

Pacific Regional Infectious Disease Association (PRIDA): capacity-building for microbiology and infectious disease across the Pacific

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Abstract. PRIDA is an Australian based network of medical and scientific specialists, combining expertise in microbiology laboratory development, infection control, management of infectious diseases and antimicrobial stewardship. PRIDA focuses on grassroots support for Pacific and Southeast Asian sites through the establishment of long-term mentoring relationships with front line health care workers. With an emphasis on bench level training for scientists and bedside development for clinicians, PRIDA has advanced testing capacity, infection control and antimicrobial stewardship in the Solomon Islands, Timor-Leste, and PNG. Understanding the need to upskill HCWs in the Pacific, PRIDA has expanded into areas of formal education opportunities with development of online microbiology diplomas, for pathologists, physicians, and scientists. Concurrent design of multidisciplinary virtual video conferenced microbiology rounds provides teaching opportunities in real time and improvement in daily patient care. From its origin of volunteerism, PRIDA has attracted funding through partnership with larger organisations and are currently involved in sponsored AMR projects in the Pacific.

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Introduction

There is an overwhelming burden of infectious disease in Pacific Nations. People of all ages are affected with high-incidence rates of tuberculosis, malaria, HIV, viral hepatitis, and other sexually transmitted infections¹. Of growing concern is the increase in global rates of antimicrobial resistance (AMR). Putting further pressure on resource-limited countries^{2,3} such resistant bacteria often cause life-threatening infections⁴ and are highlighted as one of the greatest threats to human health by the World Health Organization (WHO). As such AMR is of special concern to low- and middle-income countries which often lack the infrastructure and laboratory capacity to accurately diagnose and treat such infections⁵. Geographic isolation of Pacific Island nations, combined with lean resources and a workforce with limited training opportunities, makes it particularly challenging for the Pacific Islands to meet these needs.

The Pacific Region Infectious Diseases Association (PRIDA), formally established in 2017, aims to improve the diagnosis, management, and prevention of infectious disease in the Pacific Region. Since initiation, a number of long-term projects have been established in the Solomon Islands, Papua New Guinea, and Timor-Leste. To contain AMR in the region, it is critical to establish bacterial diagnostic testing and surveillance. Support and development of a skilled workforce in hospital microbiology is critical for meeting this need. The past four years of PRIDA's work has emphasised the currently neglected areas of infectious disease management including bacteriology laboratory capacity, detection and management of sepsis, antimicrobial stewardship, and hospital infection prevention. Work performed and supported by PRIDA has an emphasis on development of strong relationships with local professionals to create sustainable change. Empowering people at the microbiology bench and the patient bedside in their local environment has resulted in sustainable improvements. When not in-country, PRIDA provides

remote support and remains focused on training with several established online programs. In the past year of no travel, PRIDA has increased virtual efforts, including weekly Honiara and Dili video-conference microbiology laboratory meetings. Such investment has the added benefit of teaching opportunities in real time, identifying systems gaps that can be addressed and improvement in daily patient care and infection control. This is being realised despite the challenges of a global pandemic as caused by COVID-19.

Online training

Medical Microbiology Diploma

To improve and standardise microbiology pathology training in the Pacific, PRIDA developed an annual online medical microbiology course. In 2017, this was attended by PNG pathology trainees, with Fiji pathology trainees joining the program in the following year. The course has steadily expanded its student base since then with 13 health care workers, including pathology trainees, laboratory scientists, doctors, and pharmacists, successfully graduating in 2020. Now with 28 faculty, and 36 enrolled students (from 11 countries in the Asia Pacific region), the course has become a pre-requisite for pathology training at the Fiji National University.

Clinical Microbiology Scientist Diploma

Understanding the need for skilled microbiology scientists working in the region, PRIDA, in conjunction with Pacific Pathology Training Centre (PPTC) launched the Diploma of Clinical Microbiology in July 2021. Running over a year, the graduate diploma courses involve an intensive study load of weekly lectures, mentoring, guided laboratory rounds, case study analysis and practical assessments.

The program has 23 students from laboratories in PNG, Timor-Leste, Solomon Islands and Samoa. The course content focuses on clinical microbiology but also includes laboratory quality management, biosecurity, One Health along with a significant practical component. Such course work is facilitated by accredited clinicians and senior scientists, primarily from Australia, who are actively working in the Pacific region with experience working in resource-constrained settings.

With a prime focus of relationship building PRIDA has built a network of health professionals within and outside the Pacific region for sharing of expertise. Further, by ensuring that training is practical and hands-on, there is immediate realisation of development of skills effecting patient care.

Continuing to partner with other organisations PRIDA provides content material and lecturers to the Master of Orthopaedic Program, hosted by National University of Samoa and Pacific Island Orthopaedic Association, working to develop orthopaedic surgeons skilled in the knowledge of infectious disease management.

PRIDA Journal Club

PRIDA hosts a fortnightly journal club, with clinicians and scientists from across Southeast Asia and the Pacific regions participating. Home country presenters, with support from PRIDA members, are encouraged to discuss relevant articles from aspects of infectious disease, and research relevant to their local context. Despite many countries facing significant work pressure from the ongoing COVID-19 pandemic, participation remains high across several sites and has successfully established a peer network, with external input from PRIDA members as required.

Virtual Microbiology Laboratory Rounds

With an emphasis on bench level support, PRIDA members have helped facilitate regular laboratory rounds via videoconferencing tool Zoom (Video Communications Inc., 2021). Virtual lab rounds have proven to be an effective communication tool bringing together primarily Australian clinical microbiologists and senior scientists to mentor and support the local scientists and doctors in their microbiology laboratories in Timor-Leste and Solomon Islands. Major topics include review of positive blood cultures, bacterial identification and susceptibility testing issues, critical result notification and result interpretation.

These aim to ensure valid and clinically meaningful results in a timely manner, resulting in improved patient outcomes. Laboratory rounds are multidisciplinary, including doctors, infection control nurses and pharmacists, which helps to improve HCW understanding of microbiology and establish good communication pathways throughout the hospital.

Antimicrobial Stewardship Training for hospital pharmacists

In conjunction with Australian Society of Pharmacists, PRIDA is in the process of developing a mentoring program, partnering experienced Australian pharmacists with hospital pharmacy departments in the Pacific. Early efforts in July 2021 involved a week-long virtual workshop with faculty from Diagnostic Microbiology Development Program (Cambodia), PRIDA and Australian Therapeutic Guidelines. These focused on addressing AMS issues faced by PNG, Timor-Leste, and Solomon Islands Pharmacists.

Equipment Donations

PRIDA coordinates home country donation requests and third-party donations. With the donation of a blood transfusion vehicle, Honiara has been able to further develop its blood donation service. Similarly, a donated biosafety cabinet, automated bacterial identification, and susceptibility testing instrument (VITEK), incubators, microscopes, and various laboratory consumables, has helped strengthen clinical microbiology services in Solomon Islands. Clinical support

with donations of Cardiac ultrasound machines, and infection control materials has also contributed to improved hospital capacity.

Solomon Islands

A large focus of PRIDA has been on improving microbiology capacity and improvement in international standards. This has involved the introduction of a laboratory quality manual, support of the quality control program and implementation of international up to date susceptibility testing. The introduction of a donated automated blood culture instrument combined with bedside education on optimal blood culture collection and sepsis. Laboratory tours (Figure 1) have assisted in improving clinician understanding and laboratory interaction. Antibigrams (with verifiable QC) are now produced with data collection via the WHONET system, these informing antibiotic guidelines for the hospital. Confirmation of resistant isolates at the Pathology Queensland laboratory in Brisbane provides an opportunity for feedback and learning.

Annual multidisciplinary visits provide training in microscopy and bench testing, workshops to interns and physicians, pharmacy training and antibiotic point prevalence studies, infection control education and procurement strengthening. With improvements in internet, PRIDA now conducts regular virtual microbiology laboratory rounds with Solomon Islands scientists and other health care workers.

Timor-Leste

PRIDA has been a key supporter of the large laboratory capacity-building project currently underway in Timor-Leste (Figure 2). This has been driven by the Menzies School of Health Research via the Fleming Fund Country Grant. Currently daily laboratory rounds are performed with clinicians and scientists at the Laboratório Nacional de Saúde in Dili, Timor-Leste both remotely and in-country with both PRIDA members and employees of the Menzies School of Health Research.



Figure 1. Laboratory tour: Hilda Zoleveke, SI scientist, teaching hospital doctors about the Gram stain, supported by Dr Nikki Townell.

Papua New Guinea

Prior to the inception of PRIDA, various consultants, now members of PRIDA, have provided support for post-graduate education of medical pathology trainees since 2010 with in-country training (Figure 3), mentorship and virtual support that evolved into the medical microbiology course that started in 2017⁶. External examiner support for the UPNG pathology Masters of Medicine has also been provided since 2016.

Since 2020, PRIDA consultants have been engaged in a human health laboratory capacity-building project currently underway at five locations supported by the Fleming Fund Country Grant for PNG. The Fleming Fund is a UK aid investment program that tackles antimicrobial resistance in low- and middle-income countries and is managed by the Burnet Institute in collaboration with the PNG Institute of Medical Research and other partners. PRIDA consultants have contributed to the development and implementation of laboratory quality management and biosafety measures, laboratory refurbishments, Laboratory Information Management System, remote training and equipment procurement required by the project. Virtual microbiology laboratory rounds with scientists at all sites commenced in September 2021.

PRIDA Infection Control Consultants have established a network of PNG IPC nurses from five locations with regular virtual meetings, active mentoring, and in-country visits. PRIDA has facilitated donations of essential IPC consumables, including PPE and disinfectants.

In 2020, PRIDA consulted on the design and implementation of a DFAT-supported, Doherty/Burnet-led project that established a facility for local production of alcohol-based hand rub at the Port Moresby General Hospital.

New opportunities and ongoing challenges

As previous described the progress of diagnostics and infectious disease management in LMIC is framed by a number of challenges⁷.



Figure 2. Tessa Oakley training Timorese microbiology scientists in use of the MALDI-ToF mass spectrometer.



Figure 3. Goroka Hospital Laboratory staff meeting with the PRIDA/Burnet Fleming Fund team.

Each of these continue to provide opportunities for teams to assist. Development of basic infrastructure in laboratories (electricity, water, internet), combined with more mature supply lines for perishable consumables (none of which are manufactured in-country), will promote consistent testing and support clinicians to make the right diagnosis.

Training a base of technically sound, motivated and supported staff will continue to overcome the challenges of limited post graduated training opportunities for the many isolated health professionals. This training also attempts to overcome the limited quality assurance procedures and available products that are often not certified by ISO 13485 at the point of manufacture.

The requirement for COVID-19 diagnostics has renewed interest in infectious diseases in LMIC. This provides some hope that persistent funding commitments to these areas might be possible. The opportunity now exists to demonstrate to Governments that investing in early correct diagnosis is a financially viable option that limits further spread and financial harm.

Next steps

Over the next 12 months, PRIDA will continue to provide support to the large Fleming Fund Country Grant projects in both Timor-Leste and Papua New Guinea. PRIDA will also continue to support DFAT COMBAT AMR project, led by Doherty institute, with PRIDA as country lead for Solomon Islands and an implementation partner for PNG.

As part of the online Graduate Diploma courses in Medical Microbiology, extensive in-country mentoring visits are planned for 2022 when travel restrictions, due to COVID-19, are eased. In future years both the journal club and diploma courses for both clinicians and scientists are planned to continue, with a hope to expand enrolment in the courses to participants from other countries in the Pacific Region.

PRIDA will continue to strengthen and expand its mentor relationships, working with the local frontline hospital staff to empower

and improve diagnosis and management of infectious diseases. With a focus on building these long-term relationships, PRIDA understands that any future progress is reliant on local willingness and engagement of these professionals.

Conflicts of interest

The authors declare no conflicts of interest.

Declaration of funding

PRIDA is a not-for-profit unincorporated association that functions independently of any government, religious group or other affiliated corporation. Overseen by a board that meets quarterly PRIDA's financial structure is in line with unincorporated associations reporting requirements. Administrative costs are covered by consultative fees donated by its members. PRIDA consultants are registered by Australian Health Practitioner Regulation Agency (or equivalent Australian specialist regulation body). PRIDA endorses all member activities prior to participation. The majority of the work performed is on request from local health care workers. Permission to undertake work, in country or remotely, is granted by the local hospital executive and where appropriate the country's Ministry of Health. PRIDA does not provide direct patient care, rather provides advice and support to health care workers.

Health professionals willing to join are encouraged to express interest via PRIDA's website <http://www.pridanetwork.org/>.

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Biographies



Tessa Oakley is a Senior Microbiology Scientist currently based in Dili, Timor-Leste. She currently holds the position of lead scientist for Timor-Leste Fleming Fund Country Grant run by the Menzies School of Health. She has previously worked in Cambodia (DMDP) and is also a PhD student researching microbiology laboratory capacity-building in resource-limited countries.



Dr Ian Marr is an Infectious Disease Physician and Microbiologist based at The Canberra Hospital. With a concurrent role under The Menzies School of Health Research he is involved in the UK sponsored AMR capacity expansion project Fleming Fund, in Timor-Leste.

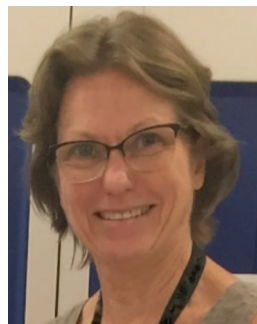


Dr Nicola Townell, Infectious Disease Physician and Clinical Microbiologist (one of the founding members of PRIDA), has experience working in the Asia Pacific region. For the past 8 years, she has undertaken voluntary and consultancy projects in the Pacific region, involving a number of organizations

including World Health Organization and University of Papua New Guinea. Her activities in the Pacific region include microbiology capacity building in Solomon Islands, development of national antimicrobial guidelines for Marshall Islands, development of Pacific region antimicrobial guidelines for Orthopaedic surgeons, Surgical Site Infection workshops and Infection Control workshops in Fiji and Solomon Islands.



Dr Claire Heney is a Clinical Microbiologist with Pathology Queensland, with an interest in antimicrobial stewardship. She has supported the laboratory in Honiara through visits and equipment donations.



Wendy Jackson is a Senior Microbiology Scientist with Sullivan Nicolaides Pathology and a founding member of PRIDA. Concurrently works in the Pacific both as a consultant and a volunteer in the Solomon Islands, PNG and Samoa, with previous experience in Lao (WHO).



Colleen Allen is a retired Senior Microbiology Scientist. She is a NATA assessor in Microbiology and is currently one of the Human Health Microbiology Scientists for the PNG Fleming Fund program.



Dr John Ferguson is a Microbiologist and Infectious Diseases Physician with Hunter New England Health and a conjoint associate professor with the University of Newcastle, NSW, Australia. He currently is the human health microbiology thematic lead for the PNG Fleming Fund program. He maintains two online sites: <http://aimed.net.au>, which focuses on antimicrobial stewardship; and <http://idmic.net>, for postgraduate microbiology and infectious diseases materials.