

Improving access to antivenom: An example of a novel approach in Papua New Guinea

Dr David Williams

Scientist (Antivenoms)

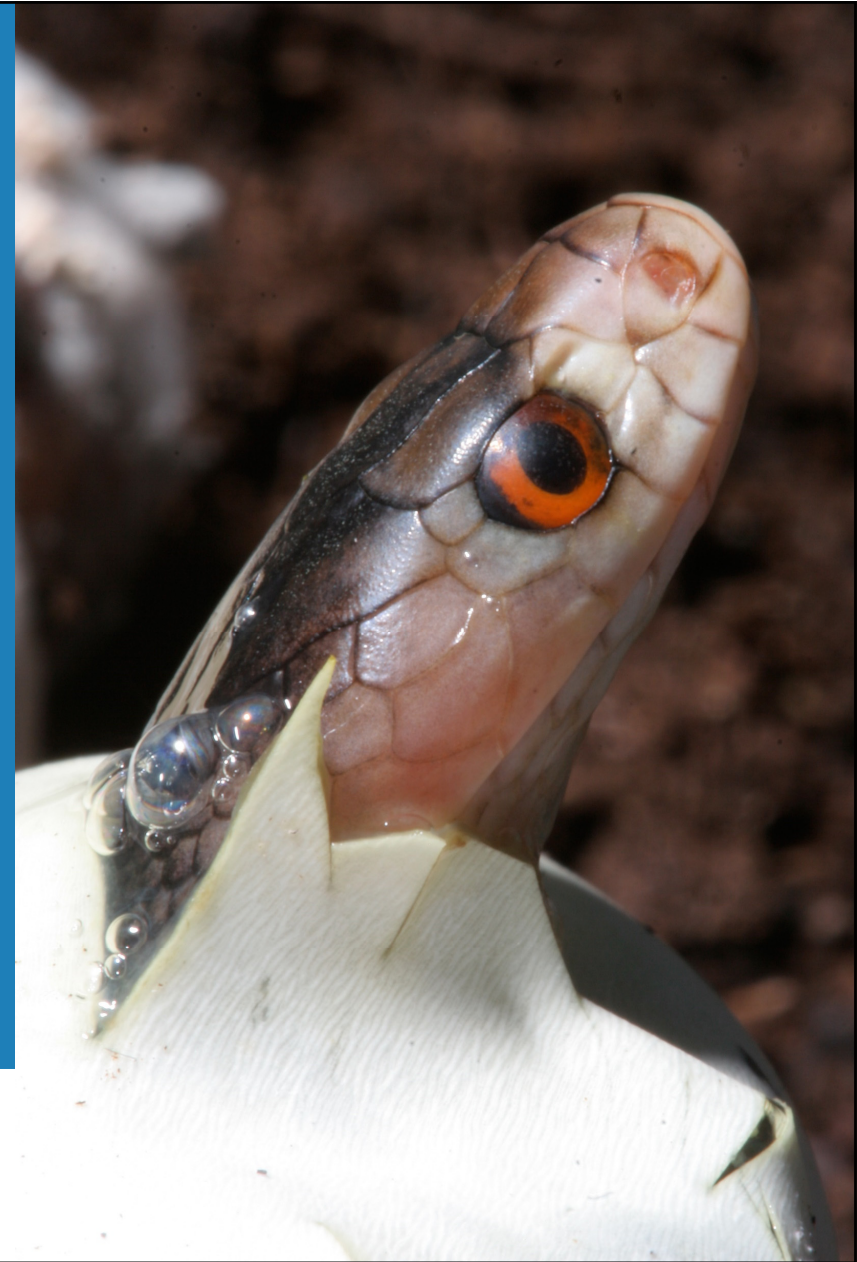
Prequalification Unit (PQT), Regulation and Prequalification Department (RPQ)

Access to Medicines and Health Products Division (MHP),

World Health Organization, Geneva, Switzerland



World Health
Organization



Access to safe, effective and affordable antivenoms is a human rights issue

Everyone has a right to a system of health protection providing equality of opportunity for everyone to enjoy the highest attainable level of health...

Antivenoms are essential medicines

- Treatments for envenoming are included in the WHO Model List of Essential Medicines.
- Snakebite envenoming is a time-critical medical emergency and prompt access to safe, effective and affordable antivenoms is critical to saving lives and preventing life-long disabilities.

Many of the world's poorest communities have little or no access to these essential medicines

- In many countries there remains a chronic lack of access to effective treatment to snakebite envenoming.
- There are many reasons – remoteness, high costs, lack of effective products in the market, insufficient investment by governments, weak political capital.
- What is clear, is that the lack of effective treatment destroy lives, while affordable access to it, saves them.

A case study from Papua New Guinea

- A previous Australian protectorate, Papua New Guinea, relies on Australian antivenoms due to lack of local production and similar snake fauna.
- Between 1992 and 2005 the local cost increased by 311.2% compared to a price rise in Australia of just 39.9% in the same period.
- Largely driven by the devaluation of the local currency by >200%.
- At the same time, use of the most expensive of these products – polyvalent antivenom rose from 49.2% in 1992-95, to 82.0% in 1997-00, increasing the individual cost of treatment by 49.7%.
- The use of monovalent antivenoms fell by as much as 90.6% (taipan AV) despite this species being responsible for >93% of all snakebites in southern Papua New Guinea.
- By 2007, the cost of treatment with a single vial of polyvalent antivenom was more than US\$2000.



A long pathway to change

Sometimes you have to crack a few eggs to make an omelette – François de Charette, 1796

Unequal distribution inadvertently cost lives

- While Port Moresby General Hospital in the national capital received 85.2% of the antivenom needed to treat presenting cases each year, the six most important rural health facilities in the surrounding catchment to which most patients initially present only received 14.2% of what was needed to institute early treatment.
- In remote Western Province only six of sixteen health facilities with capacity to treat snakebite received any antivenom, and the resultant provincial mortality rate exceeded 20%.
- Lack of antivenom in the primary health centre was the most commonly reported reason for seeking referral of patients with envenoming.

Scarcity and high prices create opportunities for corruption

- The high cost of antivenom created a thriving black market in which 10.6% of purchased stock never reached the central medical store after shipment from Australia, and a further 13.7% of stock could not be accounted for by the central medical store itself. At the same time these antivenoms were being openly sold in public pharmacies for grossly inflated prices, despite the manufacturer maintaining that the only customer for their products in the country was the Ministry of Health.
- At least one large pharmacy chain was found to be selling Indian-made SII polyvalent antivenom for more than US\$1000/vial despite it being completely unregistered and ineffective against any of the local snake species.
- Efforts to bring these issues to light led to a “shoot the messenger” response from government and threats from people associated with the pharmacy.

Efforts to effect change

- In 2007, to reduce the cost of effective treatment a partnership between the University of Melbourne, University of Papua New Guinea and Instituto Clodomiro Picado was initiated with the goal of developing a new antivenom for Papuan taipan bites.
- Clinical trials between 2012 and 2016 demonstrated that the potential replacement was equally as effective as the Australian product, at US\$150/vial
- Before it was registered the Australian manufacturer and the Australian government stepped in with an offer to supply their antivenom for free, this led to the creation of the PNG Snakebite Partnership in 2018.



Partners: Government of Papuan New Guinea, Australian Department of Foreign Affairs and Trade (DFAT), Seqirus, University of Melbourne, Charles Campbell Toxinology Centre (CCTC) at the University of Papua New Guinea.

Aim: To improve distribution and accessibility of antivenoms across Papua New Guinea (PNG).

Initial target: 600 vials of donated antivenom each year (approximately double what was being purchased at the time).

Model: Scheduled distribution to health facilities by CCTC with surveillance, reporting, training services and emergency restocking services.

A model for public-private partnership

- **Funding:** Australian government via DFAT
- **Supply:** Donation of antivenom from Australian manufacturer to Government of Papua New Guinea (GoPNG) valued at more than US\$600,000 per annum when program began in 2018.
- **Service Delivery:** Charles Campbell Toxinology Centre (CCTC)
- **Oversight:** GoPNG, Seqirus, DFAT, University of Melbourne.

Impact and current status

- Between 2018 and 2024 more than 3000 doses were distributed to all areas of the country where snakebites are a public health issue – a 3x increase in supply.
- Clinical training provided to more than 1500 health care workers throughout the country.
- Responsibility for local implementation transferred from CCTC to the St. John Ambulance Service as the new partner.
- DFAT announced renewed funding from 2024-2027 in June last year.

Function of the service delivery partner

- CCTC and now St. John Ambulance provided dedicated cold-chain storage for the antivenoms in a high security facility with 24-hour monitoring.
- Inventory management, dispatch and delivery, reordering and restocking.
- Collection and analysis of detailed surveillance data using a standard proforma reporting form.
- Health worker education and training
- Community engagement and education
- Reporting progress to partnership.



Improved reporting of antivenom use

Monitor use and outcomes and contributing to improved case management.

Established a new mandatory reporting system

- Health facilities are supplied with standard reporting forms printed in quadruplicate in NCR books – original copy must be submitted to CCTC with new orders for resupply to occur.
- Additional copies go to provincial health office and the health data statistics division in the national MoH, with the final copy remaining at the health facility.
- Specific to the assessment of elapid envenoming in Papua New Guinea.
- Antivenom use and adverse reactions must be documented.
- Four sections:
 - Patient contact details and history
 - Initial clinical assessment at triage
 - Systematic clinical examination
 - Treatment and outcomes

How the data is used

- Data is entered into a central database to enable annual review of epidemiological and clinical profiles, mapping of cases, analysis of antivenom dosing, outcomes and adverse reactions to antivenom.
- Results are shared with provincial and national MoH, and the data also informs clinical feedback to health facilities during regular visits by the partnership team.
- These reviews enable identification of problems and training gaps so that future health worker training and education can be targeted to specific needs.

Snakebite Reporting Form FORM 1A

DEPARTMENT OF HEALTH
Please complete all of the information on this form. Refer to the instruction sheet at the front of this book if you need assistance.

Australian Government

First Name: _____ Last Name: _____ ☐ Male ☐ Female Age: _____

Address: _____

Telephone: _____ Next of Kin: _____ Relationship: _____

Time Bitten: _____ Place: _____

Date: _____ Village: _____

Activity: _____ Type of first aid applied: _____

Snake Seen ☐ YES ☐ NO Description: _____

Symptoms: _____

Bite Site: _____ Appearance: _____

Local SS: _____

Systemic SS: _____

CNS SS: _____

Airway: _____

Breathing: _____

Circulation: _____

IS THE 20WBCT POSITIVE AFTER 20 MINUTES? ☐ YES ☐ NO

Bleeding: _____

Conscious ☐ YES ☐ NO Obeys Commands ☐ YES ☐ NO

Vital Signs HR: _____ BP: _____ RR: _____ T°C: _____

Are lymph nodes in bitten limb painful, or enlarged? ☐ YES ☐ NO

Other: _____

Ptosis ☐ YES ☐ NO Grade ☐ SLIGHT ☐ PARTIAL ☐ COMPLETE Diplopia ☐ YES ☐ NO

Ophthalmoplegia ☐ YES ☐ NO Grade ☐ SLIGHT ☐ PARTIAL ☐ COMPLETE Clear Speech ☐ YES ☐ NO

Tongue protrusion ☐ YES ☐ NO Grade ☐ GOOD ☐ POOR ☐ NONE Can swallow ☐ YES ☐ NO

Mouth open >2cm ☐ YES ☐ NO Pooling of Saliva ☐ YES ☐ NO Able to Cough ☐ YES ☐ NO

Able to turn head ☐ YES ☐ NO Able to flex neck ☐ YES ☐ NO LBS head off bed ☐ YES ☐ NO

Shrugs shoulders ☐ YES ☐ NO Using Intercostals ☐ YES ☐ NO Using Diaphragm ☐ YES ☐ NO

Abdominal Breaths ☐ YES ☐ NO Is Air Entry Good? ☐ YES ☐ NO Wheeze/stridor? ☐ YES ☐ NO

Complains of SOB ☐ YES ☐ NO Other problems: _____

Bite Site Bleeding ☐ YES ☐ NO Cuts/Abrasions ☐ YES ☐ NO Gums Bleeding ☐ YES ☐ NO

Spitting blood ☐ YES ☐ NO Blood in vomit ☐ YES ☐ NO Blood in Urine ☐ YES ☐ NO

Other Bleeding ☐ YES ☐ NO Please describe: _____

Nausea/Vomiting ☐ YES ☐ NO Abdomen Tender ☐ YES ☐ NO Guarding ☐ YES ☐ NO

Hepatomegaly ☐ YES ☐ NO Splenomegaly ☐ YES ☐ NO Bladder Distended ☐ YES ☐ NO

Able to Pass Urine ☐ YES ☐ NO Pregnancy ☐ YES ☐ NO Number of weeks: _____

DIAGNOSIS: _____ MADE BY: _____ DATE/TIME: _____

Treatment Plan: _____

Anaesthesia Type: _____ AV Vial Batch #: _____ If given, 2nd AV Vial Batch #: _____

☐ Death Adder Treatment Date: ☐ YES ☐ NO Suspected AV Reactions: ☐ YES ☐ NO ☐ UNSURE

☐ Taipan Premedication: _____ Please give details: _____

☐ Polyvalent Type used: _____

☐ Sea snake Dose & Route: _____

☐ Stonefish AV Start Time: _____

☐ Other AV Finish Time: _____

Other Antivenom: _____

Results of AV therapy ☐ POOR ☐ GOOD ☐ EXCELLENT

Describe patient outcome: _____

Date: _____ Signature: _____

THE TOP TWO COPIES OF THIS FORM MUST BE RETURNED TO YOUR PHO WITH YOUR NEXT ANTIVENOM REQUISITION.

AVRU AUSTRALIAN VENOM RESEARCH UNIT

PNG SNAKEBITE PARTNERSHIP

12345

FAILURE TO RETURN FORMS MAY DELAY RESUPPLY OF ANTIVENOMS



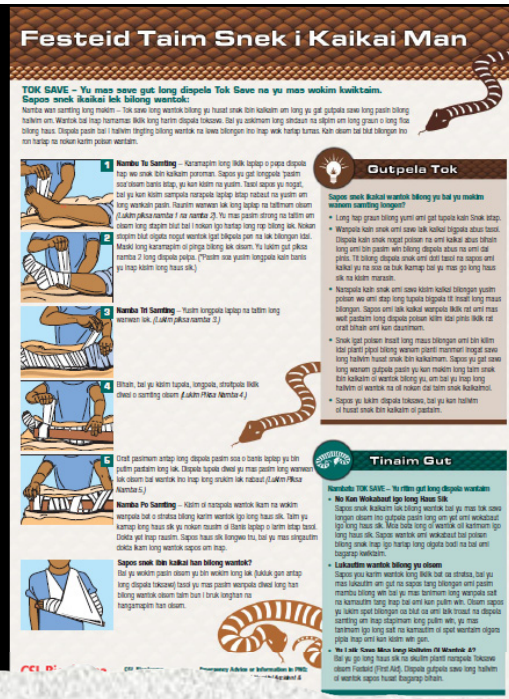
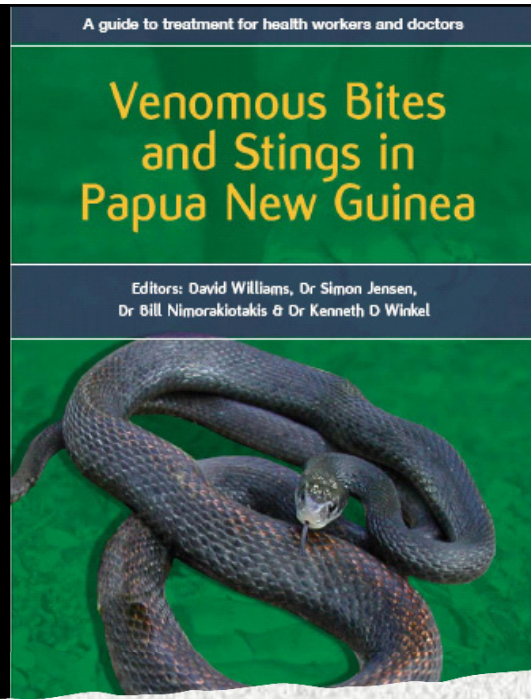
Health worker training embedded into program

National Snakebite Management Course

- Biannual national course sponsored by donors from 2004-2019.
- 5-day curriculum covering basic and advanced clinical skills, theory and practice, with formal evaluation of trainees.
- Faculty comprised of local and visiting experts who donate their time to teach the course.
- Training provided to more than 2500 health workers.

In-service training during health facility visits

- Offered situationally relevant training to health workers in rural areas since 2004.
- Focus on addressing specific needs of individual health workers in their own working environments to improve their ability to diagnose and treat patients and make informed referral decisions.
- Trained more than 1500 rural health workers since 2018.



Community & health worker education, and emergency retrievals

Community engagement and education

- Utilized epidemiological data to prioritize regular community visits to high-risk communities.
- Developed and distributed information on prevention, first aid and health care seeking behaviour for communities.
- Textbook on clinical management provided free to 2000 HCW.

PNG's first Mobile Intensive Care Ambulance

- Launched 24-hour emergency retrieval service staffed by CCTC and PMGH personnel in 2021 to provide emergency treatment for critically ill patients who required advanced airway management.
- Aim was to reduce sudden deaths during transport to hospital.
- Retrieved 50-60 critically ill patients/year from 2012-2019 with no fatalities in that period.