PC - 1029

MICROBIOLOGY EXTERNAL QUALITY ASSURANCE SCHEME

Under the aegis of Indian Association of Medical Microbiologists

IAMM EQAS New Delhi

Department of Clinical Microbiology & Immunology

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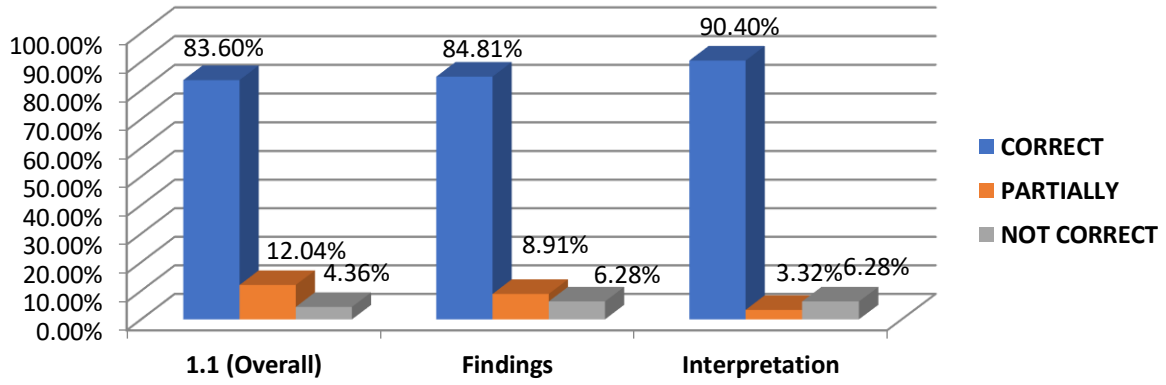
RESULT ANALYSIS
Learning & Feedback

29th QC Package, Cycle 2022, Round 1 (March)

Total participants in EQAS scheme (n= 631)

Fig 1:Bronchoalveolar, Kinyoun Stain (n =573)

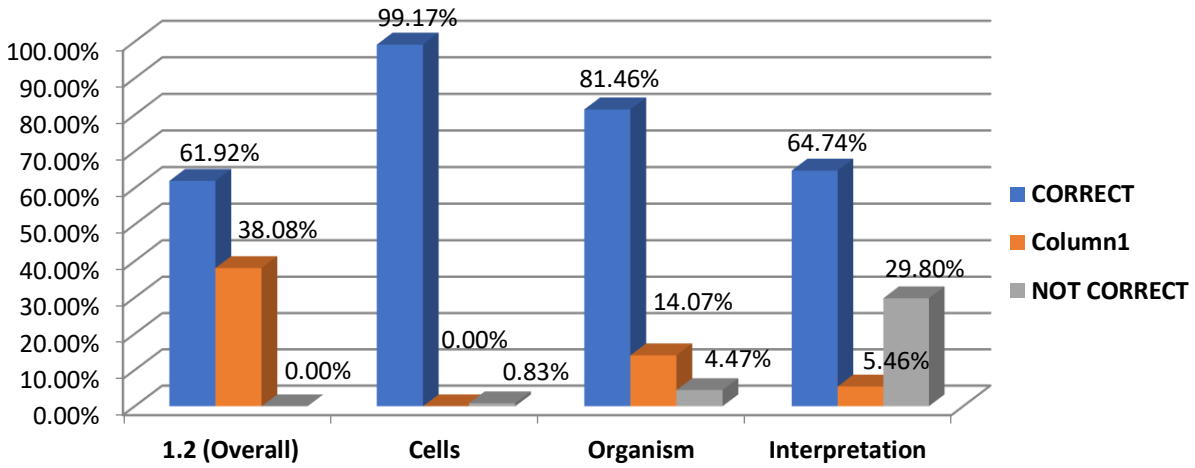


Q- 1.1 (SMEAR) [Few acid fast, slender, branching filamentous organism resembling Nocardia]

1.1 Gram's stain of BAL fluid:

A total of 573 participants reported on the smear of which an overall 83.60% interpreted it correctly, 12.04% got it partially correct and 4.36% got it incorrect (Fig. 1). Amongst the partially correct participants, 8.91% did not describe the acid fastness of the bacteria which is mandatory while reporting on a Kinyoun stain, but did mention the other characteristics of the organism like branching filamentous bacteria. 3.32% reported actinomycetes and got partially correct in interpretation. Those who got it wrong either did not describe the organism morphologically or interpreted incorrectly. A total of 4.36% did not fetch any marks, though a small number, but one need be careful in reporting such smears.

Fig 2: Pus Sample, Gram Stain (n = 604)

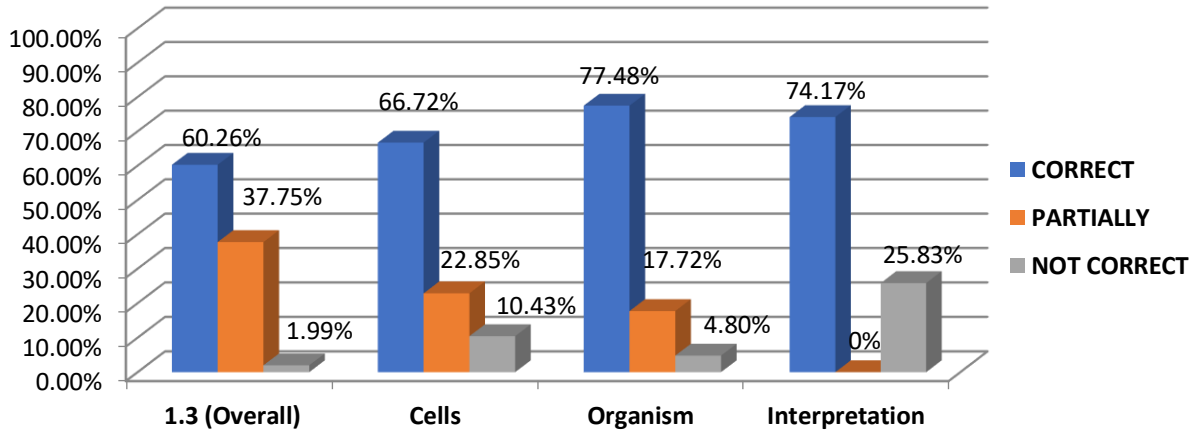


Q- 1.2 (SMEAR) [Many GPC in pairs and chains , infection due to Enterococcus species]

1.2 Gram's stain of Pus sample:

This is one of the most common sample and a common stain which a microbiologist gets to report on. Amongst a total of 604 participants, 61.92% got it completely correct and 38.8% got it partially correct. None got it completely wrong (Fig.2). 99.17% identified the presence of cells, and 81.46% described the organism and its arrangement correctly, those 14.07% who reported partially correct described mixed organisms of both GNB and GPCs and hence got the interpretation also partially wrong. 29.8% participants got the organism wrong and had an incorrect interpretation. Considering the commonality of this sample and the stain one needs to put in some effort to always try and interpret it correctly which only 64.74% participants have done.

Fig 3: Sputum Sample, Gram Stain (n =604)



Q- 1.3 (SMEAR) [Many epithelial cells with URT flora, poor quality specimen]

1.3. Gram stain of sputum sample:

Gram stain remains the cornerstone of diagnostic testing in the microbiology laboratory for the guidance of empiric treatment prior to availability of culture results. Incorrectly interpreted Gram stains may adversely impact patient care as was seen in this exercise 1.3. Interpreting the quality of a sputum smear and scoring the smear prior to interpreting is of great importance. Only 66.72% patients could do it correctly. Though 74.17% could interpret it correctly, only 60.26% could get it absolutely correct.

Q2: Culture Identification &Sensitivity (n=600)

Table 1: Various methods used by the participants for Identification

Identification Method Details	**2.1 *Klebsiella pneumoniae***	**2.2 *Staphylococcus aureus***	**2.3 *Burkholderia cepacia***
Total Response	**585**	**582**	**580**
Correct Response/ Total Response (%)			
1- Manual Method	222/243 (91.36%)	240/245 (97.95%)	188/236 (79.66%)
2- Automated Method	340/342 (99.12%)	336/337 (99.71%)	339/344 (98.55%)
(i) VITEK-2	285/286 (99.65%)	281/282 (99.64%)	287/291 (98.63%)
(ii) Microscan	13/13*	14/14 *	12/12 *
(iii) BD Phoenix	26/27 (96.29%)	25/25 (100%)	25/26 (96.15%)
(iv) MALDITOF	13/13 *	13/13 *	12/12 *
(v) DL-96	3/3 *	3/3 *	3/3 *

***Numbers small for % interpretation.**

Culture identification: As shown in Table 1 more than 90% of the participants identified the organisms correctly in the first two exercises 2.1, 2.2 and 79.66% got it correct for exercise 2.3 by manual method; however by automated methods more than 98% of the participants could identify the organisms correctly in all the three exercises.

To repeat again those relying on manual methods need to revise and reiterate the conventional methods of identification of organisms.

Table 2a: Culture Identification & Sensitivity

QC No. 29	**Description (Culture Identification & Sensitivity)**	**Lab (%) Giving No. Correct Result**
(2.1)	***Klebsiella pneumoniae*(n=585)**	**Correct-78.97% Partially Correct-19.49% Not Correct- 1.54%**
(2.2)	***Staphylococcus aureus*(n=582)**	**Correct -74.57% Partially Correct –25.26% Not Correct–0.17%**
(2.3)	***Burkholderia cepacia* (n=580)**	**Correct -79.83% Partially Correct –14.14% Not Correct –6.03%**

However after clubbing both identification and sensitivity approximately 77% participants could report it correctly (Table 2a, Fig.4).

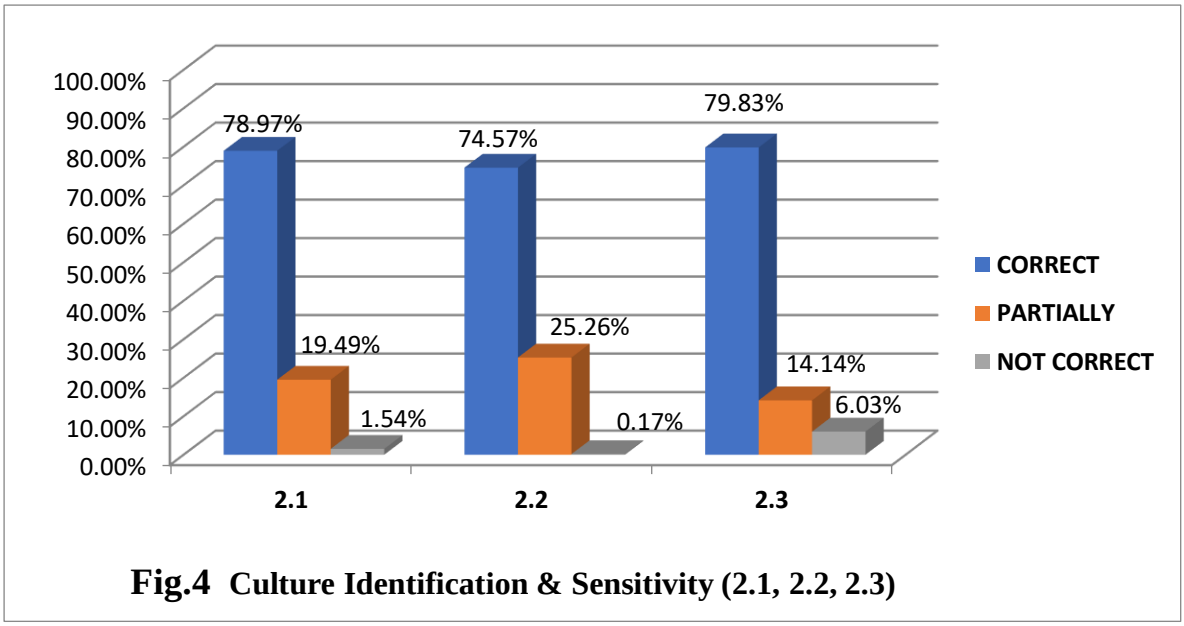


Fig.4 Culture Identification & Sensitivity (2.1, 2.2, 2.3)

Table 2b, Exercise 2.1

Total Response (n=585)	Automated Method (MIC)	Manual Method (Disc Diffusion)	Not attempted n (%)	Very Major Error n (%)	Major Error n (%)	Minor Error n (%)
(2.1) *Klebsiella pneumoniae*(n=576)	Correct Response/ Total Response (%)	Correct Response/ Total Response (%)				
Ceftriaxone (R)	323/325(99.38%)	241/247(97.57%)	4 (0.69%)	7 (1.22%)	-	1 (0.17%)
Ciprofloxacin(R)	336/337(99.70%)	235/238(98.73%)	1 (0.17%)	2 (0.34%)	-	2 (0.34%)
Co-trimoxazole (S)	319/333(95.79%)	163/242(67.35%)	1 (0.7%)	-	87 (15.13%)	6 (1.04%)
Piperacillin/ Tazobactam (S)	NOT EVALUATED					
Gentamicin (S)	338/339(99.70%)	223/237(94.09%)	-	-	12 (2.08%)	3 (0.52%)
• 9* **Participants identified the genus as well as species incorrectly.**						

Exercise 2.1:

Of the 585 participants, the AST results of 576 were evaluated. 9 participants identified the genus as well as species incorrectly (Table 2b, exercise 2.1). A total of 78.97% (Table 2a, fig 4 Ex. 2.1) participants got this exercise absolutely correct for both identification and AST. Most participants reported correctly for antibiotics ceftriaxone, ciprofloxacin and Gentamicin, both by manual and automated methods (table 2b, Ex 2.1) (Fig 4a); however with co-trimoxazole a major error of 15.13% was noticed, more pronounced by participants using manual methods. The pH of the media and the QC of the media used for AST as well as the QC of the antibiotic disc should be stringent to prevent such errors. Regular quality checks of automated machines also need to be re-emphasized.

For Piperacillin & Tazobactam disc since 70.59% participants did not refer to the 32nd edition of the 2022 CLSI guidelines, wherein the criteria of interpretation have changed, only 28.07% participants did refer to the CLSI 2022 guidelines. Therefore, this exercise was not evaluated.

Table: 2b, Exercise 2.2

Total Response (n-582)	**Automated Method (MIC)**	**Manual Method (Disc Diffusion)**	**Not attempted n (%)**	**Very Major Error n (%)**	**Major Error n (%)**	**Minor Error n (%)**
(2.2)*Staphylococcus aureus* (n-581)*	**Correct Response/ Total Response (%)**	**Correct Response/ Total Response (%)**				
Ciprofloxacin(R)	326/326 (100%)	216/255 (84.70%)	-	19 (3.27%)	-	20 (3.44%)
Vancomycin (S)	329/340 (96.76%)	**127/226 (56.19%)** **DD-99 participants E test-115/116 BMD-10/11	15 (2.58%)	-	8 (1.71%)	5 (1.07%)
Erythromycin (R)	336/337 (99.70%)	240/244 (98.36%)	-	2 (0.34%)	-	3 (0.51%)
Clindamycin (R)	335/335 (100%)	239/245 (97.55%)	1 (0.17%)	5 (0.86%)	-	1 (0.17%)
Benzylpenicillin /Ampicillin (R)	339/339 (100%)	231/239 (96.65%)	3 (0.51%)	6 (1.04%)	-	2 (0.34%0

*** 1 Participants identified the genus and species incorrectly.**

**** As per the CLSI antibiotic susceptibility interpretation for vancomycin is based on MIC result only. Disc diffusion is not a valid method·**

Exercise 2.2:

A total of 582 participants reported on this exercise; however 581 isolates were evaluated as one participant got both the species and genus wrong and was not evaluated. Those reporting AST by automated methods fared well with an average correct response of around 99%. Only 55.3% got it correct for vancomycin as 43.80% (99/226) of the participants performed disc diffusion for vancomycin, which is not a valid method of susceptibility interpretation as per the CLSI guidelines (Table 2b, Ex 2.2), (Fig 4b)

Table 2b, Exercise 2.3

Total Response (n= 580)	**Automated Method (MIC)**	**Manual Method (Disc Diffusion)**	**Not attempted n (%)**	**Very Major Error n (%)**	**Major Error n (%)**	**Minor Error n (%)**
(2.3) *Burkholderia cepacia* (n= 545) *	**Correct Response/ Total Response (%)**	**Correct Response/ Total Response (%)**				
Co-trimoxazole (S)	322/324 (99.38%)	220/221 (99.55%)	-	-	3 (0.55%)	-
Ceftazidime (S)	307/316 (97.15%)	195/226 (86.28%)	3 (0.55%)	-	31 (5.72%)	9 (1.66%)
Meropenem (S)	317/323 (98.14%)	219/222 (98.65%)	-	-	3 (0.55%)	6 (1.10%)
Minocycline (S)	300/303 (99%)	222/228 (97.37%)	14 (2.57%)	-	7 (1.32%)	2 (0.38%)
*** 35 Participants identified the genus and species incorrectly .**						

Exercise 2.3:

A total of 580 participants attempted this exercise but only 545 candidates were evaluated as 35 participants identified the organism incorrectly. Most of these 35 participants who got it wrong used manual methods of identification. Similarly for AST 5.72% participants had major error for ceftazidime sensitivity (Table 2b, Exercise 2.3). The error was more pronounced by using manual method (86.28%) as compared to the automated one (97.15%) (Fig. 4C, 2.3) underscoring the value, and need for stringent quality checks of the antibiotic discs and the media.

Fig 4a : **(2.1) AST of *Klebsiella pneumoniae***

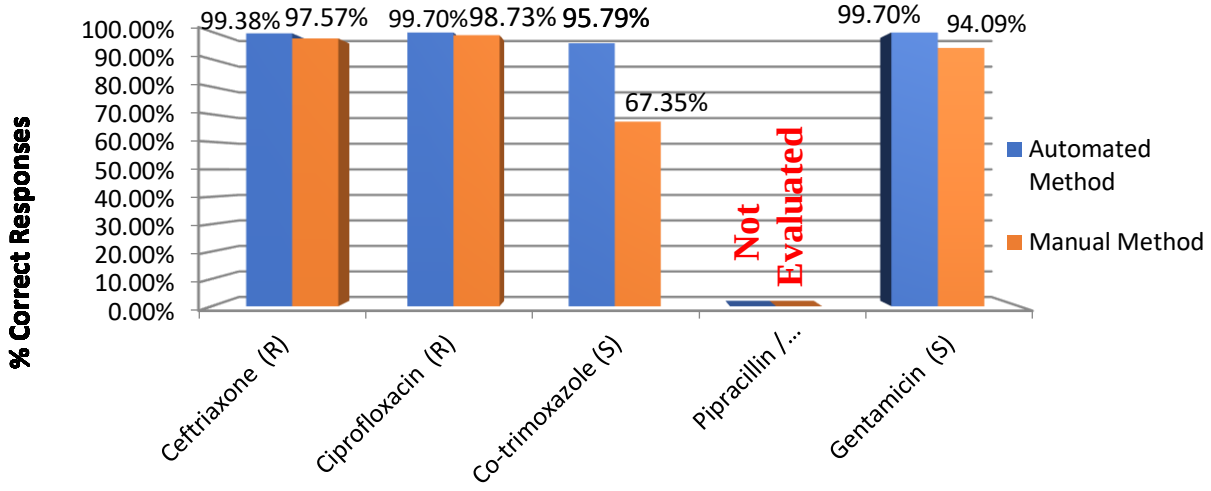


Fig 4b : **(2.2) AST of *Staphylococcus species***

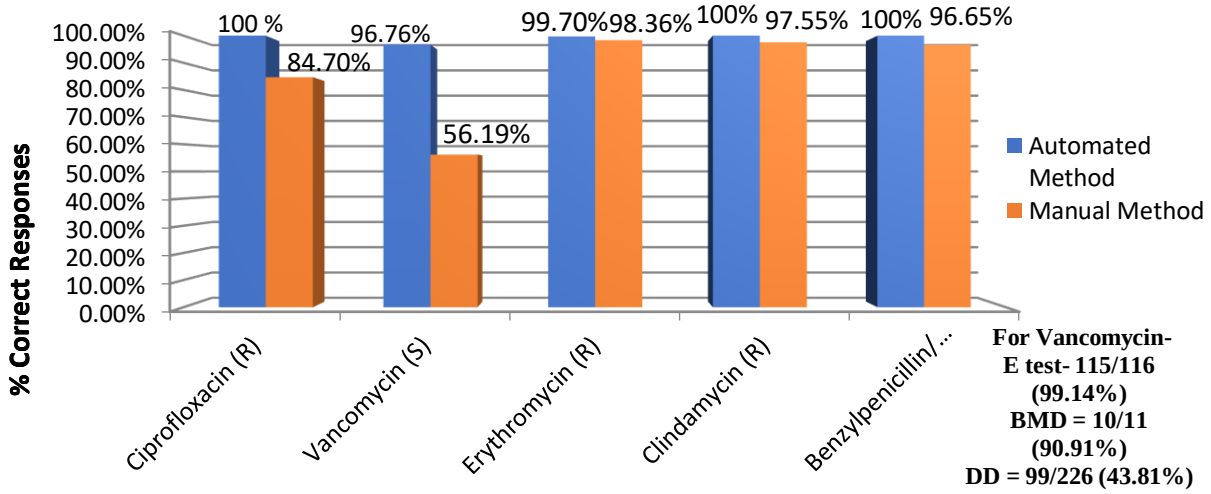
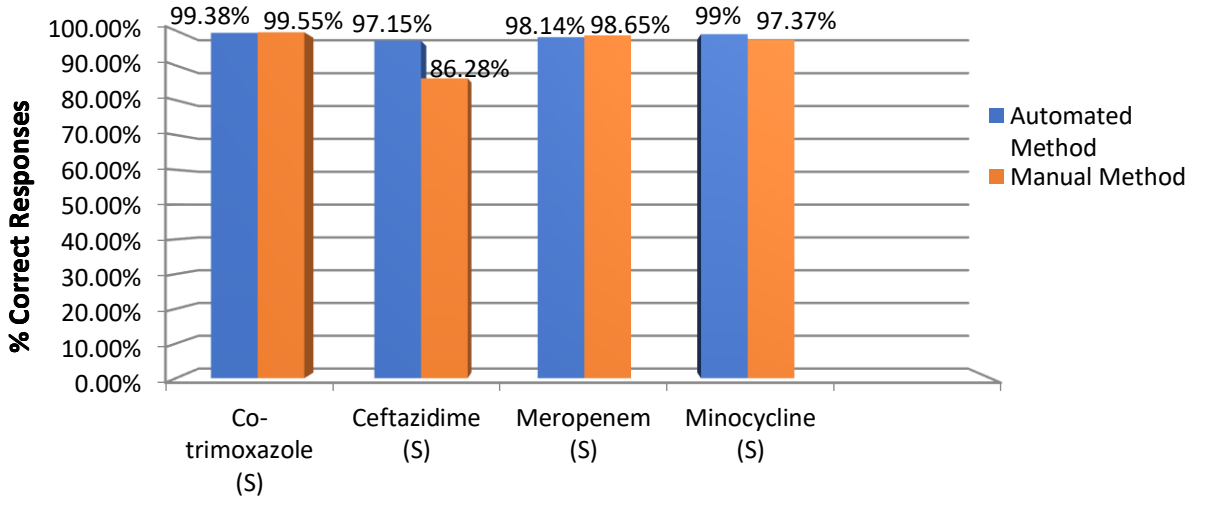


Fig 4c : **(2.3) AST of Burkholderia cepacia**



Q3: SEROLOGY & BBV

Table 3:

QC No. 29	Description Serology & BBV	Total Responses	Lab (%) Giving No. Correct Result
(3.1.1)	Typhidot (IgM)	518	Correct- 97.30% Not Correct-2.70%
(3.1.2)	CRP	577	Correct- 97.92% Not Correct-2.08%
(3.2.1)	HIV, HBsAg, HCV	611	Correct –98.74% Not Correct- 1.26%
(3.2.2)	HIV, HBsAg, HCV	611	Correct- 99.29% Not Correct- 0.71%
(3.2.3)	HIV, HBsAg, HCV	611	Correct- 98.20% Not Correct- 1.80%
(3.2.4)	HIV, HBsAg, HCV	611	Correct- 99.07% Not Correct- 0.93%

Exercise 3.1.1:

A total of 518 participants attempted this exercise and more than 97.30% got the correct results. (Table 3 & Fig 5). 2.7% reported it incorrectly. Those who faltered had used card test and ICT (Fig 5a (3.1.1). Card test and ICT is operator dependant and one need be careful in using it.

Exercise 3.1.2:

A total of 577 participants attempted this exercise and 97.92% analysed it correctly (Table 3). The method that flawed the most was card test (Fig 5b: 3.1.2). This reiterates the fact that card test is operator dependent and needs to be interpreted with caution.

Exercise 3.2.1, 3.2.2, 3.2.3, 3.2.4:

A total of 611 participants attempted the 4 exercises of blood borne viral serology (Table 3). More than 97% participants got it correct. Few incorrect answers were not specific to any one method (Fig.5c,d,e,f,g,h,i,j,k,l,m,n). However it needs to be reiterated that sensitive assays like ELFA, CLIA, CMIA should have the QC in place as false positivity is always an “Achilles heel” with very sensitive assays. Running an IQC with each run can minimize the errors.

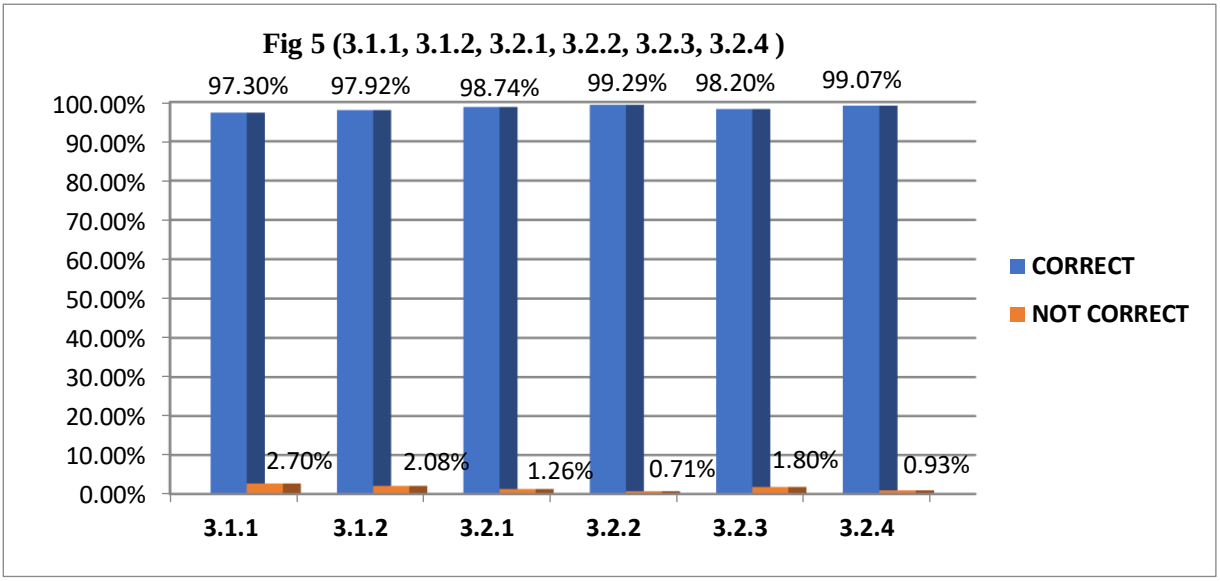


Fig 5 (3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.2.3, 3.2.4)
97.30%
97.92%
98.74%
99.29%
98.20%
99.07%
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
2.70%
2.08%
1.26%
0.71%
1.80%
0.93%
3.1.1
3.1.2
3.2.1
3.2.2
3.2.3
3.2.4
CORRECT
NOT CORRECT

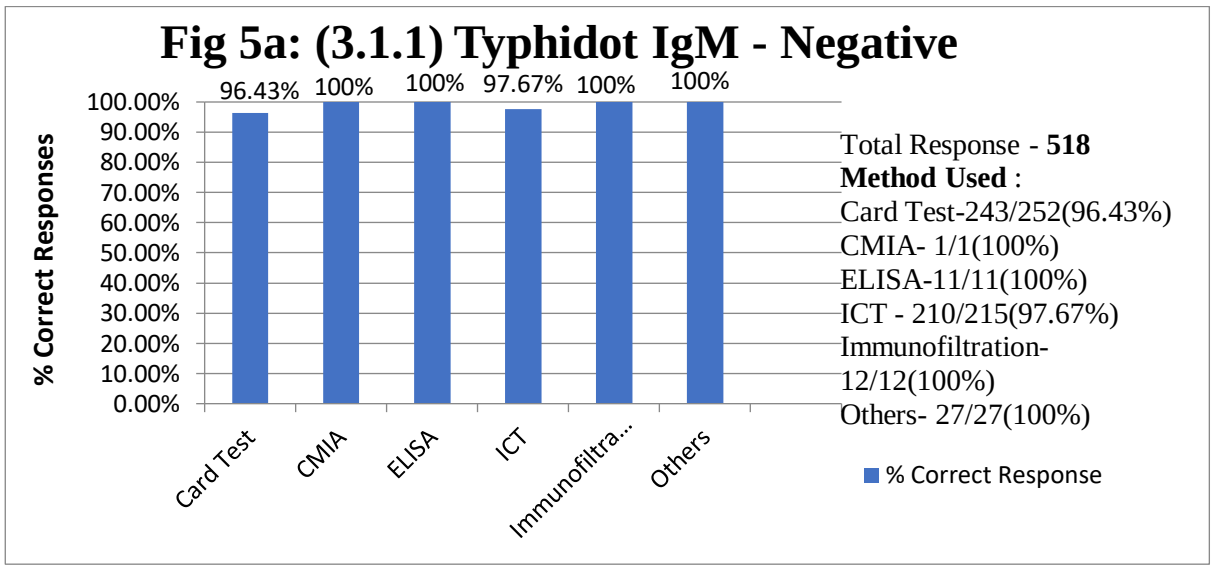


Fig 5a: (3.1.1) Typhidot IgM - Negative
% Correct Responses
96.43%
100%
100%
97.67%
100%
100%
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Card Test
CMIA
ELISA
ICT
Immunofiltra...
Others
Total Response - 518
Method Used :
Card Test-243/252(96.43%)
CMIA- 1/1(100%)
ELISA-11/11(100%)
ICT - 210/215(97.67%)
Immunofiltration-
12/12(100%)
Others- 27/27(100%)
% Correct Response

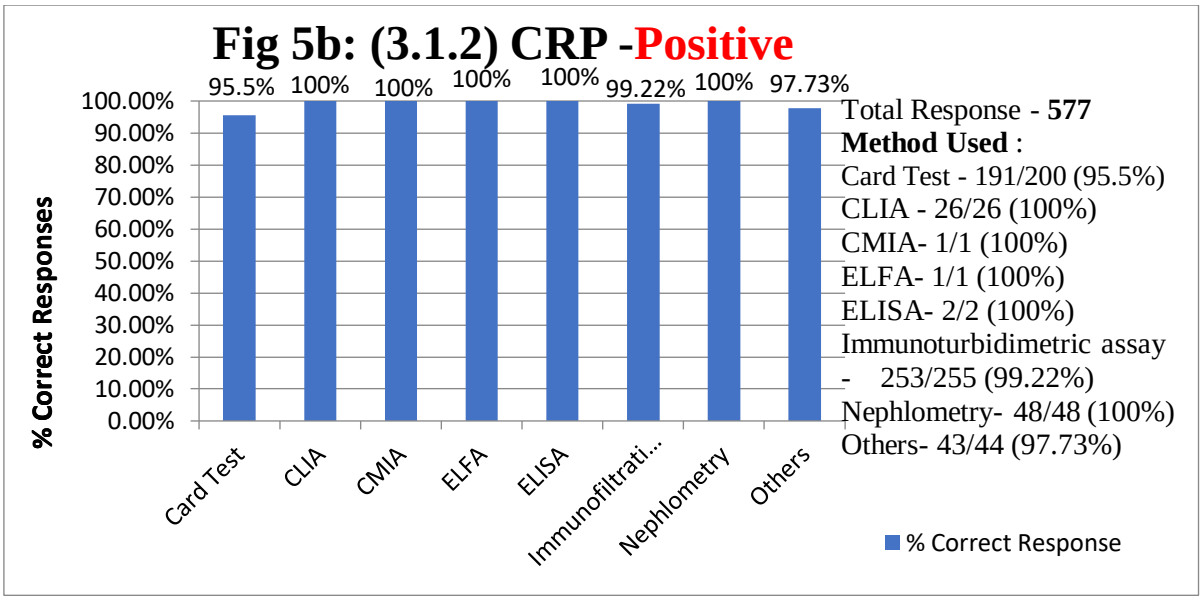
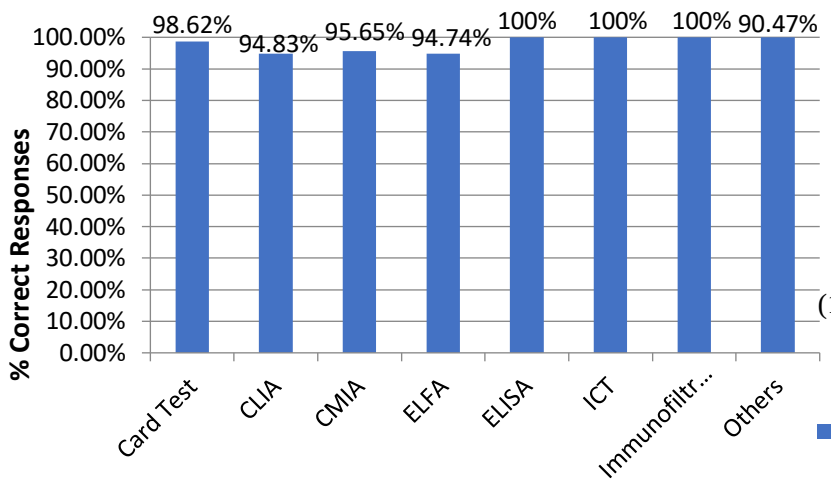


Fig 5b: (3.1.2) CRP -Positive
% Correct Responses
95.5%
100%
100%
100%
100%
99.22%
100%
97.73%
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Card Test
CLIA
CMIA
ELFA
ELISA
Immunofiltrati...
Nephlometry
Others
Total Response - 577
Method Used :
Card Test - 191/200 (95.5%)
CLIA - 26/26 (100%)
CMIA- 1/1 (100%)
ELFA- 1/1 (100%)
ELISA- 2/2 (100%)
Immunoturbidimetric assay
- 253/255 (99.22%)
Nephlometry- 48/48 (100%)
Others- 43/44 (97.73%)
% Correct Response

Fig 5c: (3.2.1) HBsAg- Negative

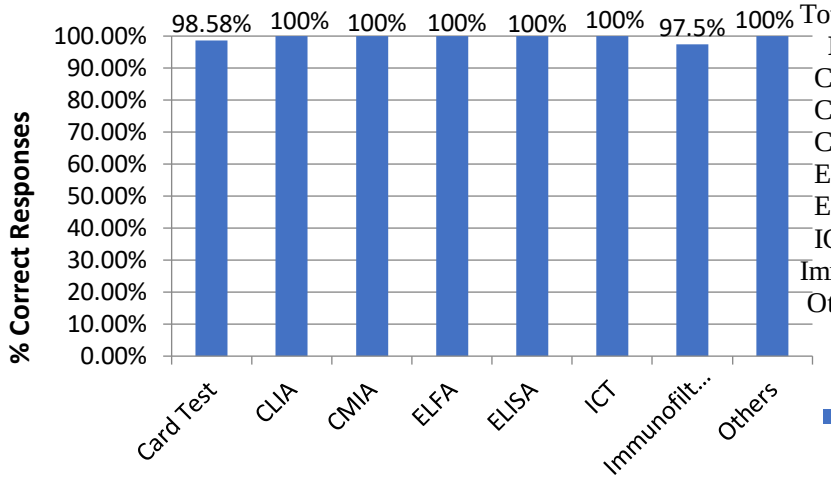


Total Response - **611**

Method Used :

Card Test- 215/218 (98.62%)
CLIA - 110/116 (94.83%)
CMIA - 44/46 (95.65%)
ELFA - 18/19 (94.74%)
ELISA - 64/64 (100%)
ICT - 115/115 (100%)
Immunofiltration - 12/12 (100%)
Others - 19/21 (90.47%)

Fig 5d: (3.2.1) HCV- Positive

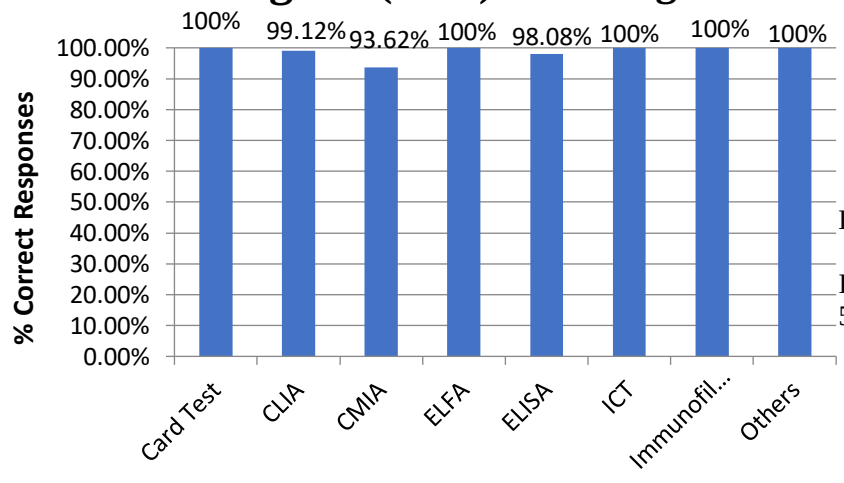


Total Response - **609**

Method Used :

Card Test -209/212(98.58%)
CLIA - 117/117(100%)
CMIA - 43/43 (100 %)
ELFA - 19/19 (100%)
ELISA - 65/65 (100%)
ICT - 92/92 (100%)
Immunofiltration-39/40(97.5 %)
Others - 21/21 (100 %)

Fig 5e: (3.2.1) HIV- Negative

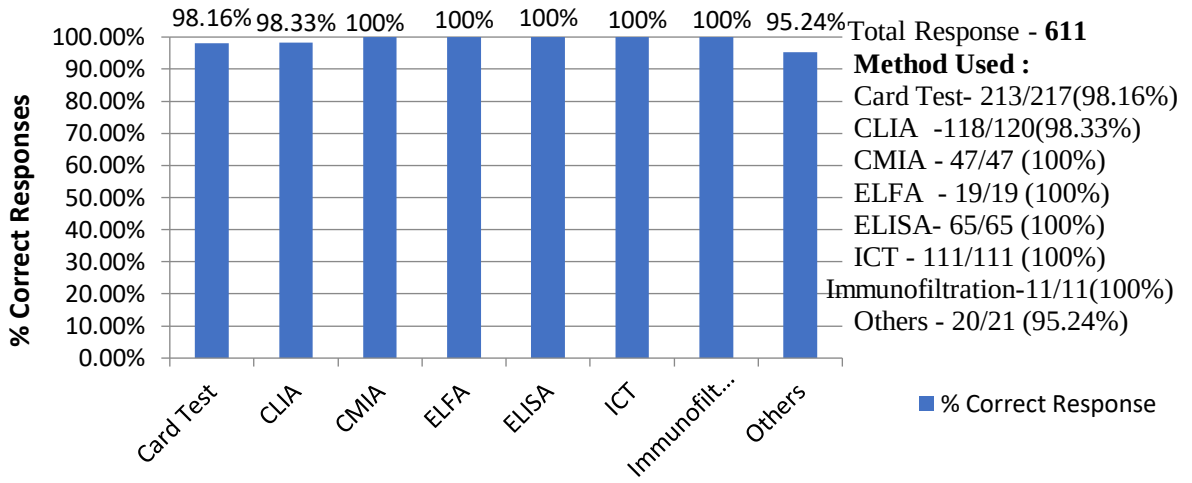


Total Response - **612**

Method Used :

Card Test-217/217 (100%)
CLIA - 113/114 (99.12%)
CMIA - 44/47 (93.62%)
ELFA - 14/14 (100%)
ELISA- 51/52 (98.08%)
ICT - 78/78 (100%)
Immunofiltration- 51/51(100%)
Others - 39/39 (100%)

Fig 5f: (3.2.2) HBsAg- Positive

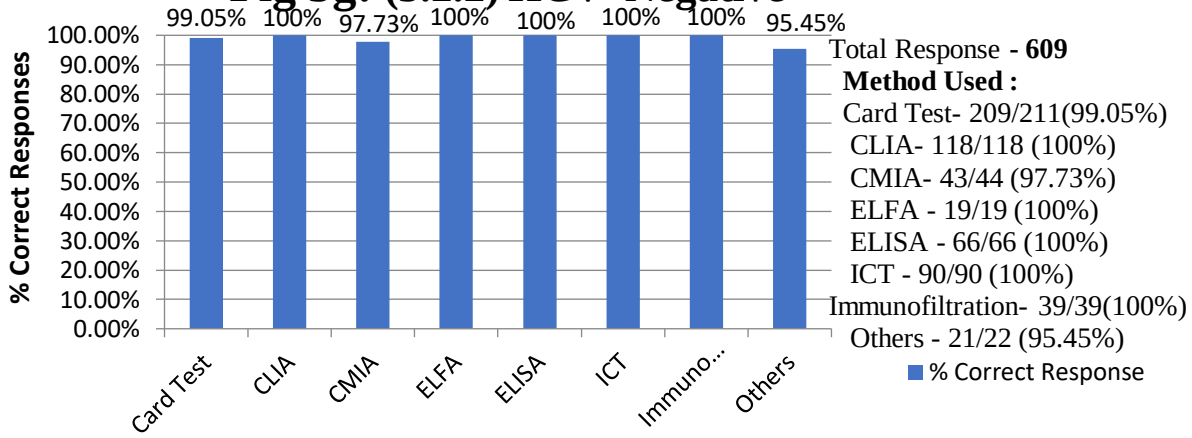


Total Response - **611**

Method Used :

Card Test- 213/217(98.16%)
CLIA -118/120(98.33%)
CMIA - 47/47 (100%)
ELFA - 19/19 (100%)
ELISA- 65/65 (100%)
ICT - 111/111 (100%)
Immunofiltration-11/11(100%)
Others - 20/21 (95.24%)

Fig 5g: (3.2.2) HCV- Negative

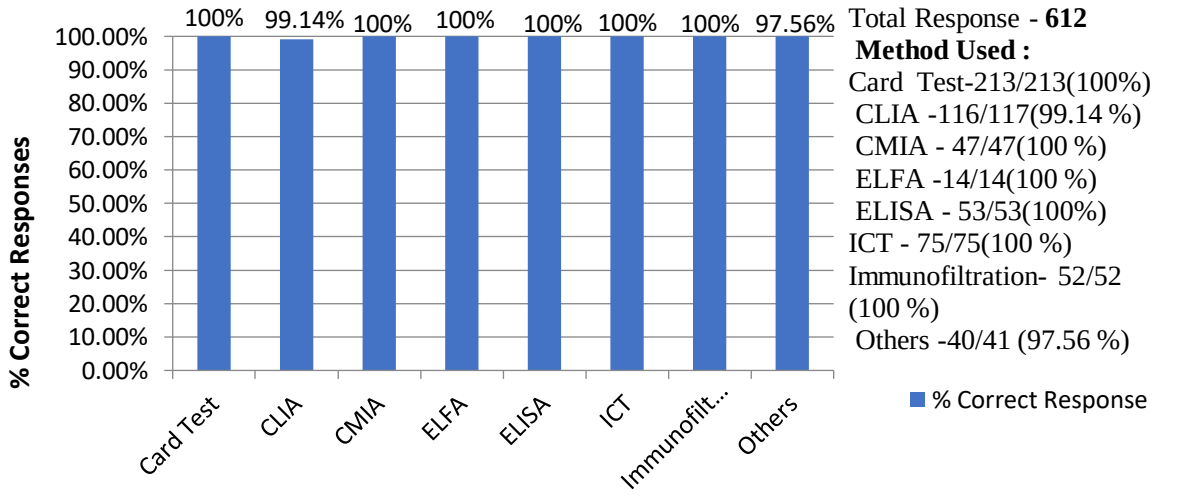


Total Response - **609**

Method Used :

Card Test- 209/211(99.05%)
CLIA- 118/118 (100%)
CMIA- 43/44 (97.73%)
ELFA - 19/19 (100%)
ELISA - 66/66 (100%)
ICT - 90/90 (100%)
Immunofiltration- 39/39(100%)
Others - 21/22 (95.45%)

Fig 5h: (3.2.2) HIV-Negative

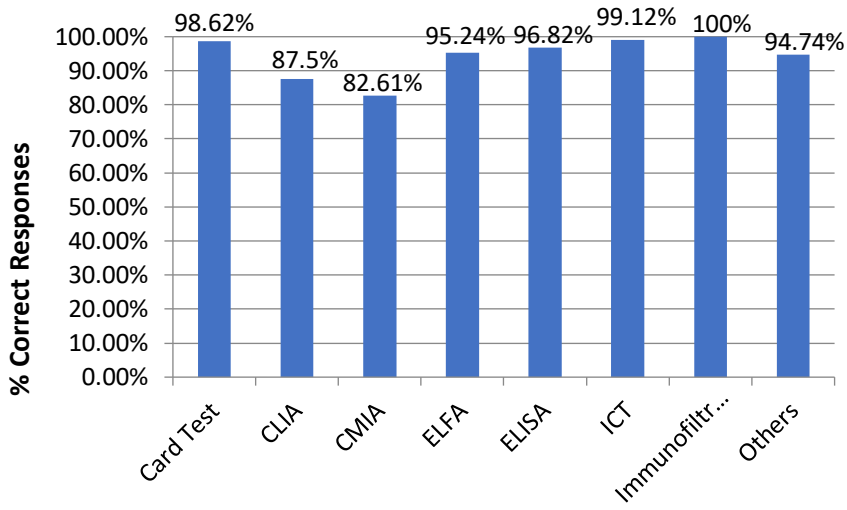


Total Response - **612**

Method Used :

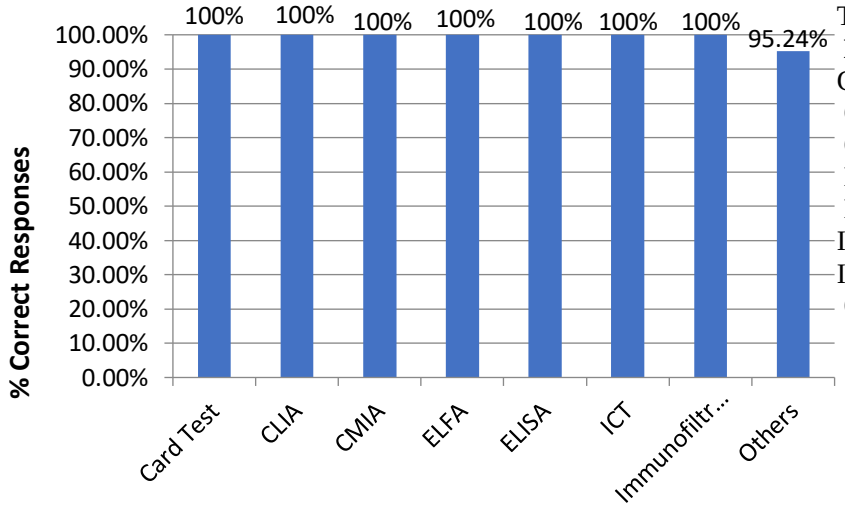
Card Test-213/213(100%)
CLIA -116/117(99.14 %)
CMIA - 47/47(100 %)
ELFA -14/14(100 %)
ELISA - 53/53(100%)
ICT - 75/75(100 %)
Immunofiltration- 52/52 (100 %)
Others -40/41 (97.56 %)

Fig 5i: (3.2.3) HBsAg-Negative



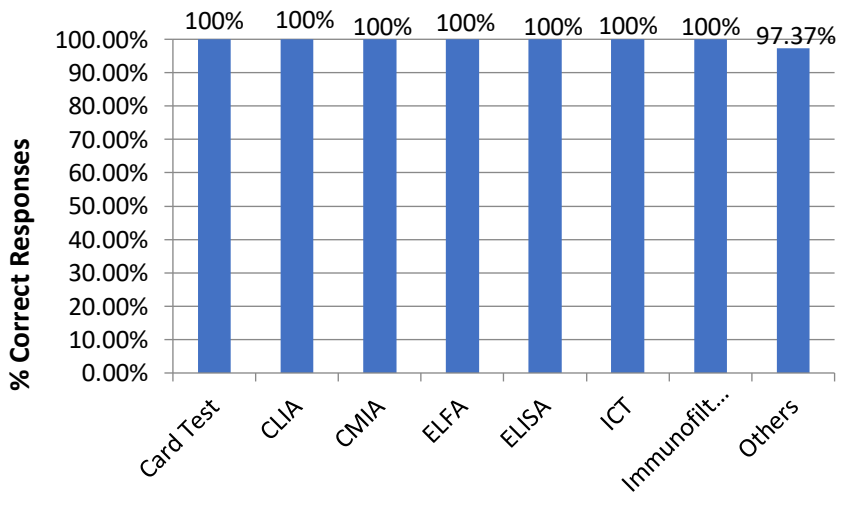
Total Response - **611**
Method Used :
Card Test-214/217(98.62 %)
CLIA -105/120(87.5 %)
CMIA -38/46(82.61 %)
ELFA -20/21(95.24%)
ELISA -61/63(96.82 %)
ICT -113/114(99.12%)
Immunofiltration-11/11 (100 %)
Others -18/19(94.74%)

Fig 5j: (3.2.3) HCV-Negative



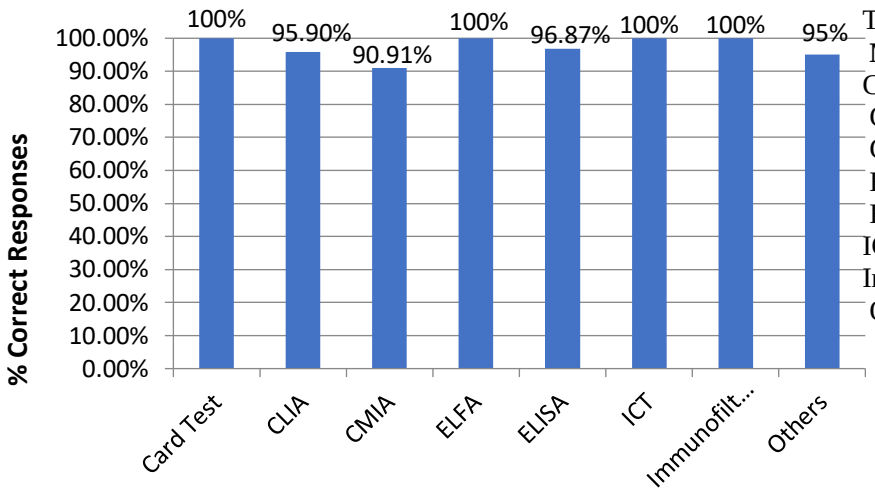
Total Response - **609**
Method Used :
Card Test-211/211(100 %)
CLIA -120/120(100 %)
CMIA -43/43(100 %)
ELFA -20/20(100 %)
ELISA -66/66(100 %)
ICT -88/88(100 %)
Immunofiltration-40/40(100 %)
Others -20/21(95.24 %)

Fig 5k: (3.2.3) HIV-Negative



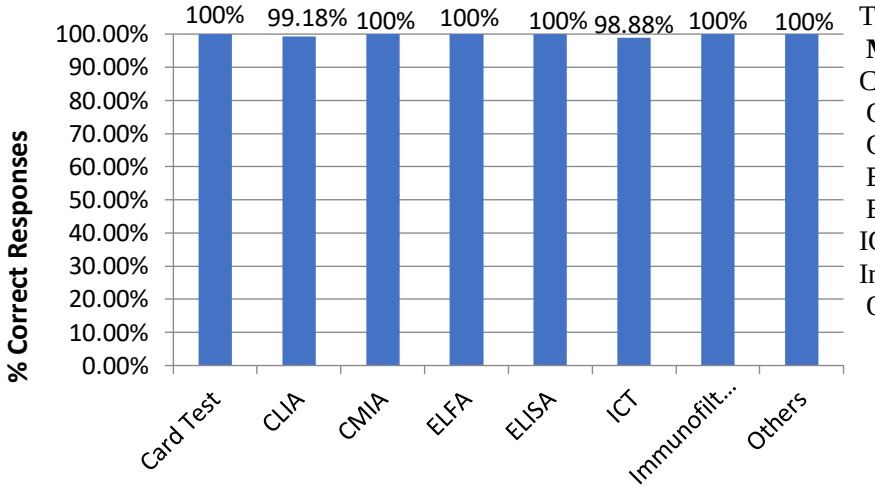
Total Response - **612**
Method Used :
Card Test-214/214(100%)
CLIA -117/117(100%)
CMIA -47/47(100%)
ELFA -15/15(100%)
ELISA -54/54(100%)
ICT -74/74(100%)
Immunofiltration-53/53 (100 %)
Others -37/38(97.37%)

Fig 5l: (3.2.4) HBsAg-Negative



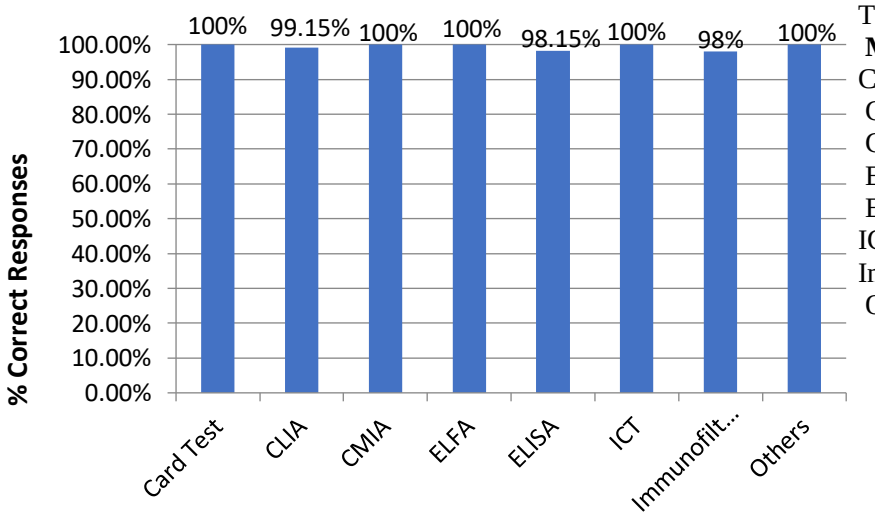
Total Response - **611**
Method Used :
Card Test-218/218(100%)
CLIA -117/122(95.90%)
CMIA -40/44(90.91%)
ELFA - 18/18(100%)
ELISA -62/64(96.87%)
ICT -114/114(100%)
Immunofiltration-11/11(100%)
Others -19/20(95 %)

Fig 5m: (3.2.4) HCV-Negative



Total Response - **609**
Method Used :
Card Test-211/211(100%)
CLIA -121/122(99.18%)
CMIA -43/43(100%)
ELFA -19/19(100%)
ELISA -66/66(100%)
ICT -89/90(98.88%)
Immunofiltration-39/39(100%)
Others -19/19(100%)

Fig 5n: (3.2.4) HIV-Negative



Total Response - **612**
Method Used :
Card Test-216/216(100%)
CLIA -117/118(99.15%)
CMIA -47/47(100%)
ELFA -13/13(100%)
ELISA -53/54(98.15%)
ICT -76/76(100%)
Immunofiltration-49/50(98%)
Others -38/38(100%)

Dear Colleagues,

As the saying goes Ensuring Quality is not an act but a habit! On that note I begin with my views on the 29th QC package.

We all need to know that a good smear examination can take us a long way. It is the key to a presumptive laboratory diagnosis and we all often falter in this exercise. Smear examination should be done with lot of deliberation and need to be seen more than once in case of any confusion. Early and correct reporting of a smear can be life saving. And of course it goes without saying the eyes don't see what the mind doesn't know.

The 2nd point to be kept in mind is to stay updated with the latest CLSI guidelines during reporting of AST. A total of 70.59% participants did not refer to the latest 32nd edition of the 2022 CLSI guidelines, wherein the interpretative cut off criteria for piperacillin-tazobactum combination have changed for Enterobacterales both for disc diffusion and MIC. To combat the issues with intermediate category, CLSI has also introduced another clinical interpretative criterion called Susceptible Dose Dependent (SDD) for selected drug-bug combinations including piperacillin–tazobactum & Enterobacterales. Reporting MICs within the SDD category suggests that treatment success is likely with higher than normal doses, thereby preserving usage of higher antibiotics which helps antibiotic stewardship.

With these take home messages I wish you all the best. Stay safe, follow preventive measures and keep moving ahead!!

Note:

The identity and results of the participants are kept confidential. Participants must consult the scheme organizer before quoting data from the scheme.
Production of PT items: Smears are prepared from the clinical samples/culture isolates. Bacterial strains are obtained from clinical samples or ATCC strains. Pooled patients' sera or commercially bought freeze dried reagents are used for serological testing.

IAMM EQAS NEW DELHI is a qualitative PT scheme, the assigned value of the PT Items is based on,

*Smear: Mode (70% of participants' results) & Expert opinion.

*Culture Identification & AST testing: Mode (70% of participant's results)

*Serology: Mode (70% of participant's results)

Statistical Analysis of Data: Scoring of >80% is considered as satisfactory. Scoring of <80% is considered as unsatisfactory for a particular PT scheme. The laboratory must then undertake retraining with appropriate documentation.
Design of PT scheme: IAMM EQAS New Delhi consists of 3 rounds /year (March, July and November). Each round comprises:

Smear
Culture
Serum specimen for serological testing.

Note: Kindly send your feedbacks for us to do better.

Best wishes till we meet again in next edition, enjoy online experience.

Jai Hind.

----------End of the report----------

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