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From the Executive Director

We are pleased to bring you this issue of the SA Pathology Newsletter, the first for 2015, and trust you will find it filled with relevant and useful information.

As you will be aware from reports in the media, the efficiency and effectiveness of SA Pathology was externally reviewed last year by SA Health. As South Australia’s public and most comprehensive pathology provider it is appropriate that our performance is reviewed regularly, particularly in the face of rapidly changing technology and demographics.

This is a time of massive change for the health system, including for SA Pathology, with the impacts of a burgeoning older population and increased demand for timely access to affordable and quality pathology services, coupled with budget pressures on the health system and the implementation of new computer systems and improved pathology automation.

In line with the Transforming Health initiative’s need to provide ‘the best care, first time, every time’, our services will continuously evolve and improve to focus on achieving better outcomes for our patient population in partnership with all our Local Health Networks and clinicians.

With the delivery of new e-Health systems and analysers designed to handle millions of tests every year, it is imperative our organisation is ready when the new Royal Adelaide Hospital opens its doors in 2016.

You can be assured we will continue to deliver accurate, timely results to support you in the care of your patients, maintaining our critical support of medical staff in both the private and public sectors, and our reputation for scientific and clinical excellence.

Mr Ken Barr

Respiratory serology changes

SA Pathology is decommissioning two antibody test services, the Chlamydia pneumoniae and Respiratory Viruses by Complement Fixation Tests (CFT).

Alternatives

You are encouraged to request PCR tests for faster, more sensitive diagnosis of respiratory viruses, M. pneumoniae and B. pertussis. Serological tests for other pathogens including Legionella, M. pneumonia and B. pertussis are not affected.

Respiratory virus and Chlamydia pneumonia serology is now only available on paired samples and if required, CFT testing can be arranged.

Why the change?

Whilst antibody testing can provide a diagnosis of infection a definitive result requires evidence of rising antibody levels in specimens collected two weeks apart. Paired samples are infrequently received and patients have usually recovered from illness, hence follow-up testing is rarely sought, resulting in low test volumes.

During 2013-14, SA Pathology received over 4,500 samples for Chlamydia pneumoniae and over 3,000 samples for respiratory virus testing, from which only one patient showed evidence of infection based on paired specimens.

With the introduction of the molecular assay, a test for respiratory pathogens is now available for reliable diagnosis of acute viral infection on a range of samples.

More Information

If you wish to speak to a pathologist, call SA Pathology on 8222 3000 and ask for the on-call microbiologist.

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SA Pathology Newsletter 2015 PAGE 2

New Patient Centres

For your patients’ convenience SA Pathology has opened two new patient centres.

Campbelltown

Located within the Health Centre
58 Newton Road, Campbelltown
Monday – Friday 8.30am to 12.30pm

Port Augusta

Located within the Ghan Medical Centre, 16 Young Street, Port Augusta
Mondays, Tuesdays and Thursdays from 8.30am to 11.30am

For a complete list of our Patient Centres visit www.sapathology.gov.au
Parasite testing

SA Pathology has introduced a new molecular testing regime for faecal parasites.

For routine initial testing Polymerase Chain Reaction (PCR) molecular tests have now replaced traditional microscopy. PCR detects significantly more parasite infections for most common pathogens including *G. intestinalis*, *E. histolytica*, *D. fragilis* and Cryptosporidium spp. It can distinguish between pathogenic and non-pathogenic Entamoeba and offers faster turnaround times.

**What to collect**

Collect unpreserved faecal specimens; there is no requirement for a special faecal parasite collection kit. Where indicated by a patient's clinical history, such as recent overseas travel, or if the patient is a migrant or refugee, microscopy tests will be performed in addition to PCR.

For further information about PCR testing contact SA Pathology on 8222 3000 and ask for the on-call clinical microbiologist.

Medicare rebate changes

In December 2014 Medicare announced that Folate, Vitamin D, B12 and Haemoglobin A1c (HbA1c) tests would only be covered by rebates for patients with specified clinical conditions.

For patients who meet these changed conditions, please include appropriate clinical notes.

**Folates**

Red Cell Folate and Serum Folate are covered by Medicare if the patient is deemed at risk of folate deficiency due to anaemia, pregnancy, malabsorption or malnutrition.

**Vitamin D**

A suite of conditions apply; all are covered in the Path Brief currently available on the SA Pathology website. Some examples of patients’ clinical conditions include those:

- suffering from malabsorption (e.g. due to cystic fibrosis, short bowel syndrome, inflammatory bowel disease or untreated coeliac disease etc.)
- having deeply pigmented skin, or chronic and severe lack of sun exposure
- taking medication known to decrease 25OH-D levels such as anticonvulsants
- having chronic renal failure or renal transplant recipients.

**Haemoglobin A1c**

For diagnosis of diabetes mellitus in asymptomatic at-risk patients, HbA1c is rebated once every 12 months only. In patients known to have diabetes, the HbA1c is still rebated up to four times per year for the management of their condition.

**B12**

Up to 30% of patients with B12 deficiency may show serum B12 levels in the lower normal range. For better diagnosis of this patient group, SA Pathology will automatically add a Holotranscobalamin in all pathology tests with low or borderline B12 levels. This will provide a more accurate estimate of tissue B12 availability for these patients.

You do not need to change your current ordering practice.
The principle features, known as the sicca complex, are:
- dry mouth
- dry eyes
- lymphocytic infiltration of the exocrine glands.

After systemic lupus erythematosus (SLE), SS is the second most common autoimmune disorder, affecting 1% – 2% of the population. Middle-aged women are most commonly affected with a female: male ratio of 9:1. It also affects about 50% of rheumatoid arthritis patients and 30% of patients with other autoimmune diseases.

Sjogren’s syndrome may be classified as primary or secondary, both forms occurring with similar frequency.

Primary SS involves gland inflammation (eyes and mouth) with no other underlying autoimmune disorder.

The secondary form involves gland inflammation associated with another autoimmune disorder such as rheumatoid arthritis, SLE and scleroderma.

SS is characterised by two phenomena.
1. Lymphocyte infiltration of the exocrine glands with predominantly T cells, and progressive destruction of the glands. Inflammatory changes may block smaller gland ducts.
2. B cell hyperactivity with circulating auto-antibodies directed against immunoglobulins (rheumatoid factors) and cytoplasmic ribonucleoprotein (anti-SSA and anti-SSB).

Clinical features
In most patients primary SS develops very slowly and symptoms are not initially severe. Whilst the disease may take up to 10 years to develop from initial presentation some subjects show characteristic serology years before any symptoms develop.

Manifestations of SS include:
- non-specific systemic symptoms such as fatigue, arthralgia, myalgia and Raynaud’s phenomenon.
- glandular symptoms
  - keratoconjunctivitis (inflammation of the tear glands) may cause eye irritation, infection, blurred vision, decreased tear production, ulcers and cornea abrasion.
  - xerostomia (failure of salivary glands) may cause mouth and throat dryness, speaking and swallowing difficulties, dental decay, candidal mouth infections.
  - failure of other exocrine glands, including skin, respiratory tract, digestive system and genital tract.
- Systemic systems
  - Arthritic joint and muscular pain
  - Lymphadenopathy
  - Renal disease
  - Vasculitis
  - Nervous system.

Recommended investigations
The disease can be very difficult to diagnose. Symptoms are often subclinical or vague, patients present to various specialists, dentists or optometrists and no two people have exactly the same symptoms or medical history. Investigations should include:
- Schirmer test, for lack of secretions or dry eyes
- salivary gland investigation
  - radiology and saliva production
  - Lip or salivary gland biopsy
- ANF and autoantibodies to SSA and SSB

Sjogren’s syndrome (SS) is a slowly progressive and currently incurable autoimmune disorder characterised by the presence of autoantibodies and immune cells that target epithelial exocrine glands, specifically the salivary and lacrimal glands. Whilst lifespan is not generally reduced quality of life may diminish.
The clinical picture of dry mouth, gritty eyes and small joint arthralgia raised the possibility of Sjogren’s syndrome. However a similar picture can be found in many other conditions including antidepressant side effects and as part of the fibromyalgia / fatigue symptom complex. Other conditions that need to be excluded include lymphoma, AIDS, sarcoidosis, graft versus host disease, hepatitis C infection and use of drugs for hypertension.

A subjective feeling of dry eyes is very common in the general population so how should the differential diagnosis be established? An important step before any investigation is carried out is to objectively measure decreased tear and saliva production.

**Initial laboratory investigations**

The Schirmer’s test is used to measure tear production but it should be noted that the test can be rendered falsely positive by many drugs.

Positive findings in four of these investigations represent a definite diagnosis, while three represents a possible diagnosis.

- Autoantibodies to RF (80%), AMA and TPO
- Anaemia (20%)
- Raised ESR and normal CRP (90%)
- Polyclonal hypergammaglobulinaemia (80%)
- Cryoglobulins (20% primary disease).

The combination of dry eyes, xerostomia, positive Schirmer’s 1 test and positive anti-SSA or anti-SSB antibodies is sufficient to make the diagnosis of Sjogren’s syndrome. In conjunction with dry eyes, xerostomia and positive Schirmer’s 1 test anti-SSA and anti-SSB have a sensitivity of 94% for SS. However these antibodies may be negative in up to 20% of patients with Sjogren’s syndrome in which case labial gland biopsy needs to be considered.

**Treatment**

There is at present no treatment that changes the course of the disorder and treatment is targeted at symptom relief e.g. artificial tears (see IMVS Newsletter Issue 70) and saliva, good dental hygiene, prevention of infections and NSAIDs for arthritic relief.

Lifespan is not usually reduced but quality of life may diminish. B cell lymphoma may develop in 5% of cases.

### Table 1 Initial laboratory results

<table>
<thead>
<tr>
<th>TEST</th>
<th>RESULT</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine chemistry</td>
<td>normal</td>
<td></td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>111 g/L</td>
<td>115 – 155 g/L</td>
</tr>
<tr>
<td>ESR</td>
<td>94 mm /hour</td>
<td>0 – 20 mm</td>
</tr>
<tr>
<td>C reactive protein</td>
<td>&lt; 6mg/L</td>
<td>8 mg/L</td>
</tr>
<tr>
<td>Immunoglobulin</td>
<td>42.9 g/L</td>
<td>6.5 – 16 g/L</td>
</tr>
<tr>
<td>- IgG</td>
<td>2.67 g/L</td>
<td>0.6 – 4.0 g/L</td>
</tr>
<tr>
<td>- IgA</td>
<td>2.42 g/L</td>
<td>0.5 – 3.0 g/L</td>
</tr>
<tr>
<td>Rheumatoid factor (RF)</td>
<td>1420 IU/mL</td>
<td>&lt; 14 IU/mL</td>
</tr>
<tr>
<td>Anti nuclear antibody (ANA)</td>
<td>speckled 1/160</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Although ANA and RF are found in 80% of patients with SS, these antibodies are found in patients suffering from other systemic rheumatic diseases including rheumatoid arthritis. If sicca is confirmed testing for specific autoantibodies associated with Sjogren’s syndrome, anti-SSA and anti-SSB antibodies, is indicated.

### Further tests

**Table 2 Follow up laboratory results**

<table>
<thead>
<tr>
<th>TEST</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-ENA antibodies</td>
<td>anti-SSA and anti-SSB positive</td>
</tr>
<tr>
<td>Serum protein electrophoresis</td>
<td>No paraprotein detected, polyclonal increase in IgG</td>
</tr>
</tbody>
</table>

Final diagnosis: Sjogren’s syndrome.
Urinary tract infection (UTI) is a very common type of bacterial infection seen in general practice. Effective empiric treatment for symptomatic infection is aided by information on epidemiology and local antimicrobial susceptibility patterns for common uropathogens.

To produce the antibiogram antimicrobial susceptibility data was extracted from SA Pathology’s laboratory information system for urine bacterial isolates in samples sent from general practices in metropolitan Adelaide and rural South Australia in 2013.

Antibiotic susceptibility testing is performed primarily by antibiotic disc and in accordance with the Clinical Laboratory Standards Institute (CLSI) guidelines. Isolates are characterised as sensitive, intermediate sensitive or resistant to a particular antibiotic. Most antibiotics (e.g. beta-lactams, trimethoprim, quinolones) used to treat UTI concentrate in urine, so for UTI, antibiotics to which organisms have intermediate susceptibility are effective. For this urinary antibiogram, isolates designated susceptible include fully susceptible and intermediate susceptible isolates.

**Susceptibility patterns**

Susceptibility patterns for the top 12 bacteria isolated from urine specimens received from general practices in South Australia are presented (Figure 2). Of all urine specimens submitted to SA Pathology from general practice, about one quarter grew bacteria which have intermediate susceptibility are effective. For this urinary antibiogram, isolates designated susceptible include fully susceptible and intermediate susceptible isolates.

86% of specimens were from females with the majority for both males and females coming from those over age 55 (Figure 1).

*Escherichia coli* was the most common bacteria isolated in both genders and all age groups (66% of isolates) accounting for >75% of uropathogens in females under 55.

*Staphylococcus saprophyticus* was the second most common isolate in women aged 15-55, accounting for 7% of UTI. In all other groups (females of other ages, males of all ages), enterococci were the second most common bacteria isolated from all urinary specimens, overall comprising 8.5% of isolates. In males, enterococci and *P. aeruginosa* featured more prominently than in females, with enterococci comprising 14% of all uropathogens versus 6% in females, and *P. aeruginosa* being isolated in 5.6% of males versus 1.6% of females.

**Therapy**

Prior to initiating treatment, it is important to consider whether antibiotic treatment is necessary at all, as asymptomatic bacteriuria is common but antibiotic therapy is not warranted when there are no urinary symptoms, except in pregnant women and patients about to undergo urologic procedures. For symptomatic patients requiring treatment, previous urine cultures if available, should be reviewed.

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**Figure 1 (pie chart) Infection rates by gender and age; (bar chart) Relative frequency of bacterial isolates (male/female)**
Patients with recurrent UTI previously treated with antibiotics may show resistance to first-line agents and therapy should be tailored according to previous known susceptibilities.

Therapeutic guidelines: antibiotic (TG: antibiotic) recommend trimethoprim as first line empiric treatment for uncomplicated UTI, with alternatives being cephalaxin, amoxycillin-clavulanate or nitrofurantoin. Recommended duration of therapy is 3-5 days.

Fluoroquinolones such as norfloxacin or ciprofloxacin should not be used as first line drugs for UTI as they are the only oral option for treatment of P. aeruginosa and other multi-resistant gram-negative organisms.

For pyelonephritis, intravenous amoxycillin plus gentamicin is recommended as first line therapy with step down to oral therapy once clinical improvement is seen. Recommended duration of therapy is 10-14 days. An alternative for pyelonephritis treatment for patients with significant renal impairment or penicillin allergy is ceftriaxone, however empiric use of ceftriaxone as a single agent may not cover all uropathogens, particularly in older males where enterococci and P. aeruginosa are more frequently identified, both of which are intrinsically resistant to ceftriaxone.

Fluoroquinolones should not be used as first line drugs for UTI.

**Figure 2** General practice urine culture antibiogram (metropolitan and rural) 2013

<table>
<thead>
<tr>
<th>Organism</th>
<th>n</th>
<th>%</th>
<th>AMP %S</th>
<th>CEP %S</th>
<th>TMP %S</th>
<th>GEN %S</th>
<th>NFT %S</th>
<th>AUG %S</th>
<th>TRI %S</th>
<th>NOR %S</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>E. coli</em></td>
<td>11921</td>
<td>65.8</td>
<td>58</td>
<td>86</td>
<td>84</td>
<td>97</td>
<td>97</td>
<td>90</td>
<td>98</td>
<td>96</td>
</tr>
<tr>
<td><strong>Enterococci</strong></td>
<td>1565</td>
<td>8.6</td>
<td>98</td>
<td>R</td>
<td>98</td>
<td>98</td>
<td></td>
<td>97</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>604</td>
<td>3.3</td>
<td>86</td>
<td>96</td>
<td>79</td>
<td>99</td>
<td>R</td>
<td>97</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>564</td>
<td>3.1</td>
<td>R</td>
<td>95</td>
<td>88</td>
<td>98</td>
<td>52</td>
<td>97</td>
<td>&gt;95*</td>
<td>97</td>
</tr>
<tr>
<td><em>Klebsiella sp.</em></td>
<td>560</td>
<td>3.1</td>
<td>R</td>
<td>96</td>
<td>93</td>
<td>99</td>
<td>73</td>
<td>96</td>
<td>&gt;90*</td>
<td>99</td>
</tr>
<tr>
<td><em>Staphylococcus saprophyticus</em></td>
<td>466</td>
<td>2.6</td>
<td>99</td>
<td>99*</td>
<td>97</td>
<td></td>
<td></td>
<td>100*</td>
<td>100*</td>
<td>100*</td>
</tr>
<tr>
<td>Strep. agalactiae (Group B)</td>
<td>415</td>
<td>2.3</td>
<td>100</td>
<td>100*</td>
<td></td>
<td></td>
<td></td>
<td>100*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>394</td>
<td>2.2</td>
<td></td>
<td></td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td>R</td>
<td>95</td>
</tr>
<tr>
<td>Enterobacter sp.</td>
<td>272</td>
<td>1.5</td>
<td>R</td>
<td>R</td>
<td>92</td>
<td>99</td>
<td>45</td>
<td>R</td>
<td></td>
<td>99</td>
</tr>
<tr>
<td>Citrobacter koseri</td>
<td>187</td>
<td>1.0</td>
<td>R</td>
<td>96</td>
<td>98</td>
<td>100</td>
<td>83</td>
<td>97</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Klebsiella oxytoca</td>
<td>159</td>
<td>0.9</td>
<td>R</td>
<td>65</td>
<td>97</td>
<td>97</td>
<td>88</td>
<td>94</td>
<td>89</td>
<td>100</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>57</td>
<td>0.8</td>
<td>24</td>
<td>100</td>
<td>97</td>
<td>99</td>
<td>91</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

~ Ceftriaxone is not tested at all laboratories on routine urine specimens. This result represents testing from a single laboratory on approximately 500 general practice E. coli specimens

* Not directly tested, result extrapolated from amoxycillin or cephalexin

**Colour Key**

- **≥ 90% susceptible**
- **70-89% susceptible**
- **≤ 70% susceptible**

**Antibiotic not tested/ no breakpoints available/ not recommended**

**Antibiotic not recommended to be used in children without specialist advice**

Percentages are shown only where more than 90% of isolates were tested for each organism unless specified above. Susceptibility Testing Method: CLSI
SA Pathology’s website has recently undergone a major rebuild. A portal to all the information you need about our services, research and latest news, the site’s content and improved functionality makes it an invaluable asset for clinicians and patients alike. Key functions such as test and Patient Centre search are accessible directly from the home page, and the three column layout for News, Patients and Clinicians makes navigation easy.

**News**
All the latest news in one place and you can filter it to display just the clinical news for easy reading. Even better the site is scalable for mobile devices, try it!

**Patients**
Aimed squarely at your patients, column two presents all the information they need to find our patient centres and prepare for their tests.

**Clinical support**
The new Pathology Collection Guide is a quantum shift in how we present our entire catalogue of tests, related data and documents like test and patient information sheets and relevant links to Medicare. Fast easy access to all the data you need.

If you have any questions, phone Enquiries on (08) 8222 3000.

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**Find a Test / Procedure**

1. Enter the test name (or acronym/partial name)
2. Click GO
Looking for a pathologist?

If you want to find one of our pathologists you can do it direct from our home page.

You’ll find their career background, qualifications and contact details – and you can sort by location and specialty.
Like blood, bone is a precious resource and supply is critical and many people depend on it for their operations.

Do you have patients needing hip or spinal surgery? Would you consider asking them to make a donation of their excess bone tissue to the South Australian Tissue Bank?

The donation process is easy and only requires a blood test. To check whether bone is healthy and will not harm recipients, SA Pathology asks potential donors two questions:

- Have they had a blood transfusion or received any blood products in the last six months?
- Have they lived, visited, or received blood in the United Kingdom for a period of over six months between 1st of January 1980 and 31st of December 1996? (This includes England, Scotland, Wales, Ireland, the Isle of Man and Channel Islands).

If patients answer ‘no’ to both these questions, they are able to donate bone tissue, which is thoroughly tested to ensure it is suitable for donation to patients needing surgery.

A simple blood test is all that’s required after patients have donated bone tissue.

If you do have a patient who may be interested, ask them to talk to their orthopaedic surgeon. If you have any clinical questions, please call the South Australian Tissue Bank on (08) 8222 3301.

Research improves routine genetic tests

Most genetic conditions are complex and may be caused by mutations in any one or more of our thousands of genes. For this reason, diagnosis to date of many genetic conditions has been extremely difficult, trying to select responsible genes from a vast array of possibilities.

Careful clinical workup and review has often been insufficient to appropriately prioritize genes for diagnostic testing. With each negative result, a new test would be ordered, leaving some families waiting for a diagnosis for many months, even years, while testing continued, and costs escalated.

A breakthrough in DNA sequencing technology has now fundamentally changed this paradigm. ‘Next-generation sequencing’ (NGS) offers the ability to sequence many genes at once, eliminating the need to pick a likely gene at the start of the diagnostic investigation if the diagnosis is not obvious.

For patients the cost of multi-gene testing with NGS is around the same as the cost of single gene sequencing using previous technology.

In NGS, DNA analysis is performed in a ‘massively parallel’ fashion, taking advantage of tremendous advances in microfabrication, optics, and computing algorithms. Each DNA sample is first barcoded so that patient samples from different patients can be tracked; it is then processed so that only those regions of interest can be amplified and analysed.

Testing can range from single genes to the full protein-coding repertoire – the ‘whole-exome’ – involving up to 20,000 human genes. The final step involves sophisticated bioinformatics thatreassembles the millions of DNA regions back together highlighting changes, or mutations.

Building on research expertise and infrastructure in the Centre of Cancer Biology’s ACRF Genome Facility, SA Pathology is proud to be at the forefront of implementing these technologies into our routine genetic pathology testing service.
Autoimmune Blood Bank

South Australia's first autoimmune blood bank has been set up by scientists at SA Pathology for research into autoimmune diseases including systemic lupus erythematosis, systemic sclerosis, Sjogren's syndrome and vasculitis.

Autoimmune diseases currently affect about 5% of the Australian population and cost the community an estimated $4.3 billion annually.

The group will collect blood to store serum and nucleated blood cells from patients diagnosed with autoimmune disease to investigate new genotype and autoantibody diagnostic markers.

There is currently no cure for these diseases and it is hoped the new autoimmune blood bank will lead to a better understanding of the diseases, their development and hence the opportunities for new therapeutic approaches.
In the 2014 winter we experienced the biggest influenza season ever in South Australia. The total test number exceeds 60000 compared to 43000 in the last pandemic influenza season in 2009. Influenza A (H1N1) pdm09 is the predominant strain (approx 70%) where H3N2 accounts for approx 30%. There has been very little activity of Influenza B viruses so far in the season (approx 7%).

Several other respiratory pathogens have also been active including Respiratory Syncytial virus (RSV) in early winter, Parainfluenza type 3 in spring, Rhinovirus, Metapneumovirus and Adenovirus all year round.

Table 1 list all respiratory viral activity (including Mycoplasma pneumoniae and Bordetella pertussis) in 2014.

### Antiviral drug effectiveness

Neuraminidase inhibitor susceptibility studies performed at WHO Influenza Centre indicated that only a small number of viruses tested showed highly reduced inhibition to the neuraminidase (Table 2).

<table>
<thead>
<tr>
<th>Type/subtype</th>
<th>No. viruses tested</th>
<th>Oseltamivir</th>
<th>Peramivir</th>
<th>Zanamivir</th>
<th>Laninamivir</th>
</tr>
</thead>
<tbody>
<tr>
<td>A(H1N1)pdm09</td>
<td>839</td>
<td>4 (0.5%)</td>
<td>3 (0.4%)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>A(H3N2)</td>
<td>275</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B/Victoria</td>
<td>35</td>
<td>1 (2.9%)</td>
<td>2 (5.7%)</td>
<td>1 (2.9%)</td>
<td>1 (2.9%)</td>
</tr>
<tr>
<td>B/Yamagata</td>
<td>188</td>
<td>0</td>
<td>2 (1.1%)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### VACCINATIONS

**2015 WHO Southern Hemisphere recommendations**

It is recommended that trivalent vaccines for use in the 2015 influenza season (southern hemisphere winter) contain the following:

- an A/California/7/2009 (H1N1)-like virus
- an A/Switzerland/9715293/2013 (H3N2)-like virus
- a B/Phuket/3073/2013-like virus

It is recommended that quadrivalent vaccines containing two influenza B viruses contain the above three viruses and a B/Brisbane/60/2008-like virus.

**Table 1: Respiratory viral and bacterial pathogens**

<table>
<thead>
<tr>
<th>Respiratory Viral PCR</th>
<th>Positive Tests 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza A</td>
<td>8106</td>
</tr>
<tr>
<td>Influenza B</td>
<td>682</td>
</tr>
<tr>
<td>RSV</td>
<td>3313</td>
</tr>
<tr>
<td>Parainfluenza 1</td>
<td>803</td>
</tr>
<tr>
<td>Parainfluenza 2</td>
<td>101</td>
</tr>
<tr>
<td>Parainfluenza 3</td>
<td>1373</td>
</tr>
<tr>
<td>Adenovirus</td>
<td>1640</td>
</tr>
<tr>
<td>Metapneumovirus</td>
<td>2253</td>
</tr>
<tr>
<td>Rhinovirus</td>
<td>9879</td>
</tr>
<tr>
<td>M pneumoniae</td>
<td>366</td>
</tr>
<tr>
<td>B pertussis</td>
<td>265</td>
</tr>
</tbody>
</table>