Supportive Care in the Solomon Islands 2010

The paediatric ward at the National Referral Hospital, Honiara, Solomon Islands

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Background

The Solomon Islands is an archipelago of more than 100 islands, comprising 9 provinces, and 500,000 people (Figure 1). Healthcare in the Solomon Islands faces many challenges, including under-development and lack of resourcing (monetary and human), civil unrest, difficulties in transport owing to the natural terrain, and the growing threat of natural disasters, particularly tsunamis and rising sea levels. Around 40% of the nation's population are under the age of 14 *[Solomon Islands 2002 Census]*, and paediatric presentations to health facilities far outweigh any other age group.

The capital, Honiara, houses the only referral hospital, the National Referral Hospital (NRH, also known as No. 9). The hospital serves the Guadalcanal provinces, and receives paediatric, surgical and other specialist referrals. NRH has 2 practicing consultant paediatricians, and 5 paediatric registrars.

Recently, the hospital has set out to develop a 'high-dependency unit' on the children's ward. With time, the plans for this initiative have expanded and gained clarity. The first step in getting this process on the way was the purchase of a Nellcor pulse oximeter, with funding from the Andrew Dent Scholarship, Pacific Development Fund, and Centre for international Child Health. This report outlines plans for the full implementation and evaluation of this unit in 2010.

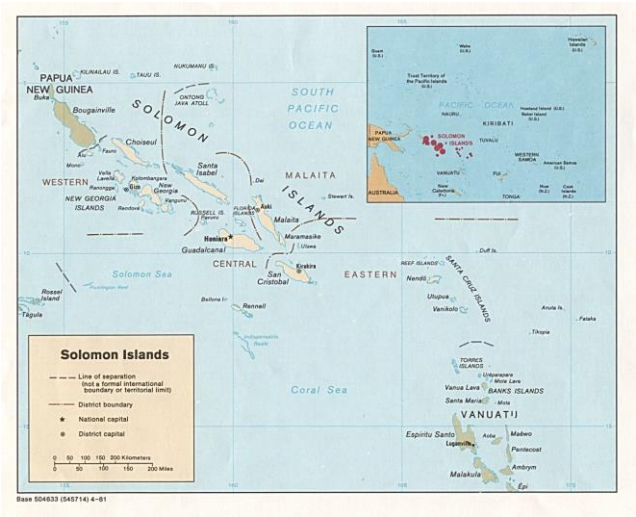

Figure 1. Map of the Solomon Islands

Paediatric ward at NRH

The paediatric ward in NRH has 30 beds, with one side of the ward housing acute presentation and the other surgical and chronic

cases. There are 4 nurses on duty on the morning and afternoon shifts supervising 2-3 nursing students.

Burden of disease and mortality at NRH

Data collected from the paediatric ward admission book between the period August to December 2009 (inclusive) shows that there were 366 medical and 157 surgical admissions: a total of 523 admissions. There were 22 deaths amidst the medical admissions (case fatality rate of 6%). A review of child deaths in 2009 shows that the leading causes of mortality are: severe pneumonia, sepsis, meningitis and heart failure secondary to congenital heart disease. Severe malnutrition (weight for height<70% or <3 standard deviations) complicated 25% of all medical admissions (92/366). Despite receiving such highly complex and severe cases, there continue to be limitations in vital resources that impact on the breadth and quality of services that can be delivered.

High dependency units in low-resource settings

A combination of deficiencies in public health, late presentation, poor transport services, and poor quality of pre-referral care means that many children presenting to hospitals such as NRH are 'critically ill'.[1;2] Once these children reach hospital, there are further barriers to timely and effective management, including the quality of triage and emergency care, availability of emergency supplies, and the quality of monitoring and supportive care.[3-5] Despite the severity of presentations to low-resourced hospitals, intensive and critical care units are often perceived as the exclusive domain of developed country facilities, and perhaps this is mainly to do with the high cost associated with the models of intensive care units in developed countries.

There is recent drive to implement and evaluate low cost, sustainable systems for improving hospital care and reducing mortality of seriously ill children.[1] The two most common causes of child mortality globally, pneumonia and diarrhoeal diseases, are both preventable and treatable. Therefore, as well as strengthening public health interventions such as vaccinations and sanitation, investing in curative interventions is also an important component of achieving Millennium Development Goal 4: to reduce child mortality by 2/3 of the 1990 rate by 2015.

High dependency units in low-resource settings need to be simple, affordable and sustainable, requiring minimal maintenance, or accompanied by technical training or support. If set-up within the paediatric ward, it can benefit all child admissions, not just the severely ill children, and can improve the quality of triaging, effective allocation of resources, and the frequency and quality of monitoring.

Components of a high dependency unit in low-resourced settings

Outlines of a model of critical care units appropriate for low-resourced hospitals such as NRH have recently been described in the published and unpublished literature [T. Duke, personal correspondence).[1;6] The following is a description of these components as applicable to NRH.

1. Timely admission from the emergency department

   Delay in admission of ill children presenting to the emergency department to the paediatric ward is an important contributor to preventable deaths.[5;7] Implementation of a program for emergency triage and treatment (ETAT) has been shown to halve inpatient mortality in Malawi.[8] Fortunately, emergency department residents at NRH rotate through the paediatric ward or complete a diploma of child health, and are therefore relatively experienced in managing children. However, there are no formal systems for triage or emergency management of children in the emergency department, especially for nursing staff. Emergency department nurses should therefore be trained using the WHO Pocketbook of Hospital Care for Children. To determine whether delays in admission from the emergency department is a problem at NRH, the time taken to admission to the paediatric ward will be recorded.

2. Resuscitation trolley, including:
   a. Bag-mask
   b. Laryngoscope
   c. Glucose monitor
   d. Resuscitation guidelines

3. Supportive care

   a. Oxygen

   Hypoxaemia has been shown to be the major fatal complication in pneumonia. At least 13% of all children admitted to hospital with clinical pneumonia will require oxygen, and this is much higher for radiographic proven pneumonia and at high altitudes.[9] A program in Papua New Guinea (PNG) which introduced oxygen concentrators as the main source of oxygen and pulse oximetry for detection and monitoring of hypoxaemia, with clinical training was associated with a 35% reduction in deaths from pneumonia.[10]

   Improving oxygen therapy will be a major component of the critical care unit in NRH. Two oxygen concentrators will be installed with flow-splitters to deliver oxygen to 4 beds at a time, allowing a total of 8 beds with an oxygen source. Pulse oximetry will be used as a '5th vital sign' for critically ill

patients. Training in oxygen therapy will be a component of the *WHO Pocketbook of Hospital Care for Children* course.

b. Fluid therapy and antibiotics

A review of quality of hospital care for children in 13 district hospitals and 8 teaching hospitals in low-income countries found that 35% of children were prescribed inappropriate antibiotics, while 20% received incorrect fluid therapy.[5] At NRH, antibiotic choice is determined by the local Standard Treatment Guidelines, and deviation from these is usually due to lack of supply of first line antibiotics. Fluid therapy continues to be challenging for both the nursing and medical staff, with uncertainties about the type of fluid, and calculations and measurements of volumes and rates. Monitoring of urine output is not routine for children receiving IV fluids.

Interventions to improve fluid therapy at NRH include standardization of the type of fluids used on the ward, and training in fluid preparation, calculation of flow rates and monitoring of fluid status.

c. Nutrition

25% of all childhood admissions to NRH present with severe malnutrition. These children have an increased risk of mortality and morbidity, and are particularly susceptible to infectious complications. Management of severe malnutrition at NRH involves feeding with high protein soup, administration of multivitamins, zinc, deworming and vitamin A therapy. Despite being outlined in the Standard Treatment Guidelines, these therapies are often only partly implemented. Having a standard checklist to follow when seeing any child with severe malnutrition should improve their management and outcomes. This list, adapted from the *WHO Pocketbook*[11] would include:

- Detection and management of hypoglycaemia
- Prevention of hypothermia
- Management of dehydration
- Correction of electrolyte imbalance
- Prevention of infection
- Micro-nutrient supplementation, including zinc
- Vitamin A and deworming
- Re-feeding
- Monitoring
- Review

4. Training, clinical guidelines and monitoring

All the above interventions are dependant on competent health workers, and in particular, nurses. The Solomon Islands was the first country to trial the *WHO Pocketbook of Hospital Care for Children* in its efforts to rebuild the health system following the devastation of years of civil conflict.[11;12] The Pocketbook outlines the essentials of hospital care for important neonatal and other paediatric conditions, including pneumonia, malaria and meningitis. It also covers aspects of supportive care, such as fluid therapy, oxygen therapy and analgesia. Currently, nurses and nursing officers in 7 of the 9 provinces have been trained. However, nurses at the National Referral Hospital are yet to be trained.

- Oxygen concentrator
  - Flow-meter box
  - Tubing and connections
- Resuscitation equipment
- Paediatric IV administration sets
- Blood glucose monitor
- Suction machine
- Soap/alcohol disinfectant
- Clinical training using the *WHO Pocketbook of Hospital Care for Children*
- Guidelines for triage, resuscitation, and management of severe malnutrition

Textbox 1 – What is required for implementation of the high dependency unit?

Figure 2. Monitoring of oxygen saturation of a child recovering from severe pneumonia

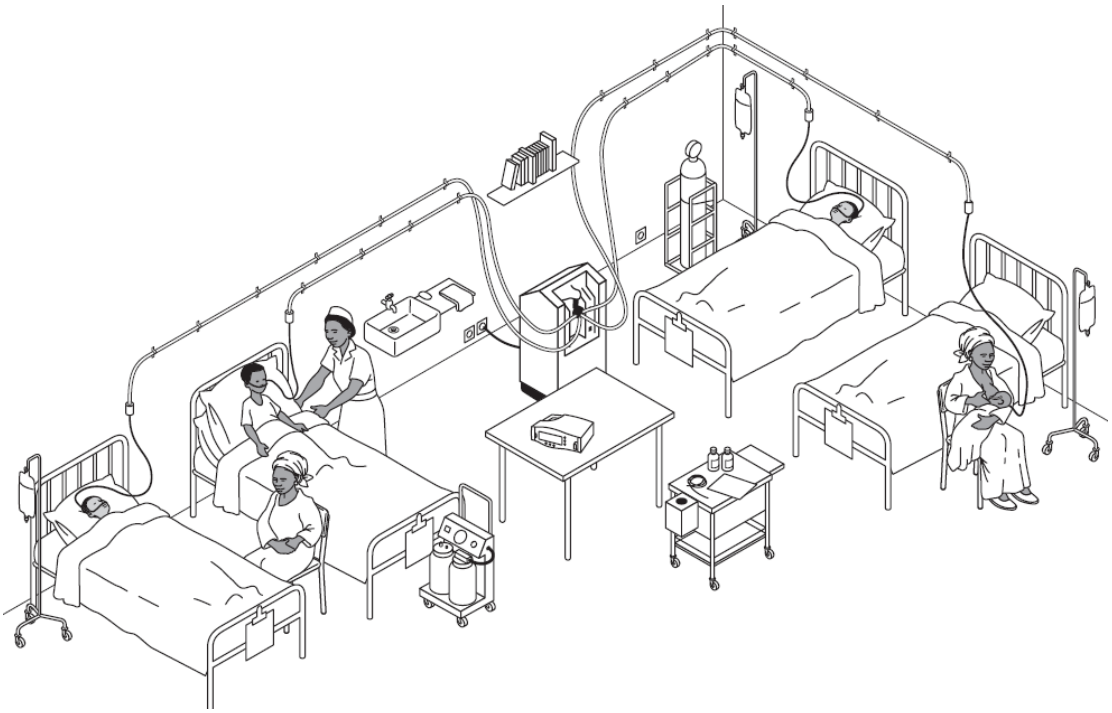

Figure 3. Schematic of the high dependency unit. *Each concentrator will be fitted with a flow-splitter to distribute output flow to 4 beds. Using 2 concentrators, this allows oxygen delivery to 8 beds. Oxygen tubing will be mounted on walls, preventing difficulties with transport of heavy oxygen cylinders.*

Evaluation

Clinical effectiveness

To evaluate the effectiveness of implementing the high dependency unit, a retrospective pre-post comparison will be conducted. Using data from the admissions books, the following will be compared for the 2 years prior to, and 2 years following the implementation of the high dependency unit:

- Overall mortality rates
- Mortality rates from severe paediatric conditions:
    - Severe pneumonia – defined according to the Standard Treatment Guidelines and equivalent to the WHO 'very severe pneumonia classification' of:
        - Cough and shortness of breath, AND
        - Chest retractions, AND
        - Danger signs – eg. hypoxaemia, signs of heart failure.
    - Severe or cerebral malaria
        - Defined clinically with or without blood slide confirmation on the basis of fever AND one of:
            - Convulsions/coma
            - Severe anaemia
            - Shock
            - Acidosis
    - Meningitis
        - Defined clinically and with laboratory confirmation
    - Severe malnutrition
        - Defined as weight for height <60% or,
        - Oedema of both feet

Cost

The total costs of implementation and training will be recorded. The projected cost-saving of using oxygen concentrator, as compared to oxygen cylinders, will be calculated by estimating the previous expenditure on oxygen cylinders from the National Pharmacy records. Cost per child treated and lives saved will be calculated.

Timeline

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Procurement of equipment												
Installation of oxygen concentrators												
Clinical training – WHO pocket-book												

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ARTICLE: Rami SUBHI

Neighbours, yet a world apart – Reflections from the Solomon Islands

Walking through the narrow concrete pathways of the National Referral Hospital in Honiara, the Solomon Islands - with the crashing waves of the Pacific Ocean not 20 metres away to the left, and the neat rows of old but well-maintain buildings of the medical and surgical wards to the right - I'm constantly met with beaming smiles revealing teeth tinged with red from years of beetle-nut chewing, and greetings of "morning doctor". There's an irony that immediately emerges between the gravity of the illnesses clearly visible in the patients wandering around the hospital, and their irrepressible and contagious joy. To the left a group of children are gathered, picking mangoes from the giant mango tree that shades the paediatric ward: a 30-bed ward that receives referrals from the rest of the country.

To some extent, the organization of the ward reveals the Solomon's way of life: communal, open and simple. Here, there's little meaning to 'privacy', and ward rounds are a public event in which the entire ward – nurses, doctors, patients and their families, neighbouring patients, neighbouring patients' families and friends – participates. I meet some happy and relatively healthy children, such as Luke – a 12 year old boy admitted for management of side effects of anti-leprosy treatment – who becomes known as the official 'water-boy' and 'ward-sweeper'.

I also meet children who are much sicker than Luke: Edmund is 7 months old, and weighs only 4 kilos. I find out that 25% of children admitted to this ward are severely malnourished; and that in my first week, three children die, two of whom die of potentially treatable conditions. In a country with high neonatal and infant mortality rates, death is seen as an inevitable fact. But while such complacency is understandable for mothers and families who are powerless to change the situation, it challenged my sense of equity and justice. Having had the privilege of growing up in a more fortunate country a mere 3 hours flight from the Solomons, I knew full well that most of these deaths are preventable with available and simple interventions.

The Solomon Islanders love Australia. They are NRL fanatics, keep abreast of Australian news and follow 'Kevin 07's' every move. We also have much in common: the pidgin 'hem alrite' is the equivalent of the Australian 'it'll be alright mate'. But Australians know very little of the Pacific, let alone of the Solomon Islands. The global financial crisis was one demonstration of how inter-dependant our world has become; of how artificial geographical boundaries really are; and of how our well-being is intricately woven into the well-being of the global community. Engaging more closely with the Pacific, as well as being a humanitarian imperative, is clearly also in our interests.

From a medical perspective, there have been and continue to be admirable demonstrations of how such engagement can take place. The late A/Prof Andrew Dent AM was an Australian doctor, whose

commitment to global health led him to work in less-resourced countries, including Cameroon and Papua New Guinea. He continued his involvement in the Pacific as Director of Emergency Medicine at St Vincent's Hospital, Victoria, demonstrating that the values of compassion, equity and justice in medicine should not be contained within national borders. One of his many legacies is the Andrew Dent Scholarship, of the Pacific Health Fund, which aims to promote health system development and aid the people of the Pacific, and is offered to medical students on elective. During my stay in the Solomons, with support from the Pacific Health Fund, St Vincent's Hospital, and the Centre for International Child Health, Melbourne, I was fortunate enough to be able to contribute to the ongoing development of a high dependency unit within the children's ward.

Reflecting on my time in the Solomons, I was a little disheartened by the magnitude of the problems. But I was also grateful for and encouraged by the perseverance, hope and commitment of the local health-workers and patients.

For more information:
http://www.svhm.org.au/infoabout/foundation/stvpacifichealth/STVPacificHealth.htm

http://www.rch.org.au/cich

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