

Vanuatu Health Imaging & Diagnostic Equipment Needs

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Report on site visits to Vanuatu

Introduction

- Population 220,000: 50% with a primary school education, one fifth having never attended school. Only 3% of the population speak English or French at home.
- Workers: 25% are engaged in monetary activity and 66% work as subsistence farmers.
- Youth: 43% of the population under 15 y. Early teenage pregnancy is now a problem, especially in school dropouts. Big improvement in school attendance in recent years.
- Health workers (2008): 34 Health Centers, supported by 46 midwives and 40 nurse practitioners.
- 6 hospitals in 6 provinces, Cuba provides 6 doctors and undertakes the training of 10 Vanuatuan doctors.

Port Vila National Referral Hospital

Services

- Inpatient services in Medicine, Surgery, Obstetrics, and Pediatrics.
- No specialists in Pathology, Oncology & Radiology nor biomedical engineer.
- *No mammography, no cancer program.*
- 20-30 pts per day.

Staff:

- Four or five specialist doctors.
- Pathology laboratory staff train in NZ with refresher courses.
- Cervical screening by an Australian doctor; free anti-HPV vaccine.

Equipment:

- *One US & two mobile Toshiba hand units for abdominal and antenatal imaging.*
- *Doppler US for blood flow in the fetus and deep vein thrombosis.*
- *X-ray images read by technical staff. A 15 year old Toshiba mammography unit with poor contrast was not in use.*
- *Flouroscopy unit was used for barium, general and breast examinations.*
- *CT was not available.*

Regional Referral Hospital

Staff: 100 bed hospital; a general surgeon & gynecologist from China on contract.

- French gov funds for training program in PNG. Fiji offers a medical degree under the WHO.
- Nurse practitioners (NP) have 5 y RN experience, plus 1 y training.
- 5 NPs diagnose and treat outpatients, diagnose, admit and treat inpatients; with later validation by Doctor.
- 55 registered nurses (RN) & 10 nursing aids (NA) with minimal in service training.

Equipment:

- *Portable US machines are operating well, but another machine is needed.*
- *X-rays are run by technicians and scans are reviewed by doctors. Mobile phone consultation with the Vila Central Hospital is possible.*
- *Neither mammography nor cervical screening.*

Health Centers

Paunagisu Health Centre:

- about 1½ hours out of Port Vila by unsealed and at times very rough road.
- Mobile clinics are run every month to the surrounding villages, population ~5000.

Port Olry Health Centre: 2 h from the Luganville by a slow and bumpy unsealed road.

- A biogenerator for electricity was being installed and wireless telephone was in operation via the village wireless transmitter. Solar panels for electricity had been installed.
- The Centre serves a population of 2500. The location is ideal for tourism, and sea transport of patients and tourists by fast boat should be considered as an alternative to road.
- While current communication may be limited, mobile phone towers are available.

Staff:

A mid-wife (MW), RN and NA. NAs cover for MWs when in outreach service.

Maternity:

5-40 deliveries per month; ~ one high risk delivery & some home births. There are 3-4 emergency deliveries each year from each centre that are referred to the hospital. An antenatal flow chart protocol was followed; risky cases sent early to hospital, often a 1-2 h drive over rough unsealed roads.

Equipment:

There were neither forceps nor vacuum equipment for deliveries, no spare oxygen bottle and no incubator for preterm babies.

- Vaccines are stored in a gas fridge.
- A new maternity “wing” in one Medical Centre was built by the village but there were no electrical services.
- Resources are the Yellow Bible (2004) which lists symptoms & drugs, the blue book which lists drug doses and reactions, and the white gynecology & obstetrics book.

Staff wish lists: Ultrasound, TM, email, blood test for hemoglobin, cervical screening, mobile phones.

Specific Recommendations

- Staff morale would be enhanced by availability of improved communications via mobile phone towers
- Case files and statistical data should be maintained.
- Vacuum birthing equipment is required.
- *UltraSound should be available.*
- In-house training and distant education for improved morale, skill base and service.
- *Telemedicine is strongly recommended.*
- Microscope needed for malaria, HIV in hospital.
- Need pressurized autoclave; drip stand for IV infusion; baby scales; blood pressure measurement.
- Ambulance requires replacement. Distant patients referred to hospital must endure seated transport by 4WD on bad roads.

Dispensary

- The dispensary serves a population of ~2000. Some 10-30 patients per day are seen. RN supported by a NA.
- Antenatal patients are seen up to 8 months; then referred to the hospital.
- There is no apprenticeship scheme in place.
- In the absence of the RN, the NA takes over as there is no equal level replacement policy.
- The RN prescribes & delivers medication, but over a reduced range of drugs.
- Resources are the Yellow Bible (2004) which lists symptoms & drugs, the blue book which lists drug doses and reactions, and the white gynecology & obstetrics book.

General Comments

- Health Centre staff work well above their qualifications. Nurse practitioners (NP) in the hospital environment diagnose and treat at the MD level. Mid-wives do the same thing at the Health Centers.
- When the MW is away, the replacement is an RN or even a NA. So the gap between training and task level is even higher.
- The Health Center's role is to educate, immunize, treat or refer patients to the town hospitals. However, Mid-wives revealed the heavy responsibility of their position when difficult decisions needed to be made.
- In-house local apprenticeships are needed to overcome the staffing problems. This would lead to more dynamic, rather than static, career paths, better morale, more competent replacement and to higher standards of service.

Status Quo

- The number of medical specialists is very low and not all specialties are represented.
- The system is highly dependent on nurse practitioners in hospitals and mid-wives and registered nurses in the Health Centers.
- Retirement age is 55 years.
- Recruitment into the health services at all levels is inadequate.
- The health system is heavily dependent on grants from overseas organisations.
- Training is a cost to the trainee unless external funds are available.

Recommendations 1

- High cost interventions should not be at the expense of primary health services.
- Improve access to medical services and the quality of those services.
- More outreach services to remote communities.
- Monitor quality practices with refresher training.
- Appropriate remuneration and incentive programs.
- Collection of health status data.

Recommendations 2

- Introduction of local, in-house apprenticeships and continuing education at all levels; NA, RN, MW, NPs.
- Increase the retirement age so as to retain experienced staff.
- Engineer required for urgent equipment repair.
- Palliative Care Centre is required for end-stage cancer patients.
- *Telemedicine via mobile phone to be introduced with priority for both imaging and training.*
- *Urgent need for low cost imaging or equivalent technology*

Health Stations (www.iupesm.org;httpg)

- **Mekong Delta, Vietnam**

MD plus some allied health staff, small dispensary, no equipment, “dumbing down”, motor cycle transport.

- **Philippines**

MD, little equipment, reliance on private hospitals,

- **Vanuatu**

Mid-wife & nursing aide, little equipment. Bad roads and boats,

- **Bangladesh**

MDs, pharmacy, little equipment .

- **Outback Australia**

Small isolated aboriginal communities ???

What do we need?

- **Telemedicine:** the essential glue to join the disparate skills of Health Centers and Referral Hospitals & to overcome the tyranny of isolation.
- **New approaches** to the development and implementation of robust, low cost devices, eg:
 - remote split-unit ultra sound to provide low cost transducers in Health Centers with image analysis at Referral Hospitals.
 - Focused Impedance Method (FIM)
 - Lixiscope for bone fractures.
 - Beta tested in DCs for specific indications.

And when do we need it?

- **NOW!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!**

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Part 1: Draft Recs on Needs

- R&D to focus on the needs of Health Stations in DCs.
- Major need is to overcome the isolation of rural communities.
- Robust & appropriate low cost imaging and diagnostic medical devices are required.
- Rapid access to referral hospital expertise is required.

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Part 2: Draft Recs on Modalities

- Clinical deeds
- Specifications

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Part 3: Draft Recs Imaging Unit

- Procurement
- Training
- Telemedicine

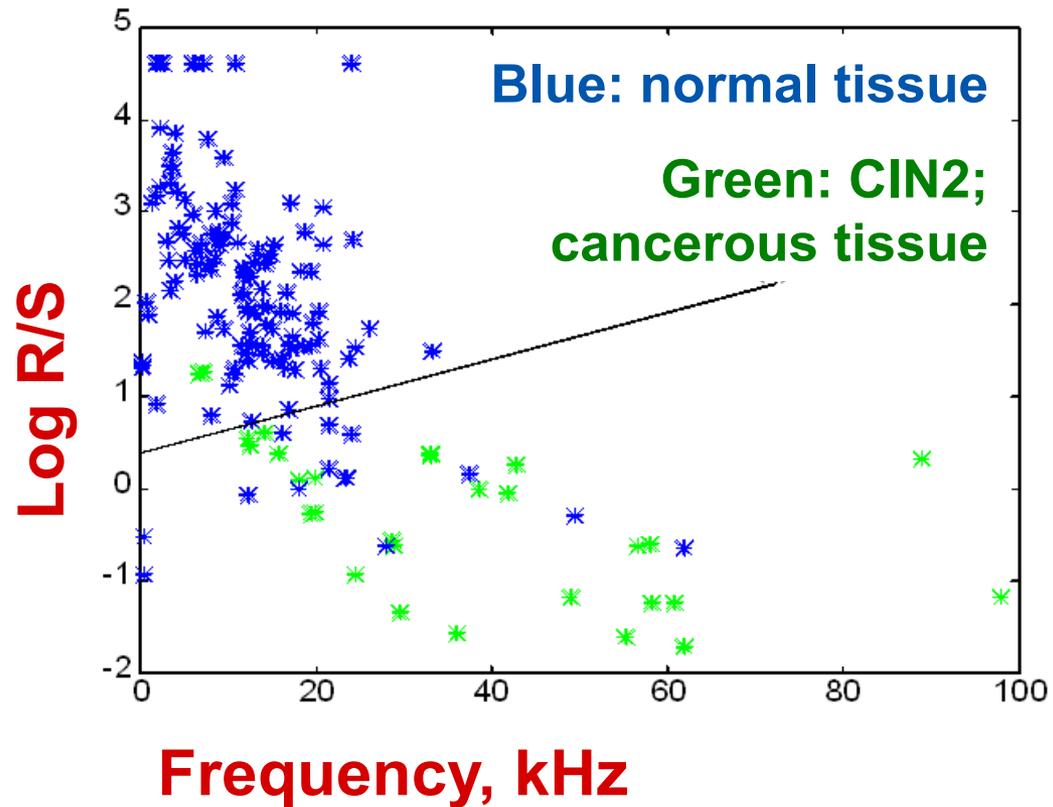
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Part 4: Draft Recs - Operations

- Quality control
- Radiation protection
- Referral protocols

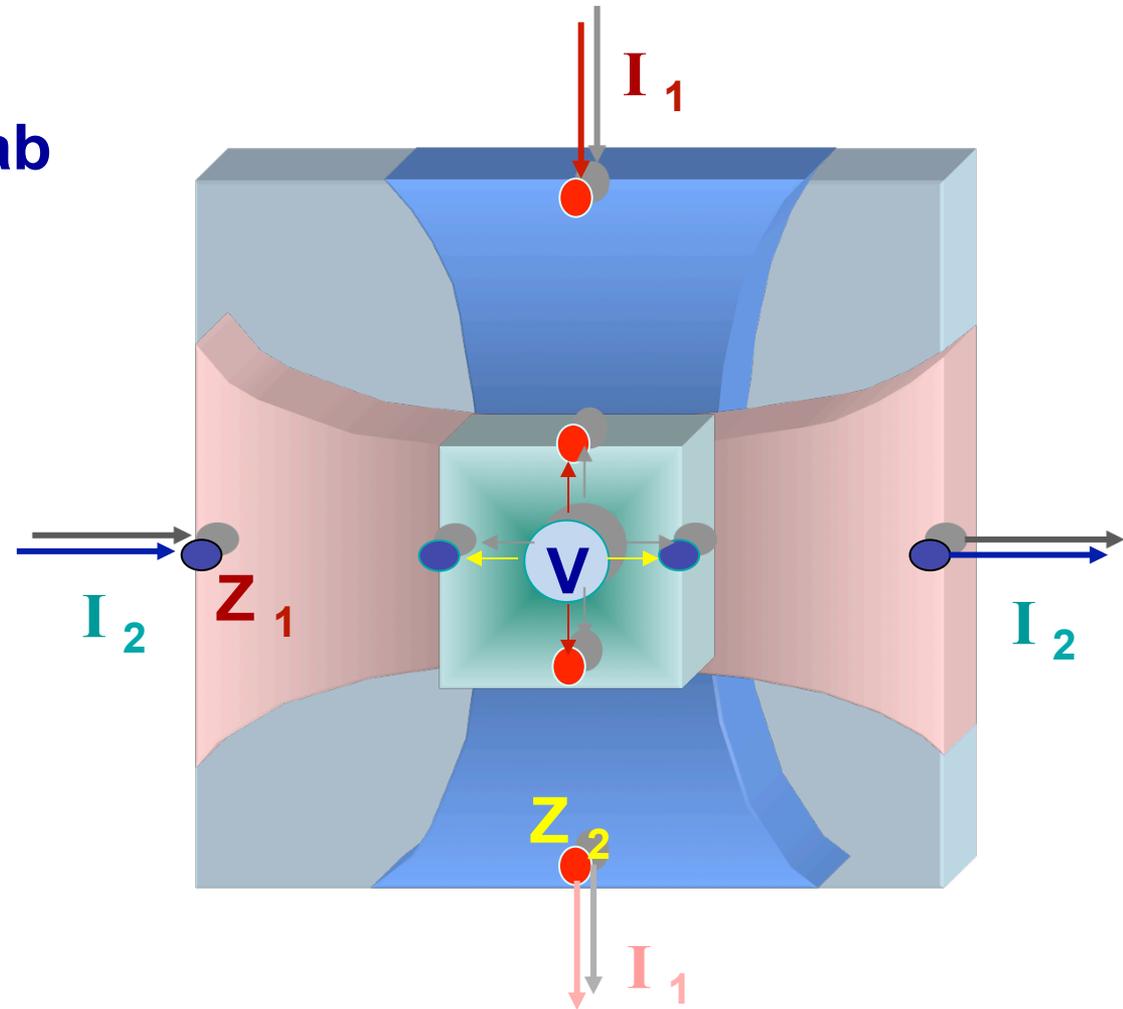
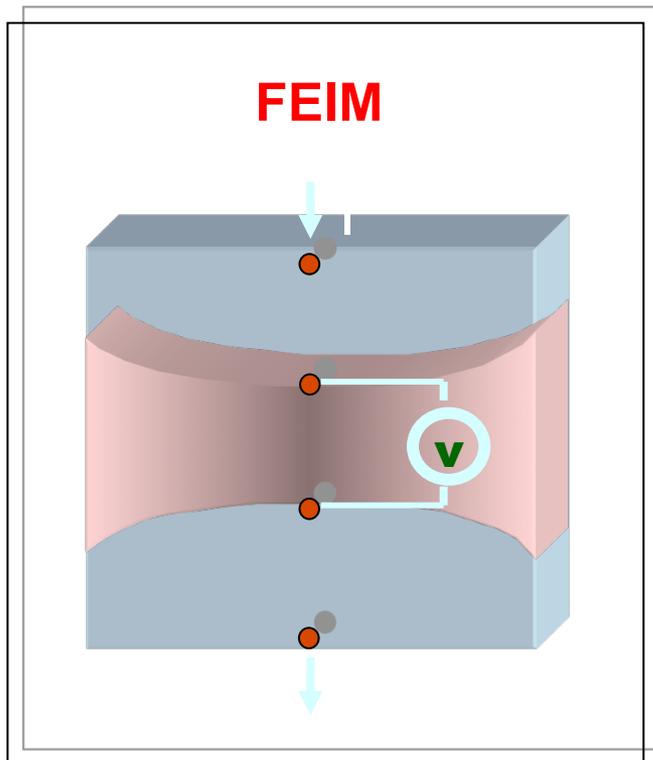
Impedance (Z) in Cervical tissue

Measured



Focused Impedance Measurement (FIM)

-a new idea from
Biomedical Physics Lab
Dhaka University



$(Z_1 + Z_2)$ focuses central region

Focused Impedance Method (FIM)

Prof Siddique Rabbani, Univ Dhaka

- Detection of early stage Cervical Cancer: clinical trials in UK.
- Characterisation of breast tumours - malignant or benign: first FIM on a patient with diagnosed breast cancer gave 50% impedance on the affected side compared to normal breast for both 10 kHz and 100 kHz.
- Abdominal fat thickness (risk indicator for heart attack and diabetes): performing empirical measurements on different phantoms to achieve a viable protocol.
- Respiration rate: mobile phone based diagnostic system for pneumonia detection in children, in conjunction with heart rate and other parameters. The basic unit is almost ready.
- Pneumonia diagnosis: different frequency measurements may help distinguish pneumonia from other lung disorders.
- Gastric acid volume: acid secretion has a relation to diarrhoea and anaemia. Need to develop ways and means to estimate gastric acid volume.