OUT OF AFRICA: RESPONSE TO EBOLA IN THE DEVELOPED WORLD; LESSONS FOR THE FUTURE

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The unprecedented Ebola outbreak in West Africa has attracted considerable ethical scrutiny relating to, inter alia: extreme poverty and inadequate healthcare in affected countries; delayed international response; availability and allocation of scarce therapeutics; extreme measures to prevent spread to and within other countries. There has been less scrutiny of how hospitals in rich countries have prepared for Ebola.

When WHO declared the outbreak an international public health emergency, Ebola had already spread beyond Africa, attracting intense media scrutiny, especially after two nurses acquired Ebola in the USA. The CDC's advice, that transmission was unlikely in countries with robust healthcare systems, was, and remains, correct; transmission requires direct contact with body fluids and is preventable by appropriate use of personal protective equipment. But there can be no guarantees, especially in hospitals without past experience of or adequate preparation for Ebola. CDC's failure to communicate uncertainty and subsequent modification of infection control guidelines were criticised by an unforgiving media.

Combined with news of healthcare worker deaths in Africa, this focussed attention on hospital infection control, like nothing before. Many hospitals have spent a fortune preparing facilities and staff for a possible Ebola case; protocols for management of suspected cases, based on worse case scenarios, risk delaying appropriate treatment of febrile returning travellers – far more likely to have malaria. Often, this is occurring in hospitals with previously dwindling infection control budgets and poor staff compliance with infection prevention practices. Has this experience, taught us how to stop the next infectious disease emergency at its source and avoid the desperate scramble, elsewhere, to train and equip hospital staff for what should be "business as usual"? Without strong political and professional leadership there is a risk that, once the crisis passes, lessons will be forgotten, funds redeployed and bad habits reinstated.

DUTCH PECULIARITIES: BIBLE BELT AND INTENSIVE ANIMAL FARMING

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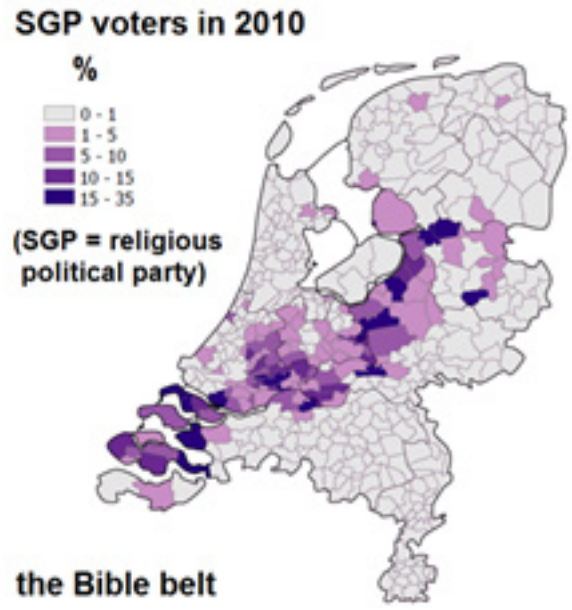
Because of high taxes and mandatory Roman Catholicism, the Netherlands freed themselves from Spanish rule during the 'Eighty years war', lasting from 1568 to 1648. Subsequently, in parts of the country the protestant religion evolved into orthodox variants, resulting in the 'Bible belt', where many people oppose vaccination on religious grounds.



In the Netherlands vaccination of babies and children is organised by the state. The overall vaccination coverage for the various vaccines in the National Vaccination Programme is high: 92-99% (2014). (For HPV vaccination the coverage of teenage girls only is 59%, but rising). In the Bible belt however the vaccination coverage is much lower. This situation leads to recurrent outbreaks, for exampe of measles in 1999 and 2013/2014; of rubella in 2004/5; and of poliomyelitis in 1971, 1978 and 1992/1993. These outbreaks in the Bible belt never spill over into the rest of the Netherlands, which nicely demonstrates the protective power of vaccination and herd immunity. During the twenty-two years since 1993 a large population, susceptible to poliovirus, must have been built up. As a precautionary measure, refugees from Syria, where poliomyelitis has returned, are accommodated far from the Bible belt.

In the Netherlands the industrialised farming of animals has reached record levels. For example in 2013, 14.013.000 pigs and 536.272.000 chickens were slaughtered (Central Bureau for Statistics). As a consequence, outbreaks of infectious animal diseases occur repeatedly, necessitating the culling of large numbers of animals because of porcine pest in 1997, foot and mouth disease in 2001, Q-fever in 2009, and avian flu in several years. Intensive animal farming in the Netherlands is a frequent source of zoonoses. Probably in the late eighties, the vCJD agent was introduced from the UK into the Netherlands, causing endogenous cases of BSE among Dutch cattle and three endogenous cases of human vCJD, in 2005, 2006 and 2009. In 2005-2007 the Netherlands experienced the largest outbreaks of Q-fever ever recorded, caused by industrial goat farming, with 2354 notified human cases in 2009. In 2009 is was reported that pigs in 53% of 97 Dutch pig farms were infected with hepatitis E virus genotype 3 (HEV-gt3). A striking but puzzling age cohort effect, observed by the testing for IgG anti-HEV in stored sera from Dutch blood donors, sampled in 1988, 2000 and 2011, suggests that decades ago HEV infection was very common in the Netherlands, then disappeared, to re-appear approximately 10 years ago. Currently HEV-gt3 infection pressure for Dutch citizens is very high. The monthly screening of 2000 plasma donors for HEV RNA shows that 1:850 donors experiences acute (but asymptomatic) HEV-gt3 infection, suggesting an incidence in the population of approximately 1%/year. As a consequence, 1-2% of our solid organ transplant patients, hematological patients, and other patients undergoing serious immunosuppression, are found to suffer from chronic hepatitis E, which quietly but rapidly can lead to cirrhosis.

SHORT CASE PRESENTATIONS ON ANTENATAL INFECTIONS

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Rubella, Parvovirus and Cytomegalovirus (CMV) are three contributors to human congenital infections. Rubella infection of a non-immune woman during pregnancy can result in miscarriage or embryopathy if acquired during the first trimester. Human Parvovirus B19 primary infection in pregnancy can result in foetal anaemia, hydrops or intrauterine death. CMV is the leading non-genetic cause of congenital abnormalities with an estimated 2% of women acquiring either a primary or reactivated CMV infection during pregnancy. Case One entails a seroconversion to Rubella IgG at 7 weeks gestation, confirmed by positive PCR. Case Two is a seroconversion to Human Parvovirus B19 IgG and IgM at 14 weeks gestation confirmed by PCR and subsequent foetal demise. Case Three is a seroconversion to CMV IgG with PCR detected on amniotic fluid at 22 weeks gestation.

RUBELLA IGG DIAGNOSTIC ASSAYS: A COMPARISON OF THE ABBOTT ARCHITECT, ROCHE COBAS E602, AND DIASORIN LIAISON XL

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Introduction
Rubella is a viral illness most important for its potent teratogenic effects on the foetus in pregnant women. An effective vaccine has been available since 1969; however, coverage rates with the measles, mumps, rubella (MMR) vaccine have been dropping nationally since the mid-1990s. The diagnosis of rubella in pregnancy remains an important component of the serology platform of clinical laboratories.

Objectives
Validation of the Cobas method in our laboratory had previously demonstrated variation of results around the cut-off for Rubella IgG. Comparison of results between the Abbott Architect, Roche Cobas e602, and the DiaSorin Liaison XL was assessed to determine performance.

Methods
61 serum samples were selected that had delivered a range of values between 0-30 on the Architect (negative <5, equivocal 5-10, positive >10). These samples were run in parallel on the Architect, Cobas e602, and Liaison XL to determine consensus results.

Results
Analysis of these results demonstrated 91.8% concordance between the Architect and Cobas, 86.9% concordance between the Architect and Liaison, and 85.2% between the Cobas and Liaison. Based upon majority consensus results, performance of the Architect and Cobas assays was robust, while the Liaison suffered from a lack of sensitivity.

Conclusions
The Abbott Architect is a robust method for the detection of rubella IgG in a screening population. Performance is similar between all three assays, though the DiaSorin Liaison XL demonstrates some reduction in sensitivity when compared to the other platforms.

ARBOVIRUS CROSS-REACTIVITY: FOCUS ON CHIKUNGUNYA AND ROSS RIVER VIRUSES

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Introduction:
The Serology laboratory at VIDRL is involved in a collaborative study with the Defence Science and Technology Organisation (DSTO). The aim of the study is to ascertain the prevalence of disease in travellers to sub-tropical and tropical areas, nationally and within the region; our role is to perform Arbovirus serology.

Objective:
To investigate the potential serological cross-reactivity between two alphaviruses: Chikungunya virus (CHIK) and Ross River virus (RRV) in the DSTO study group and in a patient infected with Chikungunya virus.

Methods:
To examine serological test results obtained using the following assays:
For the DSTO group - Euroimmun Anti-Chikungunya virus IIFT (IgG) immunofluorescence assay, NovaLisa Chikungunya IgG µ-capture ELISA, Panbio Ross River virus IgG ELISA, in-house RRV total antibody epitope blocking ELISA and Chikungunya and RRV Microneutralisation tests. In addition CHIK and RRV PCR and IgM tests were performed on the CHIK seroconverter patient samples.

Results:
The DSTO group examined in this study consisted of 89 samples: 8 screened positive/ 1 equivocal by CHIK IgG IIFT, 1 screened positive by CHIK IgG ELISA and 3 tested low positive by neutralisation testing (titre: 10). All were positive for RRV.

In total 13 samples screened positive by RRV IgG ELISA, 10 tested by in-house epitope blocking ELISA all tested positive and all were positive by neutralisation testing with titres ≥ 80.

The seroconverter patient was initially CHIK PCR positive and subsequently CHIK seroconversion was demonstrated using both IFA and ELISA screening assays and RRV antibody activity was also detected in some specimens; however RRV PCR was negative.

Conclusion:
In the DSTO study group all CHIK screen positive samples confirmed positive for RRV. The neutralising capacity of the 3 CHIK neutralisation low positive samples was negligible and is likely due to cross-reacting antibodies to RRV. CHIK screening tests gave discordant results whilst RRV screening tests gave concordant results. Discordant screening test results may indicate a false positive result and further testing by neutralisation may help resolve the discrepancy.

The CHIK seroconverter patient demonstrated reactivity to RRV antibodies, in particular IgM, this correlated with the development of CHIK antibodies. RRV PCR negative results and the absence of IgG development supports the RRV IgM antibody reactivity being due to cross-reacting antibody.

HEPATITIS C ANTIBODY SCREENING: AN ALGORITHM IN NEED OF REVIEW

Chambers I

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Testing for antibody to hepatitis C virus (anti-HCV) remains the cornerstone of screening for this globally-important infection. While the screening assays for anti-HCV are among the most sensitive and specific of any serological assays the problem of false-reactives remains and a positive result cannot be reported as such without being supported by the results of additional tests.

National testing guidelines mandate a testing algorithm which involves two screening assays for anti-HCV. Non-reactive sera in the first may be reported as negative without further testing, but reactivity in both assays is required before a positive result can be reported. The validity of this algorithm relies on the second anti-HCV assay being sufficiently different in format from the first to make the second result truly supplementary to the first and not simply a replicate of it.

However, no guidance is readily available when selecting assays which are complementary, in this sense, and therefor useful in combination. Without such guidance, and given the convergence of assay format and antigen derivation over time, not to mention commercial-in confidence reluctance from manufacturers, the continued validity of the primary/supplementary screening algorithm is questionable and requires review.

To assess assay performance we ran 102 unselected sera in 5 commercially available anti-HCV assays. Any sample which gave one or more discrepant results was then tested by HCV blot. An assessment of true antibody status for each was made, based on clinical history, HCV blot result, results of repeat anti-HCV testing and PCR for HCV RNA. From this assessment we attempted to identify the assay combination or combinations which discriminated best between anti-HCV reactive and non-reactive sera.

Results of this evaluation will be presented, together with a discussion of alternative anti-HCV testing algorithms, in particular those based on S/CO values in association with NAT testing.

PERFORMANCE EVALUATION OF THE APTIMA HIV-1 QUANT DX ASSAY FOR DETECTION OF HIV-1 IN PLASMA AND DRIED BLOOD SPOTS (DBS)

This presentation is sponsored by Hologic

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Introduction/ background:
The Aptima HIV-1 Quant Dx presented on the Hologic PANTHERTM system provides continuous and random access processing of molecular samples for groups M, N and O HIV-1 RNA viral load testing. Significant efficiencies are realized through 2 hours 40 minutes to first result with over 320 samples processed within 8 hours. This study assessed the performance of the system in routine plasma samples and whole blood presented as dried blood spot (DBS).

Methods/ description:
A total of 181 plasma samples were tested over the analytical range and compared to a benchmark real time PCR system. The study focused on the lower analytical range <5,000 copies/mL HIV-1 RNA (55%). HIV-1 viral load equivalence in non-B subtypes of regional geographical significance was assessed where subtype was available (72%). A further 20 DBS (single 10mm punch, whole blood) with HIV-1 RNA 500-5,000 cpy/mL and were eluted using a variety of methods, tested and compared with plasma RNA.

Results/ outcomes:
Overall, Aptima HIV-1 Quant Dx correlated with the routine analytical platform (r2=0.9605). Samples ranged undetectable (16, 8.8%), below the benchmark test lower limit of detection (<20 cpy/ml) (16, 8.8%), low range (20-5,000) (84, 46.4%), medium (5,000-50,000) (36, 19.9%) and high range (>50,000 cpy/ml) (29, 16%). Samples in the lower analytical range <1,000 cpy/ml showed little variance when compared with the Roche (CAP/CTM) assay using Bland-Altman correlation analysis. Reproducibility was assessed in the high, medium and low range within 1-2SD of mean. DBS samples with HIV-1 RNA results >1,000 were well correlated with plasma.

Conclusion:
The Aptima HIV-1 Quant Dx automated random access platform correlated with a commonly used HIV RNA test in plasma and offered significant workflow advantages. Promising results obtained using DBS samples could potentially overcome logistics encountered with conventional plasma. Further correlations and limit of detection studies are needed to validate DBS.

Disclosure of Interest Statement:
No conflict of interest to declare.

A NOVEL MULTILINE IMMUNOCHROMATOGRAPHIC TEST KIT FOR RAPID DETECTION AND DIFFERENTIATION OF HIV-1/2 INFECTION BASED ON REVERSE-FLOW TECHNOLOGY

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MULTISURE HIV Rapid Test, a novel multiline immunochromatographic test for rapid detection and differentiation of HIV-1/2 infection based on Reverse-Flow Technology, was developed using well-characterized recombinant HIV antigens, including HIV-1 gp120, gp41, p24 & HIV-2 gp36. Our study showed that the new test is able to detect all known positive HIV samples (n=641), including HIV-1 samples (n=516), HIV-2 samples (n=122) & HIV untypable (n=3), with a diagnostic sensitivity of 100% (95% CI: 99.43% to 100.00%), while maintaining an excellent diagnostic specificity of 99.36% (95% CI: 98.86% to 99.68%) with samples (n=1725) from healthy control (n=1184) or various patient groups & interfering samples (n=541). The positive predictive value (PPV) and the negative predictive value (NPV) for the new test reached 98.31% and 100%, respectively. In addition, MULTISURE HIV Rapid Test detected all available Group M subtypes and the Group O subtype as positive. When the test kit is used for differentiation of HIV-1/2 Infection, majority of known HIV-1 samples were correctly detected as HIV-1 positive with an accuracy of 97.55 % (517/530), while HIV-2 samples were correctly identified as HIV-2 positive with an accuracy of 93.94 % (124/132). The comparative performance on seroconversion sensitivity of MULTISURE HIV Rapid Test was evaluated against various Rapid Test kits & Western Blot kits, demonstrating an excellent sensitivity of early detection of HIV infection.

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A PROLONGED SECOND DIAGNOSTIC WINDOW FOR HUMAN IMMUNODEFICIENCY VIRUS (HIV-1) TYPE 1 IN A FOURTH GENERATION IMMUNOASSAY: ARE ALTERNATE TESTING STRATEGIES REQUIRED?

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Diagnosis of acute HIV is by patient history and examination, and testing of RNA, proviral DNA and serology using fourth-generation antigen/antibody detection assays. We describe an HIV-1 primary infection with a second diagnostic window of 18 to 34 days on a fourth-generation immunoassay, which would have been missed using some current algorithms. Caution must be exercised when interpreting fourth-generation HIV-1 immunoassays in isolation, and additional testing considered depending on patient risk assessment

HIV SEROLOGY: WESTERN BLOT RESULT INTERPRETATION AND REPORTING OF SEROLOGY STATUS

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Background:
NRL provides an HIV Serology External Assessment Scheme (EQAS) to laboratories that conduct HIV serology testing. The major objectives of the scheme are to assess the ability of participants to correctly report HIV serology reactivity for a sample and to assess whether participants report serology status (final interpretation) for HIV that are appropriate and consistent with the test results.

Methods:
Sample G in HIV Serology EQAS panel 2014-11-12 was confirmed positive for HIV-1 antibodies. EQAS participants' western blot (WB) results were analysed to examine the criteria used to interpret WB banding patterns.

Results:
Of the twenty-three participants that performed WB analysis on sample G, eighteen were testing on the MP Diagnostics HIV BLOT 2.2 WB. Eight of these participants reported WB assay interpretations of "indeterminate". Had they used manufacturer's instructions for use (IFU) to interpret results, seven of the eight would have reported that the sample was "positive". The eight participants indicated that they had used either "NRL interpretation criteria" or criteria alternative to the manufacturer's IFU for interpretation of results. All eight participants also reported an HIV status of "indeterminate" for sample G. "Indeterminate" assay interpretations and HIV statuses reported by these participants for sample G were identified as aberrant. The other ten participants testing in the MP Diagnostics HIV BLOT 2.2 WB reported "positive" assay interpretations for sample G.

Discussion:
NRL's HIV-1 WB result interpretation criteria are intended to be used specifically with NRL's in-house WB. Using NRL criteria to interpret results on commercial WBs can lead to inappropriate assay interpretations and a risk of reporting false positive results. NRL is aware of at least one diagnostic instance where an individual with an indeterminate western blot result on a commercial WB was wrongly identified as HIV positive due to the inappropriate use of NRL interpretation criteria.

Now that the In Vitro Diagnostics (IVD) framework is fully implemented all laboratories in Australia will be required to follow manufacturers' IFU otherwise a laboratory may need to register the assay as an in-house IVD.

PERFORMANCE OF THE ADVIA CENTAUR SYPHILIS (SYPH) ASSAY ON THE ADVIA CENTAUR XP COMPARED WITH THE FUJIREBIO SERODIA TPPA ASSAY

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Introduction:
Syphilis antibody testing within the Queensland Fertility Group has been performed for many years using the Fujirebio® Serodia TP.PA (TPPA) assay. This is a manual, subjectively interpreted passive particle agglutination test for the detection of antibodies to Treponema pallidum in serum or plasma.
The ADVIA Centaur Syphilis (SYPH) assay is a fully-automated direct sandwich immunoassay used for the detection of Treponema pallidum antibodies in human serum or plasma.

Objectives:
This study's aim was to compare the results generated by the TPPA and SYPH assays and assess whether routine syphilis testing could be performed on the ADVIA Centaur XP at the same time as the endocrinology and other infectious disease testing.

Methods:
Negative and positive validation samples were selected from the laboratory's sample bank on the basis of historical TPPA results. Fifty-three samples were selected and tested in both the TPPA and SYPH assays on the same day. The SYPH assay testing was performed on two ADVIA Centaur XPs to verify platform concordance. Both inter- and intra-run precision were evaluated by running QC samples twice daily for five days, and 20 times on one day respectively on both ADVIA Centaur XPs.

Results:
Forty-eight of the 53 samples yielded the same results on both methods. The five discordant results were positive in the TPPA assay and negative in the SYPH assay. Of the five discordant results, one patient was unavailable for confirmatory testing. The remaining four were referred to another laboratory for testing on the Abbott Architect Syphilis TP assay which produced negative results concordant with the SYPH assay. RPR testing was not possible. The intra-assay CV for the SYPH positive QC was 1.21% and 0.99% for each respective ADVIA Centaur XP instrument. Inter-assay CV was 1.60% and 2.47% respectively.

Conclusions:
The number of false positive results produced by the Fujirebo Serodia TPPA assay may be attributable to the potential cross reactions acknowledged in the kit insert. The results of this study indicate that the ADVIA Centaur Syphilis assay is a precise and accurate assay for determining a patient's syphilis status. All samples which have a positive result on the ADVIA Centaur Syphilis assay will be referred for supplemental testing on an alternate assay.

EVALUATION OF THE SOFIA INFLUENZA A & B, RESPIRATORY SYNCTIAL VIRUS AND LEGIONELLA FLUORESCENT IMMUNOASSAYS ON THE SOFIA ANALYSER

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Introduction:
Rapid diagnostic tests (RDTs) in Microbiology play an important role in the clinical management of patients as well as infection control and public health responses. A common disadvantage with RDTs is test sensitivity and user subjectivity (in particular weak positive results). The Quidel Sofia fluorescent immunoassay analyser is a rapid, immunofluorescence-based, automated test system. A number of fluorescent immunoassays (FIAs) have been developed for use on the Sofia Analyser, including Influenza A and B, respiratory syncytial virus (RSV) and Legionella pneumophila serogroup 1 antigen in urine.

Objectives:
The purpose of this evaluation was to compare the performance of the Sofia Influenza A+B, RSV and Legionella pneumophila FIAs with the current rapid chromogenic immunochromatographic tests (ICTs) in use at Monash Pathology.

Methods:
A total of 102 respiratory specimens were selected for analysis, which comprised a combination of patient and Quality Assurance Program (QAP) specimens. All respiratory patient specimens were tested prospectively after prior testing with the AusDiagnostics Respiratory Pathogen 12b Multiplex PCR Assay. The performance of the Sofia Influenza A+B FIA was compared to the BD Directigen EZ Flu A+B ICT. The performance of the Sofia RSV FIA was compared to the BinaxNOW Rapid RSV Card ICT. A total of 65 urine samples were tested by the Sofia Legionella FIA and compared to the Oxoid Xpect Legionella Test. The panel of urine samples included a combination of prospective patient samples, QAP specimens and known positive specimens previously confirmed by enzyme immunoassay (EIA) and ICT testing at a reference laboratory.

Results:
Both the Sofia Influenza A+B and RSV FIA demonstrated higher sensitivity than the current ICT in use when compared to PCR. The sensitivity of the Sofia Influenza A+B and RSV FIAs was proportional to the amount of virus present in the sample tested, which was demonstrated by the Real Time-PCR threshold cycle. No cross-reactivity was observed for either Influenza A or Influenza B, however there was one sample that tested positive by Sofia RSV FIA and negative by both PCR and binaxNOW Rapid RSV. The sample was positive for Human Metapneumovirus (HMPV) by PCR. Three additional samples that tested positive for HMPV by PCR did not demonstrate cross-reactivity. The Sofia Legionella FIA demonstrated 100% sensitivity and 97.5% specificity compared to the Xpect Legionella ICT card. One discrepant sample tested positive by Sofia Legionella FIA and negative by confirmatory testing at the reference laboratory. The non-specific reactivity was removed with the addition of a heat treatment step.

Conclusions:
The Sofia Legionella, RSV and Influenza A+B FIAs all demonstrated a high positive and negative agreement compared to the respective ICT currently in use. Although PCR remains the superior diagnostic method, the higher sensitivity of the Sofia RSV and Flu A+B FIAs make it an improved alternative for urgent screening during peak seasons (particularly out of hours). The automated test interpretation removes user subjectivity with the added benefit of interface capability with the laboratory information system (LIS).

PERFORMANCE EVALUATION OF THE DIASORIN HBEAG AND ANTI-HBE CHEMILUMINESCENCE IMMUNOASSAY (CLIA) ON THE LIAISON XL ANALYSER

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Introduction:
Hepatitis B virus (HBV) tests may be used for a variety of reasons. Some of the tests detect antigens produced by the virus, some detect antibodies in response to a HBV infection and others detect viral DNA. The detection of these markers can help determine a current or past infection, acute or chronic disease, response to therapy and immune status.

One of these markers, Hepatitis Be Antigen (HBeAg), is present in the early phase of a hepatitis B infection and appears after Hepatitis B surface antigen becomes detectable.

It's presence is usually an indicator of active viral replication and the infectious state of a serum sample. It can be detectable in either acute or chronic HBV carriers and it may also be used to monitor the effectiveness of treatment. During recovery from acute hepatitis B, HBeAg levels decline and Hepatitis Be antibody (HBeAb) appears. This indicates a decrease in viral replication and may suggest a patient is no longer infectious. HBeAb may persist for several years after recovery.

Objectives:
To compare the DiaSorin Liaison HBeAg and Anti-HBe CLIA (60 minute duration) against the BIORAD Monolisa HBeAg-Ab PLUS ELIZA (4 hour duration).

Methods:
108 serum samples that had previously been routinely screened for HBeAg and HBeAb by the BIORAD Monolisa PLUS ELIZA on the Triturus, were retested using the DiaSorin HBeAg and Anti-HBe CLIA on the LIAISON XL analyser. Of those 108, 18 samples were HBeAg/Ab negative, 35 samples were HBeAg positive and HBeAb negative and 55 were HBeAg negative and HBeAb positive.

Results:
94/108 (87%) of the samples tested for HBeAg and HBeAb on the Liaison XL were concordant with the BIORAD results as tested on the Triturus. There were some minor discrepancies. In the HBeAg positive review, 3 samples tested negative on the Liaison but were low positive on the BIORAD, one sample tested HBV Load DNA Not Detected and the other two had insufficient specimen for DNA testing. Further,1 sample tested positive for HBeAb on the Liaison and was a high negative on the BIORAD. For the HBeAb positive review all 55 samples tested the same for both assays. For the HBeAg/Ab negative review the Liaison detected 6 HBeAg samples as positive which also had HBV DNA Detected by viral load.1 sample tested HBeAg equivocal however was HBV Load DNA Not Detected. 2 samples tested equivocal for HBeAb and 1 was also HBV Load DNA Detected.

Conclusion:
Overall both assays showed comparable specificity however the DiaSorin Liaison HBeAg and Anti-HBe CLIA showed greater sensitivity for HBeAg detection, reduced test time and theability to quantitate HBeAg results.

ENSURING BLOOD SAFETY WITH VIRAL SURVEILLANCE AND NEW VIRUS DISCOVERY

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Introduction:
While the rapid evolution of viruses such as HIV-1 and HBV impacts transmission, resistance to drug therapy, and development of escape mutants, it also has important implications for blood screening, diagnostic testing, and patient monitoring. Recognizing the importance of this issue, Abbott pro-actively initiated a comprehensive surveillance program designed to monitor global diversification of HIV, search for newly emerging strains, and assemble well-characterized panels of genetically and geographically diverse specimens. Due to globalization, changes in the environment and climate, and the encroachment of humans into natural habitats, recent outbreaks of clinical and public health significance have been caused by novel viruses emerging from animal reservoirs. To anticipate the next epidemic and quickly fill the need for accurate diagnosis, our virus discovery program has been actively screening samples from patients around the globe presenting with idiopathic symptoms.

Methods:
A pan HIV-specific priming method (HIV-SMART) coupled to Nextera tagmentation was developed for next generation sequencing (NGS) on an Illumina MiSeq. In parallel, unbiased priming approaches followed by analysis with the SURPI bioinformatics pipeline were implemented to deep sequence HIV as well to search for known and novel co-infecting agents present in specimens.

Results:
HIV-SMART accurately characterized genomes from 49 virus isolates derived from all HIV-1 groups (M, N, O and P) and HIV-2. The protocol was further optimized to permit sequencing directly from primary clinical specimens and successfully obtained full length sequences from a diversity of subtypes and circulating recombinant forms. Randomly primed libraries from 35 Cameroonian blood donors yielded 26 complete HIV genomes, 9 of which were unique recombinants, and 9 full genomes of a common co-infecting virus, GBV-C.

Conclusions:
Full genome sequencing of HIV by NGS has facilitated the development of well characterized, diverse specimen panels, providing an invaluable resource for assay development and enabling rigorous performance evaluations. Using metagenomic approaches, we can catalog known pathogens and predict the presence of highly divergent viruses for both acute and chronic illnesses that are otherwise undetectable with conventional molecular methods. Our surveillance and virus discovery programs demonstrate how Abbott is meeting the challenge posed by viral diversity and its commitment to keeping the blood supply safe.

INFECTION AND CANCER EXPLORING DIFFERENCES BETWEEN DEVELOPED AND DEVELOPING COUNTRIES

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Improved sanitation, prevention campaigns, vaccinations, clean syringes and maintaining a clean blood supply have arguably all played a role in keeping infection rates lower in developed countries and as a result, the number of cancers attributed to infection is ~4% when compared to ~20% in developing countries. HIV has been an exception in that it increased risks for certain cancer in both developed and developing countries, however risks in relation to HIV for any given cancer have been higher in developed than in developing countries. HIV also provided an opportunity to monitor cancers that may be caused by as yet undiscovered infectious agents.

This presentation will explore the differences in risk of HIV with selected AIDS related cancers and certain cancers such as oesophageal cancer which appeared to be increasing in risk in relation to HIV in developed countries but not so in developing countries. Oesophageal cancer was thought to be caused by HPV for 30 years now. Using multiplex serology we were able to shed further light on this subject.

Finally, the important role played by 'sero-cohorts' will be discussed, i.e. studies which have collected and stored serum from sick and healthy individuals for the investigation of novel agents, but which also collected some basic lifestyle information, to control for confounding.

IMPROVED DETECTION OF CHRONIC OCCULT HEPATITIS B VIRUS INFECTION IN AUSTRALIAN BLOOD DONORS USING ULTRIO PLUS COMPARED TO ULTRIO.

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Introduction:
In July 2010 the Australian Red Cross Blood Service implemented HBV nucleic acid testing (NAT) using the Ultrio assay. Subsequently, donor screening by HBV NAT revealed the presence of occult HBV infection (OBI), a form of chronic infection characterised by low, and sometimes intermittently detectable, levels of serum HBV DNA and antibodies to HBV core antigen (anti-HBc) but without detectable hepatitis B surface antigen (HBsAg). A small number of donors with acute HBV serological window period infection (detectable HBV DNA without detectable HBsAg or anti-HBc) were also detected. In July 2013, the Ultrio assay was replaced by the Ultrio Plus assay with improved sensitivity for HBV DNA.

Objectives:
The primary aim of the study was to compare performance of the Ultrio and Ultrio Plus assays for the detection of OBI in Australian blood donors. In addition, the ability of the two assays to detect acute serological window period HBV infection was also compared.

Methods:
The Procleix Ultrio and Ultrio Plus assays are multiplex NAT assays for the detection of HIV-1 RNA, HCV RNA and HBV DNA, and both are performed on the Procleix Tigris automated system (Grifols Diagnostic Solutions Inc. Emeryville, CA). Samples initially reactive on the Ultrio or Ultrio Plus assays are 'discriminated' to identify the specific virus using the associated Procleix HIV-1, HCV and HBV discriminatory assays. This study analysed all donor screening results for the period of the Ultrio assay (July 2010 – June 2013) and the first 1.5 years of the Ultrio Plus assay (July 2013 to December 2014). During both periods, all donors were screened for HBsAg using the Abbott PRISM HBsAg chemiluminescent immunoassay (Abbott Diagnostics, Delkenheim, Germany). Samples reactive on the NAT and/or HBsAg screening assays were also tested for anti-HBc by either the AxSYM CORE or Architect anti-HBc II assays, and for antibodies to HBsAg (anti-HBs) by either the AxSYM AUSAB or Architect AUSAB assays (Abbott Diagnostics, Delkenheim, Germany). The 95% fiducial limits for the Ultrio and Ultrio Plus assays are 10.44 (9.20 – 12.16) IU/mL and 3.4 (3.0 – 4.1) IU/mL, respectively.

Results:
(i) During the three years of using the Ultrio assay the number of OBI cases detected annually for July 2010 to June 2011, July 2011 to June 2012 and July 2012 to June 2013 were 27, 15 and 9 cases, respectively, and the annual detection rates were 4.87, 2.72 and 1.72 per 100,000 donors, respectively. The difference between year 1 and year 3 was significant ($0.005>p>0.004$). (ii) For the first year of Ultrio Plus (July 2013-June 2014), 23 OBI cases were detected with a detection rate of 4.73 per 100,000 donors. This was significantly higher than the third year of Ultrio ($0.008>p>0.007$), but not significantly different from the first 2 years of Ultrio. (iii) The detection rate of OBI cases decreased significantly in the first half of the second year of Ultrio Plus (July to December 2014) compared to the first year ($0.024>p>0.021$). (iv) Compared to the three years of using the Ultrio assay, the OBI detection rate in the second year of Ultrio Plus was significantly less than the first year of Ultrio ($0.019>p>0.016$) but not significantly different compared to the second and third years of Ultrio. (v) OBI donors were predominately repeat donors during both the Ultrio (82.4%) and Ultrio Plus (72.4%) periods. (vi) During the three years of HBV NAT a relatively small number of donors with HBV acute serological window period infection were detected annually (2, 6 and 0 cases for the 3 years of Ultrio, respectively, while 2 acute window period infections were detected in the first year of Ultrio and 3 in the first half of the second year. The annual detection rates for acute HBV window period infections were not significantly different.

Conclusions:
The decreased OBI detection rate over the Ultrio period is most likely due to the initial detection of OBI donors with relatively high levels of HBV DNA who were detected the first time they are screened by Ultrio, subsequently followed by the detection of OBI donors with lower, intermittently detectable levels of HBV DNA who were detectable only after several NAT non-reactive donations. The significant increase in the OBI detection rate observed in the first year of Ultrio Plus assay indicates the detection of OBI donors with HBV DNA levels undetectable by the Ultrio assay. These results therefore demonstrate that the Ultrio Plus assay (i) has improved sensitivity for the detection OBI in our donor population and (ii) that the primary benefit of Ultrio Plus is observed in the first 12 months following implementation. However, the detection rate of acute HBV serological window period infections was not significantly different between the two assays.

SEROLOGY AND NUCLEIC ACID TEST SCREENING IN ORGAN AND TISSUE TRANSPLANTATION

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Serology and nucleic acid test (NAT) screening are critical steps to prevent transmission of bacterial and viral diseases from organ donors. Our screening protocol included 12 serological followed by 3 NATs, performed in average-risk (ARD) and increased-risk donors (IRD).

A review of serology and NAT results for donor screening from October 2009 to May 2015 showed that serological screening was performed on 678 donors; whilst NAT was performed prospectively on 151 and retrospectively on 486 donors. There were 487 organs (3.2 organs/donor) retrieved from IRD and 1,826 organs (3.8 organs/donor) retrieved from ARD. Altogether there were 33 cancelled tests due to various reasons.

The availability of prospective NAT screening with 8 hours turn-around-time enabled the use of IRDs with positive serology but negative NAT and donors with false-positive serology results. Our data showed an increased number of IRDs as well as increased organs retrieved per IRD.

We review our screening protocol periodically to continue to expand the donor pool. A rapid hepatitis C virus (HCV) genotyping assay was introduced recently to allow transplantation of organs from HCV antibody positive donors to HCV viraemic recipients.

ANALYSIS OF THE CAUSE OF INCONSISTENT RESULTS BETWEEN THE TRIPLEX-NAT AND THE DISCRIMINATORY- NAT

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Introduction:
ProcleixTMTIGRIS Ultrio HIV-1/HCV/HBV TMA has been used in routine Nucleic Acid Testing (NAT) blood screening in Beijing Red Cross Blood Center (BRCBC) since October 2010. According to the screening strategy in BRCBC, if a specimen was triplex NAT (Tri-NAT) reactive but discriminatory NAT (D-NAT) nonreactive, the index blood and component products would be discarded finally. But the cause of the inconsistent results between Tri-NAT and D-NAT has not been completely illuminated, and the specimens with inconsistent results should be analyzed further.

Objectives:
To analyze the reason for the results with Tri-NAT reactive and D-NAT nonreactive. To improve NAT screening strategy by decreasing the incidence of the inconsistent results between Tri-NAT and D-NAT.

Methods:
A part of Tri-NAT reactive but D-NAT nonreactive blood donors were followed up for their HBV infection condition. Samples were tested by Tri-NAT twice and further with ULTRIO PLUS assay to evaluate the efficiency for reducing the incident of the inconsistent results.

Results:
504 Tri-NAT reactive but D-NAT nonreactive specimens was selected, 364 of them was HBV antigen or antibody positive. 40 indexed blood donors were followed up, 9 of them were HBV non-infection and 31 were occult HBV infection (OBI). 483 of 504 specimens repeated Tri–NAT twice, 49 of them were detected as HBV reactive. 92 unidentified specimens were further tested with ULTRIO PLUS assay, 19 of them were detected as HBV reactive.

Conclusions:
OBI might be the most important reason for the blood screening Tri-NAT reactive but D-NAT nonreactive results. Repeating Tri-NAT twice or more and using the ULTRIO PLUS assay will effectively reduce the incidence of Tri-NAT reactive but D-NAT nonreactive results, and is valuable for the safety of blood. It is important to re-evaluate the recent NAT strategy and appropriate improvements should be carried out.

NSW FRAMEWORK AND STANDARD OPERATING PROCEDURE FOR HIV POINT OF CARE TESTING

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Introduction:
Increasing HIV testing rates, and reducing the pool of undiagnosed HIV infections, is critical to the successful implementation of the NSW HIV Strategy 2012-2015: A New Era1. Methods to increase and sustain testing rates in NSW include facilitating rapid HIV point of care testing (POCT) at sexual health clinics and community based testing sites to encourage people from high risk populations, particularly men who have sex with men (MSM), to be tested regularly for HIV. Prior to 2015, POCT in the public sector in NSW was only available under the auspices of pilot research studies which created a gap in regulation and created the need for a systematic and sustainable approach for NSW.

Methods:
The NSW Ministry of Health worked with an expert group to develop a Framework and standard operating procedure (SOP)2 to guide the delivery of high quality, safe, sustainable POCT. The Framework and SOP set quality and safety standards for sites offering POCT, including regulations for use, minimum patient information for consent, a proficiency standard for the site, training and competency standards for staff, and a standardised means for collecting denominator data for monitoring and evaluation. A quality assurance and safety package was developed in consultation with the St Vincent's NSW HIV State Reference Laboratory to support the implementation of the Framework.

Results:
Implementation of the Framework and SOP for HIV POCT at community sites that engage a high proportion of MSM and sexual health clinics with express HIV testing models has facilitated provision of quality system elements relating to non-laboratory settings. These include a comprehensive training curriculum for staff, routine quality assurance and site management support including compliance checks, and collection of denominator data for monitoring and evaluation.

Conclusion:
The establishment of the Framework and SOP has successfully supported the provision of well-targeted, safe and high quality HIV POCT testing in NSW. Implementation of the Framework has introduced strategies to ensure potential risks are mitigated and the added benefits of rapid HIV testing are realised.

References:

1. NSW HIV Strategy 2012-2015: A New Era. Cited 20 June 2015. http://www.health.nsw.gov.au/publications/Publications/nsw-hiv-strategy-2012-15.pdf
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POINT-OF-CARE HIV TESTING IN SEXUAL HEALTH CLINICS

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HIV Point-of-care testing (POCT) has been available in many countries overseas for more than ten years, but it is relatively new to Australia. Following some pilot research and epidemiological studies using POCT technology in the late years of the last decade, the first studies to offer HIV POCT with provision of the result in the same clinic visit began in Melbourne and Sydney in 2010 and 2011.

Changes to the National HIV Testing Policy in 2011 provided a framework for HIV POCT for the first time and permitted the implementation of HIV POCT for screening men who have sex with men (MSM), first in sexual health clinics and then in community sites. The Alere Determine HIV 1/2 Ag/Ab Combo was the first assay to be licensed for HIV POCT in Australia in December 2012.

The Sydney Rapid Test Study started in October 2011 and it involved over 3000 men in four high MSM caseload public sexual health clinics. The study aimed to assess the acceptability of HIV POCT to patients and clinic staff, as well as barriers to testing among MSM and the performance of the Alere Determine HIV Combo rapid test compared to conventional laboratory serology. Clinic staff were trained in HIV POCT by staff from the NSW State Reference Laboratory for HIV and the National Reference Laboratory. HIV POCT was offered to MSM attending for sexual health screening and men completed a survey assessing barriers to HIV testing and acceptability during their visit. Clinic staff conducting HIV POCT completed acceptability questionnaires and the performance of the rapid test versus conventional HIV serology was assessed via parallel laboratory testing in all patients.

The findings of the Sydney Rapid Test Study will be presented and their implications for the delivery of HIV POCT will be discussed, with reference to the findings from other clinic-based studies.

IMPLEMENTATION OF THE GENEXPERT POINT-OF-CARE TEST FOR SEXUALLY TRANSMITTED INFECTIONS IN REMOTE ABORIGINAL COMMUNITIES IN AUSTRALIA

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Background:
Young Aboriginal people living in remote Australian communities experience very high rates of sexually transmitted infections (STIs), which can lead to pelvic inflammatory disease, infertility and in pregnancy; premature rupture of membrane and low birth weight of the baby. Regular screening and treatment is a key prevention tool, yet there are significant delays in treatment due to large distances from laboratories. We describe the early findings from TTANGO; a cross-over randomised controlled trial of GeneXpert point-of-care (POC) testing for Chlamydia trachomatis (CT) and Neisseria gonorrhoea (NG) infections in this setting.

Methods:
TTANGO commenced in June 2013 and 12 remote health services have implemented GeneXpert testing on-site as routine practice, with specimens also sent to jurisdictional laboratories for conventional nucleic acid amplification testing (NAAT). We assessed the agreement of the GeneXpert CT/NG test with routine laboratory tests, implementation processes and patient and staff acceptability.

Results:
GeneXpert POC testing was mainly conducted by Aboriginal health workers and nurses. Of 2486 GeneXpert tests performed, 212 (8.5%) were CT positive and 145 (5.8%) were NG positive. Positivity was highest in young people aged 15-24 years. The positive, negative and overall agreement between the GeneXpert test and laboratory test for CT was 98.5% (95%CI:94.9-99.6), 99.5% (99.0-99.8) and 99.4% (99.0 -99.8) respectively. The positive, negative and overall agreement for NG was 100.0% (96.3-100.0), 99.9% (99.6-100.0) and 99.9% (99.6-100.0), respectively. Integration of GeneXpert testing into clinical practice generally involved collection of the sample at the start of a consultation, and during the 90 minute wait for result, conducting a health assessment or asking the patient to stay close by. The GeneXpert POC assay was also used to increase accessibility of testing on remote Islands by flying samples daily to a local health service for POC testing. Surveys and interviews among staff and patients show high acceptability of GeneXpert POC testing.

Conclusion:
The performance of GeneXpert CT/NG in the hands of trained health service staff is excellent and consistent with previous evaluations. Overall, results show the GeneXpert method is suitable for routine detection of CT and NG. More timely treatment through GeneXpert CT/NG, combined with strategies to increase regular testing, has the capacity to reduce the morbidity associated with these STIs.

NRL WHOLE BLOOD EXTERNAL QUALITY ASSESSMENT SCHEME FOR HIV POINT OF CARE TESTING

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Background:
The use of rapid Point of Care (POC) test devices using finger-prick blood as the sample source to screen for HIV is increasing in clinical and community care settings. Participation in an External Quality Assessment Scheme (EQAS) is recognised as critical for maintaining quality in pathology results. Therefore, sites offering HIV screening at POC in Australia are encouraged to participate in EQAS to ensure ongoing competency of testing staff. For a POC environment, whole blood EQAS samples more closely represent the actual samples tested at the site than serum or plasma supplied in tubes. NRL is committed to producing a whole blood HIV POCT EQAS for Australian participants in a format that is compatible and appropriate in non-laboratory settings.

Methods:
Stabilised whole blood cells were re-constituted with plasma samples, whose HIV reactivity was fully characterised, and packaged in dropper bottles. Five-member sample panels were assembled and sent to participants along with handling instructions and results forms for 3 test events in 2014.

Results:
HIV test sites around Australia have participated in the NRL HIV POCT EQAS during 2014. Of the 112 tests performed on HIV negative samples a reactive result was reported on 5 occasions; a false reactivity rate of 4.5%. A total of 68 tests were performed on HIV positive samples; in two cases a result of “Invalid” was reported. All remaining results were reported “Reactive” for these samples. An error in reporting a final interpretation for a test result occurred on three occasions. A report on the results of each test event was sent to all participants.

Conclusions:
NRL has delivered whole blood HIV POCT EQAS samples to HIV testing sites around Australia during 3 test events in 2014. For HIV-negative samples the false reactivity rate was 4.5%. There were no false negative results reported at participating HIV test sites.

Disclosure of Interest Statement: The authors have no conflicts of interest to declare.

HIV EXTERNAL QUALITY ASSURANCE TESTING. A FIVE YEAR REVIEW

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Introduction:
RCPAQAP Serology has offered external quality assurance (EQA) for HIV testing since 2006. Between 2010 and 2014 RCPAQAP Serology has distributed specimens to 284 unique participants. The HIV Serology Module comprises six surveys a year, two specimens per survey. Specimens are distributed worldwide, but the majority of specimens are sent to laboratories in Australasia.

Objectives:
To analyse the data collected over a 5 year period, to provide an overview of the HIV assay performance and to highlight the common errors reported by the participants.

Methods:
Serum or plasma specimens that have been pre-issue tested by reference laboratories are dispatched at the beginning of the year to participants enrolled in the HIV Serology Module. The specimens are tested by participants during the survey period with results analysed by RCPAQAP Serology, and a review provided by an expert in HIV Serology. Assigned results are determined by a consensus of ≥ 80% of participants but the report also identifies other inconsistencies in results and data including: omission of kit details, use of expired kits, occurrence of transcription errors, inconsistent or incomplete data and non-identification of clerical errors.

Results
Over the last five years we have seen consensus achieved for all specimens for the Antigen/Antibody Combination Screen and the Antibody Only Screen. Over the past 5 years there has been a high rate of concordance in results for these screening assays (>90% consensus for all specimens). Of the 8242 results returned for the Antigen/Antibody Combination Screen and the Antibody Only Screen, there were only 76 result errors. Fifty five percent (42/76) of results that are out of consensus appear to have been due to the specimens being reversed by the participants. We have observed a shift away from the antibody only screening assays (38% in 2010 to 9% in 2014) to the use of antigen/antibody combination screening assays (57% in 2010 to 88% in 2014).

Conclusions
These results demonstrate the excellence in HIV testing. The majority of the errors that are observed at the RCPAQAP Serology are due to human error rather than problems with the assay performance. HIV Reports enable participants to review the validity of their assay results and identify procedural and technical problems through comparison of data from other participants using the same methodology. Participants receive recommendations with regard to possible reasons for results outside the consensus and suggested HIV testing algorithms. Multiple surveys throughout the year with corresponding documentation of corrective actions facilitate trend analysis for ongoing monitoring of laboratory performance in the HIV Serology Module of the Retroviral Program.

ESTABLISHMENT OF BACTERIAL TESTING EXTERNAL QUALITY ASSESSMENT SCHEMES (EQAS) FOR BLOOD PRODUCTS

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Introduction:
Over the last 30 years, astounding reductions in the risk of viral infection via blood transfusion have been achieved, but bacterial contamination of blood products has emerged as the greatest residual source of transfusion-transmitted disease. In order to prevent residual risks from bacterial contaminated blood products, blood banks were requested to test bacterial before the products have been issued to the hospitals. But in China, there were not any quality control requirements or external quality assessment schemes (EQAS) for bacterial testing in blood banks.

Objectives:
To establish Bacterial Testing EQAS for blood products in China.

Methods:
Standard commercial bacterial strains were bought from bioMérieux. Samples were diluted to a proper concentration, then were aliquot, and lyophilized in 10- thousand grade purification laboratory. After homogeneity and stability testing, the EQA samples were sent to 17 pilot laboratory participants. Four pilots were practiced from 2013 to 2014 and a data collection system based on OASYS (Oneworld Accuracy, Canada) was also been developed for the EQAS. Only positive samples were included in the EQA panels of the first 2 pilots in 2013. Negative samples were added into the EQA panels since 2014.

Results:
Four pilots practiced successfully. The positive coincidence rate between the feed back results from the participants and the reference results were 100% (14/14), 68.8% (11/16), 94.1(16/17) and 100% (17/17) respectively. The negative samples were not evaluated in the first test event of 2014 because of the contamination during sample preparation. The negative coincidence rate increased to 76.5% (13/17) after the aliquot and lyophilized processes were moved into a 10-thousand grad purification laboratory.

Conclusions:
Although still need further improvement, a bacterial testing EQAS has been established in China for helping Chinese blood banks to improve testing proficiency for bacterial testing.

NRL BLOOD SCREENING EQAS: UPDATE 2014

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Background:
In 2013 NRL introduced the Multimarker Blood Screening Serology (MMBS4320) EQA Scheme, specifically designed for the donor screening laboratory. Data from this inaugural year were presented in 2014 and, now in its second year, an update on observations sheds some interesting information in the performance of donor screening laboratories and the testing algorithm and tests used. In 2014, the early HIV infection scenario was expanded upon with inclusion of both manufactured HIV-1 p24 and natural early infection specimens. Complementary to this serology scheme is the existing Multimarker Blood Screening NAT Scheme (NATA4315), already into its 7th year in this current format. For NATA4314, observations will be presented from the 2014 distributions, a most interesting year in this scheme's history due to an unexpected reactivity result submission pattern phenomenon.

Aims:
To assess the performance of donor screening laboratories using serology and NAT tests for TTI viruses.

Methods:
MMBS4320 2013 and 2014 consisted of three 20-member panels per year. Each panel contained samples positive for one or more of anti-HIV, anti-HCV, anti-HBc total and HBsAg, as well as samples negative for all these markers, sourced from blood donors. In two samples for 2013 distributions, recombinant HIV-1 p24 antigen was spiked into normal human plasma to simulate early HIV infection. In 2014 distributions, both recombinant HIV-1 p24 antigen and a natural early infection (HIV-1 RNA and HIV-p24 antigen positive, but HIV antibody negative) samples were included to simulate early HIV infection. NATA4315 2014 consisted of plasma pooled samples spiked with nucleic acids for HIV-1 and HIV-2, HBV and HCV at various concentrations above the lower limit of detection for most donor screening tests used. Participants were requested to test the samples in the same manner as their donor samples. Results were submitted to NRL using OASYS, an internet-based proficiency test application. The results were then compared with internally-generated reference results and with those obtained by the peer group.

Results:
A total of 129 serology and 110 NAT donor screening laboratories from up to 28 countries participated in MMBS4320 and NATA4315 generating over 59,000 serology and over 14,000 NAT results from 155 assays. In the analysis of testing strategies, there were many instances where the testing strategy did not allow for adequate detection of HIV-1 p24 antigen positive samples. Many examples of aberrant test results were observed based on poor assay sensitivity, particularly where rapid tests were used or where third-generation tests were used in isolation. Further analysis of aberrant results revealed some of the errors identified were due to data entry, lot variation and/or peer group false reactivity. In addition, there was a large proportion of unexpected reactivity reported for HBV DNA and HIV-1 RNA for NATA4315 2014 across all distributions.

Conclusions:
Overall, the performance of all assays used was of a high standard. NRL EQAS provided participants with valuable information regarding their performance relative to their peers and created many opportunities to educate and facilitate continuous improvement in institutions delivering donor screening at a local, regional or national level.

CASES ANALYSIS ON EQAS TROUBLESHOOTING

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Introduction:
In China, besides mandatory EQAS organized by National Center for Clinical Laboratory (NCCL), nearly 60 blood bank laboratories also participate NRL EQAS voluntarily. Although many laboratories participate at least 3 times EQA activities annually for each kind of EQA program, some of them still do not completely understand the meaning of the troubleshooting, and they even do not know how to analyze the data from EQAS.

Objectives:
To help laboratories to improve the testing proficiency through cases analysis on EQAS troubleshooting.

Methods:
The problems which usually occurred in the NRL or NCCL EQA results were summarized and classified. The reasons for each problem were analyzed case by case.

Results:
Eleven cases were analyzed, which caused by different reasons such as transcription or data entry error, random error, systemic error, sample contamination, carryover contamination, poor sensitivity and the false reactivity of the assays. The final case also interestingly showed that after a series of improving measures were applied based on the troubleshooting analysis, the laboratory overcame all problems and achieved good results in the next EQA activities.

Conclusions:
Troubleshooting analysis could help laboratory to avoid the same problem to be happened in routine work. Based on the following quality improvement strategy, the testing proficiency of blood screening laboratory could improve to a higher level.

STUDY ON FUNCTIONS OF PROVINCIAL BLOOD CENTER ON REGIONAL BLOOD QUALITY MANAGEMENT

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Introduction:
In China, there are over 430 independent Blood Transfusion Services (BTSs) under the jurisdiction of local governments at different levels. A BTS belongs to provincial government named Provincial Blood Center, while a BTS belongs to local government named Central Blood Bank or Blood Bank. The testing proficiency and the blood quality of local blood banks were limited by the relatively poorer management and less professional experience. Although most of blood banks have already established quality assurance system, there are still a lot of problems in quality internal audit in local blood banks. Law has been regulated that provincial blood center has the duties on business guide for local blood banks on regional blood quality. But faced on numerous local blood banks with broad diversity, how could a Provincial Blood Center effectively fulfill the duties, especially for those blood banks without any administrative relationships?

Objectives:
To share the experiences from Jiangsu Provincial Blood Center on how to develop the functions on regional blood quality management.

Methods:
A blood quality management system covered 18 blood banks all over the province has been established. The system is including 3 parts, a provincial EQAS for quality control laboratories, a joint blood quality internal audit mechanism, and quality control business and technique training for the technicians from blood banks. Blood screening EIA testing (HBsAg, Anti-HIV1/2, Anti-HCV and syphilis serologic testing), biochemical quantity testing (ALT, Total plasma protein, Na+ and K+), blood cell quantity testing (Hb, Hct, Count of WBC, RBC and PLT) and blood coagulation quantity testing (FVIII:C and Fbg) were included into EQA programs.

Results:
Most of laboratories achieved good results in EQA, except for some laboratories had some problems on biochemical quantity testing and blood coagulation quantity testing. EQA can improve the testing proficiency of blood quality control laboratories of blood banks, and blood quality can be improved based on the strict and accurate quality testing by blood quality control laboratories. The joint blood quality internal audit mechanism can help to enhance the function of internal audit for finding the potential problems of the blood banks. The training, of course, was good for improving ability of the staffs on blood quality control and management.

Conclusions:
Although the blood quality management system still need further improvement, Jiangsu Provincial Blood Center has found a good way to enhance the functions on blood quality guidance for regional blood banks.