VIROLOGY
Head: Dr Pravi Moodley

1. About the Department

The Department had its second SANAS Audit in July 2014 and received three non-conformances. We were awarded best performing Early Infant Diagnosis (EID) laboratory by the NHLS National Priority Program (NPP) Offices.

The Department obtained 5 year accreditation from HPCSA for Registrar and intern medical scientists training.

Table 1: Total number of staff per profession and highest qualification

<table>
<thead>
<tr>
<th></th>
<th>Pathologist</th>
<th>Med Doctors</th>
<th>MSc Scientist</th>
<th>Technologists</th>
<th>Student Technologists</th>
<th>Support</th>
<th>South African*</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>Coloured</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Indian</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>South African*</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>13</td>
<td>8</td>
<td>7</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>13</td>
<td>8</td>
<td>7</td>
<td>37</td>
<td>38</td>
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2. Diagnostic Service

The number of HIV PCR tests (Table 2) increased considerably due to expansion of the Early Infant Diagnosis HIV testing in infants and the changes in PMTCT Guidelines. The number of HIV viral load tests decreased considerably since the establishment of HIV Viral Load testing in the Madadeni, Hlabisa and Addington Hospital Laboratories.

Viral serology which uses Enzyme Linked Immuno-Assay (ELISA) for HIV, HAV, HBV, HCV, Rubella, Cytomegalovirus, Epstein - Barr virus, HSV 1/2 and Toxoplasma serological markers are done routinely. The number of these tests (Table 2) continues to increase due to more requests for HBV, CMV and Toxoplasma from the clinics in the CCMT Program.

All in-house Viral PCR (Table 2) assays were replaced by commercial assays for diagnosis of CMV, VZV, HSV and Parvovirus, Respiratory Viruses and Enteroviruses. These passed all quality assurance and verifications before being offered as part of the diagnostic service. These more sophisticated assays replaced the conventional virus isolation methods which are no longer offered as a diagnostic service.
Table 2: Trends in Diagnostic service workload: 2010-2015

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV Viral Loads</td>
<td>218446</td>
<td>188512</td>
<td>155287</td>
<td>93068</td>
<td>161806</td>
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<tr>
<td>HIV PCR</td>
<td>80161</td>
<td>103424</td>
<td>85866</td>
<td>133541</td>
<td>115691</td>
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<tr>
<td>Viral Serology</td>
<td>171428</td>
<td>338113</td>
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<td>404105</td>
<td>360915</td>
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<tr>
<td>Viral PCR</td>
<td>5933</td>
<td>6985</td>
<td>5872</td>
<td>11809</td>
<td>1483</td>
</tr>
<tr>
<td>HIV Drug Resistance</td>
<td>-</td>
<td>28</td>
<td>234</td>
<td>172</td>
<td>74</td>
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</tbody>
</table>

The Registrars spend one day a week in the CCMTP Clinics in various hospitals in Durban as part of our service to our customers. The Department expanded coverage of our Virology service monthly to the Tertiary Complexes in Pietermaritzburg, Ngwelezane and Madadeni Hospitals.

3. Teaching, Training and Professional Development

All our Student Medical Technologists were successful in the 2014 examinations. Four students passed in March 2015. One student will write in September 2015. Four students are currently registered and being prepared for the March 2016 examinations.

We teach an average 15 undergraduate science students in the final year BSc (Biomedical Science) per year with an annual pass rate of 100%. The pass rate in 2014 was 2 of 3 students. There are currently 15 students registered.

We teach an average of 200 undergraduate medical students through lectures and assessments in the first three years of the curriculum. The Department plays a much more intensive role in this program especially in third year.

Table 3: Total number of trainees per qualification category and rates of successful completions /pass rates.

<table>
<thead>
<tr>
<th>Qualification Category</th>
<th>Total Number of trainees</th>
<th>Final year trainees</th>
<th>Successful completion</th>
<th>Percentage of Successful Completions</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSc/MMed</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Registrars</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>PhD</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Post Doctoral</td>
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<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>South African</td>
<td>9</td>
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<td>-</td>
</tr>
<tr>
<td>All</td>
<td>11</td>
<td>-</td>
<td>-</td>
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</tr>
</tbody>
</table>

4. Research Activities

The Department has an established Drug Discovery Laboratory which investigates new methods of drug discovery, searching for novel antivirals against HIV and other viruses using nanotechnology. The Laboratory is led by Raveen Parboosing. He has one Research Technician funded by DST and one Post-Doctoral Fellow funded by UKZN.
The DOV has scientific links within UKZN such as Chemistry, Higher Education, Paediatrics, Neurology, HIV Pathogenesis Program (HPP), Africa Centre, Women’s HIV Research Unit. Our international links include Emory University (USA), IrsiCaixaRetrovirology Laboratory (Barcelona, Spain) and US Centers for Disease Control and Prevention (CDC), Atlanta.

4.1. Research Projects

**Project Title:** Aptamer Conjugated Hybrid Nanoparticles for Targetted Delivery Of An Antiretroviral Drug To The Lymph Nodes  
**Collaborators:** Prof Thirumala Govender  
**Funding:** UKZN Nanotechnology Platform

**Project Title:** Impact of HIV, Antiretroviral Therapy and TB Genotype on Survival in MDR and XDR TB in a HIV positive adult South African cohort.  
**Collaborators:** Neel Gandhi and his team from Emory University School of Medicine, and Koleka Mlisana.  
**Funding:** NIH (non-IND study)

**Project Title:** KwaZulu-Natal HIV Drug Resistance Surveillance Study.  
**Collaborators:** Yunus Moosa (University of KwaZulu-Natal), South Africa; Vincent Marconi and his team from Emory University School of Medicine, Atlanta, Georgia, USA; Daniel Kuritzkes (Harvard University School of Medicine, Boston, Massachusetts, USA); with researchers from University of Colorado, Denver, and Centers for Disease Control, Atlanta, Georgia, USA  
**Funding:** The National Institute of Allergy and Infectious Diseases (non-IND study)

**Project Title:** Zidovudine (AZT) resistance in pregnant patients enrolled in the dual therapy arm of the PMTCT program  
**Principal Investigator:** Reshmi Samuel  
**Collaborators:** Roger Paredes (IrsiCaixaRetrovirology Laboratory, Barcelona, Spain) and Michelle Gordan (HPP, UKZN)  
**Funding:** NHLSRT and MRC

**Project Title:** Assessment of several synthetic peptides for anti-HIV activity  
**Collaborators:** Gert Kruger  
**Funding:** India-Brazil-South Africa Trilateral Cooperation in Science & Technology, NRF, K-RITH, MRC. Sample testing on-going. Four papers published and four being drafted.

**Project Title:** Inhibition of HIV-1 Encapsidation by Targeted Poly-ribonucleotide Decoys: A Novel Nanoparticle Approach  
**Principal Investigators:** Raveen Parboosing  
**Collaborator:** Gert Kruger  
**Funding:** Discovery Foundation and NRF

**Project Title:** Association between clinical correlates and CMV viral load  
**Researchers:** Department of Paediatrics, UKZN, Kerusha Govender  
**Funding:** Discovery Foundation, NHLS Research Trust

**Project Title:** Prevalence of HBV infection in infants in KZN, South Africa  
**Researchers:** Nokukhanya Msomi - Virology MMed  
**Funding:** NHLS Research Trust
Project Title: To evaluate the end point of Herpes Simplex Virus in cell culture using TCID\textsubscript{50} and comparing it to real time qualitative PCR.
Researchers: Subitha Govender, BSC Hons, Dr Pravi Moodley  
Funding: UKZN, College of Health Sciences

Project Title: Validation of a two-spot method of dried blood spot specimen processing prior to HIV polymerase chain reaction  
Researchers: Dr Kerusha Govender- Virology MMed  
Funding: Virology, KZN

Project Title: HIV-associated Hepatic Tuberculosis in South Africa  
Researchers: Lilishia Gounder Virology MMEd, Pravikrishnen Moodley  
Collaborator: Paul K. Drain- Division of Infectious Diseases, Department of Medicine, Massachusetts General Hospital, Harvard Medical School, Boston, USA, Andrew J. Hickey-University of Maryland School of Medicine, Baltimore, USA, Mahomed-Yunus S. Moosa -Department of Infectious Diseases, Nelson R. Mandela School of Medicine  
Funding: Department of Infectious Diseases, UKZN

Project Title: Anaemia and pure cell aplasia secondary to Parvovirus in HIV-infected and un-infected patients  
Researchers: Dr Kerri-Lee Ann Francois- Virology MMEd  
Funding: Virology, KZN

Project Title: Pattern of viral respiratory infection in children less than 5 years in KZN, South Africa  
Researchers: Dr Tayo Famoroti- Virology MMEd  
Funding: Virology, KZN

Project Title: Occupational exposures to blood borne viral infections with relevance to HIV Hepatitis B and Hepatitis C in KZN  
Researchers: Dr Tinyiko Khosa– Virology MMEd  
Funding: Virology, KZN

Project Title: Prevalence of Delta Hepatitis Infection in KwaZulu-Natal Province, South Africa  
Researchers: Dr Raveen Parboosing, Virology, UKZN  
Funding: NHLS Research Trust  
End Date: December 2014

Project Title: JC Virus in Neurological Patients Infected with HIV  
Researchers: Dr Pravi Moodley, Lavanya Singh Virology, UKZN, Neurology, UKZN  
Funding: NHLS Research Trust  
End Date: December 2015

4.2 Grant Funding

Discovery Foundation, NHLS Research Trust, Medical Research Council (MRC), The National Institute of Allergy and Infectious Diseases (non-IND study) and National Institute for Health (NIH) (non-IND study), UKZN College of Health Science postdoctoral scholarship, UKZN Nanotechnology Platform
5. Research Output

5.1. Journal Publications


Submitted for Publication


5.2. Conference Presentations

Oral Presentations


Poster Presentations


transmission. Conference on Retroviruses and Opportunistic Infections (CROI), 3-6 March 2014, Boston, Massachusetts, USA

The Department hosted and international speaker Dr Fernandez funded by NRF Travel Grant.

6. **Academic and Research Honours Awards/Recognition**

Dr Reshmi Samuel awarded MRC Self-Initiated Grant of R190 000.00 per year from 2013-2016

Dr Raveen Parboosing was awarded R280 000.00 per year from 2013-2016 from the NRF Thuthuka Program.

Dr L Chonco received a postdoctoral scholarship from the College of Health Science, UKZN, 2014-2016, R180 000 per year stipend and R40 000 per year operational funds.

Dr L Chonco, NRF Knowledge Interchange and Collaboration (KIC) funding, running expenses for HIV research for Prevention conference, R17 000, in 2014

Dr R Parboosing, NRF Knowledge Interchange and Collaboration (KIC) funding, Foreign Research fellowship, R25 000, in 2014