to the survey are interested in participating in a future EQA scheme for mumps IgG serology, this pilot scheme will be further developed in association with the measles serology scheme.

ACKNOWLEDGEMENTS

Dr Vivienne James, (Director, UK NEQAS for Microbiology), Priya Patel (Placement/Project supervisor), UK NEQAS staff, all reference and participating laboratories.

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