MRSA Screening

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Introduction

Healthcare-associated infections are a major problem for hospitals, in particular methicillin-resistant *Staphylococcus aureus* (MRSA). MRSA infection can range from asymptomatic colonisation to fatal septicaemia.

The United Kingdom National External Quality Assessment Service (UK NEQAS) for Microbiology MRSA screening scheme provides participants with the opportunity to assess the quality of culture and molecular screening techniques employed for the detection of MRSA. A total of 194 laboratories, representing 13 countries, participated in the scheme from 2009 to 2010. Six distributions were dispatched between April 2009 and March 2010, each comprising of two simulated nasal swabs.

Aim

To analyse the performance of clinical laboratories participating in the MRSA screening scheme.

Method

- From 2009 to 2010, 12 simulated nasal swab specimens were distributed.
- Specimens sent included seven positive and five negative for MRSA.
- Results reported by participants for these specimens were analysed to determine their performance with these specimens.

Results

Culture Results

- With the exception of one specimen (specimen 9281) performance by culture was very good with over 93% of participants reporting correctly on the detection of MRSA in eleven specimens (Tables 1a, 1b).
  - Specimen 9281 contained a MRSA and a coagulase negative staphylococcus; only 84.6% of participants reported correctly (Table 1a).
- The overall false positive rate for the MRSA negative specimens was 1.1% (10/916).
- The overall false negative rate for the MRSA positive specimens was 4.6% (58/1272).
- One specimen (9282) contained a ciprofloxacin susceptible community associated MRSA which 12 laboratories incorrectly reported as negative for MRSA (Table 1a).
- The number of participants using Oxoid Brilliance MRSA chromogenic agar increased from 64 to 84 during the first year of the scheme (Table 2).
- The number of participants using Heipha MRSA Ident Agar increased from one to 63 during the first year of the scheme (Table 2).

Molecular Results

- Overall performance by molecular methods was good with 93.9% (351/374) of participants reporting correctly on the detection of MRSA.
- The overall false positive rate for molecular methods with the MRSA negative specimens was 3.25% (5/154).
- The overall false negative rate for molecular methods with the MRSA positive specimens was 8.6% (19/220).
- The number of UK Cepheid Xpert users doubled from six to 12 during the first year of the scheme (Table 2).

Figure 1a: UK NEQAS for Microbiology scheme for MRSA screening (2009/2010): method breakdown of UK participants only

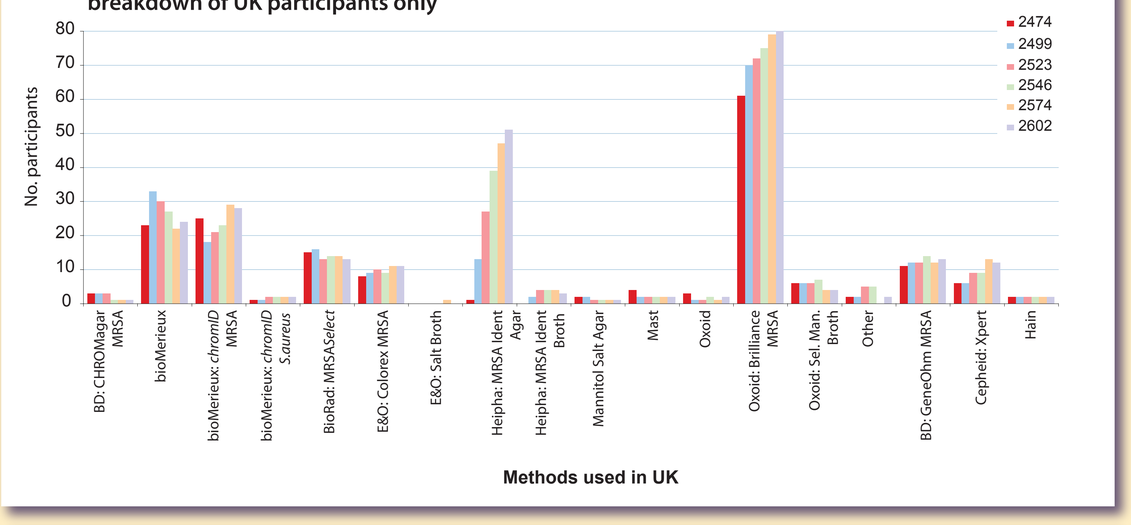

Figure 1b: UK NEQAS for Microbiology scheme for MRSA screening (2009/2010): method breakdown of non-UK participants

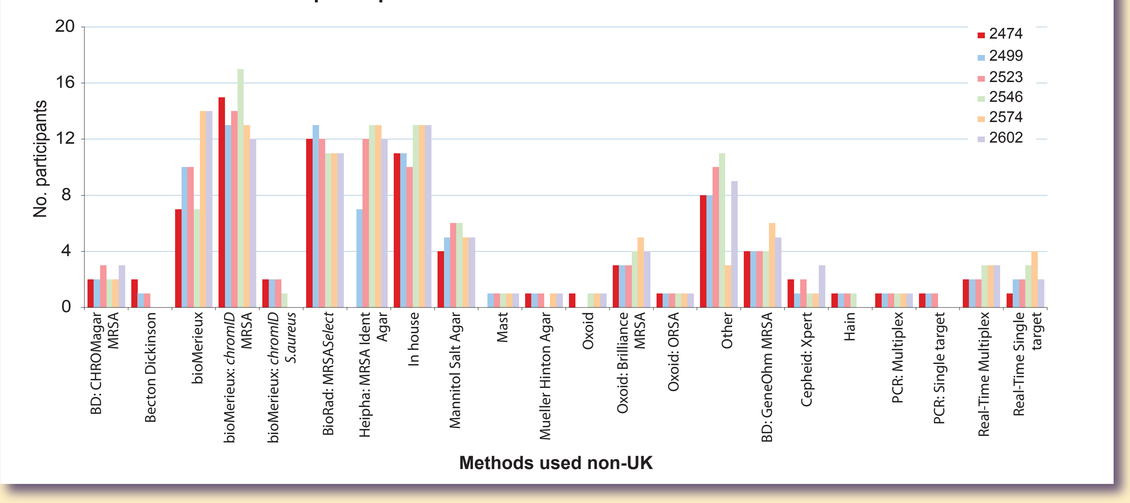

Figure 2: Example report for the MRSA screening scheme. The results are presented by method in the histograms.

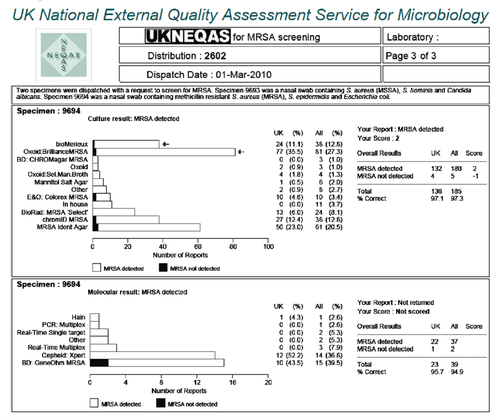

Table 2. Methods used by participants over the first year of the scheme

		Distribution 2474 (May 2009)	Distribution 2602 (March 2010)
	Methods	**UK (Non-UK)**	**UK (Non-UK)**
Culture	BD: CHROMagar MRSA	3 (2)	1 (3)
	Becton Dickinson	0 (2)	0 (0)
	bioMerieux	23 (7)	24 (14)
	bioMerieux: *chrom*ID MRSA	25 (15)	28 (12)
	bioMerieux: *chrom*ID *S. aureus*	1 (2)	2 (0)
	BioRad: MRSA*Select*	15 (12)	13 (11)
	E&O: Colorex MRSA	8 (0)	11 (0)
	E&O: Salt Broth	0 (0)	0 (0)
	Heipha: MRSA Ident Agar	1 (0)	51 (12)
	Heipha: MRSA Ident Broth	0 (0)	3 (0)
	In house	0 (11)	0 (13)
	Mannitol Salt Agar	2 (4)	1 (5)
	Mast	4 (0)	2 (1)
	Mueller Hinton Agar	0 (1)	0 (1)
	Oxoid	3 (1)	2 (1)
	Oxoid: Brilliance MRSA	61 (3)	80 (4)
	Oxoid: ORSA	0 (1)	0 (1)
	Oxoid: Sel. Man. Broth	6 (0)	4 (0)
	Other	2 (8)	2 (9)
Molecular	BD: GeneOhm MRSA	11 (4)	13 (5)
	Cepheid: Xpert	6 (2)	12 (3)
	Hain	2 (1)	2 (0)
	PCR: Multiplex	0 (1)	0 (1)
	PCR: Single target	0 (1)	0 (0)
	Real-Time Multiplex	0 (2)	0 (3)
	Real-Time Single target	0 (1)	0 (2)

Table 1a. Participant performance with specimens containing MRSA

	Percentage of participants fully correct: Culture			Percentage of participants fully correct: Molecular		
Specimen number	**UK participants**	**Non-UK participants**	**ALL participants**	**UK participants**	**Non-UK participants**	**ALL participants**
9281	84.0 (110/131)	93.5 (43/46)	86.4 (153/177)	87.5 (14/16)	100 (12/12)	92.9 (26/28)
9282	90.6 (116/128)	100 (45/45)	93.1 (161/173)	84.6 (11/13)	100 (14/14)	92.6 (25/27)
9359	97.0 (130/134)	100 (46/46)	97.8 (176/180)	80.0 (12/15)	90.0 (9/10)	84.0 (21/25)
9439	98.5 (130/132)	100 (49/49)	98.9 (179/181)	94.4 (17/18)	90.9 (10/11)	93.1 (27/29)
9507	93.5 (130/139)	100 (49/49)	95.2 (179/188)	80.0 (20/25)	83.3 (10/12)	81.1 (30/37)
9508	98.6 (137/139)	100 (49/49)	98.9 (186/188)	100 (25/25)	100 (12/12)	100 (37/37)
9694	97.1 (132/136)	98.0 (48/49)	97.3 (180/185)	95.7 (22/23)	93.8 (15/16)	94.9 (37/39)

Table 1b. Participant performance with specimens that did not contain MRSA

	Percentage of participants fully correct: Culture			Percentage of participants fully correct: Molecular		
Specimen number	**UK participants**	**Non-UK participants**	**ALL participants**	**UK participants**	**Non-UK participants**	**ALL participants**
9358	98.5 (132/134)	97.8 (45/46)	98.3 (177/180)	92.9 (13/14)	100 (8/8)	95.5 (21/22)
9440	98.5 (130/132)	98.0 (48/49)	98.3 (178/181)	94.7 (18/19)	100 (8/9)	92.9 (26/28)
9603	99.3 (138/139)	95.7 (44/46)	98.4 (182/185)	100 (23/23)	100 (11/11)	100 (34/34)
9604	100 (139/139)	100 (47/47)	100 (186/186)	100 (23/23)	100 (11/11)	100 (34/34)
9693	97.1 (132/136)	98.0 (48/49)	99.5 (183/184)	95.7 (22/23)	93.8 (15/16)	94.4 (34/36)

Discussion

- Specimen 9282 contained a ciprofloxacin susceptible MRSA. There is an increasing number of ciprofloxacin susceptible MRSAs being reported in the UK and in other countries. These organisms can be found in both community and healthcare settings and have been identified in nosocomial outbreaks.
- The most commonly used culture method in the UK was Oxoid Brilliance MRSA chromogenic agar (Figure 1a).
- The most commonly used culture method for non-UK participants was various bioMerieux media (Figure 1b).
- The most commonly used molecular method for all participants was the BD GeneOhm MRSA assay (Figure 1a, b).
- Results from the UK NEQAS MRSA screening scheme will help participants monitor the performance of their methods (Figure 2).
- During the 12 months the scheme has been running, the number of laboratories reporting molecular screening results has risen from 22 to 39, which is an increase of 56.4%.
- The scheme has been well received and participation increased to 306 laboratories (19 countries) in April 2010.

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