Irukandji Taskforce guidelines for the emergency management of Irukandji syndrome
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These guidelines have been developed for use in Queensland Health hospitals and emergency departments. They have been approved by the Prevention and Response Working Group of the Queensland Irukandji Taskforce and were endorsed by the Taskforce on 29 January 2007.

Irukandji syndrome is described as a tropical marine sting (usually minimal discomfort) followed in 15–40 minutes by significant systemic symptoms of pain, agitation, and restlessness, and clinically associated with signs of catecholamine excess. A small number go on to develop cardiac failure. There have been two fatalities in Queensland in patients who have presented with Irukandji syndrome, both of whom succumbed to intracerebral bleeds.

Where a patient is suspected to be experiencing Irukandji syndrome the following guidelines may be found useful.

Over the phone advice may be sought through the Poisons Information Centre, Phone: 131 126.

Additional notes to guidelines flow chart

1 Initial resuscitation
   • Application of vinegar, if not already administered.
   • Attention to airway, breathing and circulation.
   • Cardiac arrest managed as per standard protocols.

2 Hypertension
   • Control of hypertension may be life saving given that both Irukandji-related deaths succumbed to intracerebral haemorrhage.
   • Nitrates should be used as first-line antihypertensives for severe hypertension.
   • IV phentolamine has been used successfully and may influence pain as an additional effect.

3 Investigations
   • If available, all suspected Irukandji syndromes should have:
     On arrival:
     • Pathology: FBC, UEC, Mg, cTnI
     • 12 lead ECG
     • CXR
     • An echocardiogram may be required if there is clinical or radiographic evidence of cardiovascular instability.

4 Maintenance
   • Infusions can be reduced or ceased after 4 hours and recommenced if there is recurrence of symptoms or signs (see appendix 4).
   • Monitoring is required if there is an abnormal initial cTnI or continuing severe symptoms.

5 Disposition
   • Many patients settle after initial boluses of opiates and can be discharged home after 4 hours (even if they are experiencing mild symptoms) with simple analgesia, provided their symptoms are resolving and investigations are normal.
   • If they require narcotic or magnesium infusions they should be admitted for observation and management. Management in hospital for at least 6 hours after the cessation of infusions is mandated and may require admission. If no opiate or magnesium has been required for 6 hours, and symptoms have resolved, the patient may be discharged.
   • For any patients with ongoing severe pain, or cardiac abnormalities on ECG, CXR or raised Troponin, there is a risk they may deteriorate further and warrant high dependency monitoring with serial ECGs, CXR and cTnI.

For overt cardiac failure or the need for phentolamine infusions, or if there is evidence of neurological dysfunction the patient should be admitted/transfered to an ICU for aggressive management.

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The information on this page has been slightly condensed to fit; the material removed being already displayed in the flow chart opposite. The complete Taskforce guidelines including the detailed appendices on magnesium sulphate, glyceryl trinitrate and phentolamine infusions can be found on the SPUMS website <www.spums.org.au/information_and_research>.

Key words
Reprinted from, first aid, jellyfish, marine animals, toxins, resuscitation, treatment, flow chart
Guidelines for the Management of Irukandji syndrome

**Dx** Irukandji Syndrome

- First
  - Apply high flow oxygen
  - Establish monitoring (ECG, SpO2)
  - Check blood pressure
  - Establish IV access

**Pain And/Or Hypertension**

- Then
  - 1. Opiate analgesia: Fentanyl 0.5mcg/kg q5min, up to 4 doses
    Morphine 0.05mg/kg q5min, up to 4 doses
  - 2. GTN spray: 2 puffs q5min until infusion started
    (contraindicated in patients on Viagra/Levitra etc)
  - 3. MgSO4: 0.15mmol/kg over 15min
    then infusion (for analgesia and hypertension)
    Adjuncts:
    - Midazolam: 25mcg/kg q5min up to 4 doses or,
    - Chlorpromazine or promethazine 0.3 mg/kg IV over 10 minutes

**? Controlled**

- YES, Completely
  - Observe q30min for 4hr
  - If symptoms and signs have been controlled on simple analgesics then may be discharged home for LMO F/U.
  - If initial cTnl is raised then admit for monitoring O/N

- NO
  - Seek assistance (RING PIC 131126 or your regional ICU)
    Readminister analgesic
    And commence infusion. See appendices
    Patient will require admission and can be discharged when symptom free for 6 hours.

**YES, but Pain returns**

- Persistent Pain And/Or Hypertension
  - Call for help (PIC)

**POISONS Info Centre: 131126**

- Opiate side effects and precautions
  - Respiratory depression
  - Reduced level of consciousness
  - Increased nausea
  - Itch
  - Urinary retention
  - Ensure naloxone is available

- MgSO4 side effects and precautions:
  - Flushing and mild to moderate injection site pain are common
  - Hypotension may occur especially if the pt is dehydrated or on antihypertensive drugs
    If significant hypotension occurs:
    - Stop infusion
    - Give 10ml/kg Hartmanns solution stat
    - Consider calcium gluconate

- Hypotension from GTN
  - May be related to unexpected use of a selective phosphodiesterase inhibitor (Viagra/Levitra). If BP doesn’t improve with cessation of GTN, aggressive IV fluids and adrenaline will be required.

Cardiac toxicity has not been reported in humans without antecedent disturbance of neuromuscular function. Serum level is not a useful guide to either therapy or toxicity. Dose limits are determined by maintenance of reflexes and clinical effect.
Obituary

Henry Valance ‘Val’ Hempleman MA, PhD

Physiologist 
Born: 25 March 1922 
Died: 14 July 2006 

Dr Val Hempleman, whose name will rank alongside those of other notable scientists such as Professors JS Haldane and Leonard Hill, died aged 84 on 14 July 2006. Val’s work in the field of decompression procedures provided the next quantum leap in decompression techniques after some 100 years’ experience with Haldanian theories.

His work has undoubtedly saved many lives and countless cases of decompression sickness worldwide. Beneficiaries of his achievements include naval, commercial and recreational divers, submariners and caisson tunnel workers, all of whom require safe decompression procedures.

Val was born in Neasham, Darlington, UK, on 25 March 1922. His father, Harry Hempleman, was a sea captain who worked between New Zealand and the UK. Val’s keen interest in science and his natural academic ability won him a scholarship to Hymers College, Hull. One of his earliest experimental projects almost blinded him when, at the tender age of 13, he managed to blow himself up, together with the garden shed in which he had built a home-made laboratory.

His academic prowess continued to excel and Val obtained a place at St Catherine’s College, Cambridge University, where he studied inorganic chemistry and physics. His degree work was interrupted by the Second World War when in 1942 he was called up to work as a research scientist for the Royal Navy.

He joined the staff of Vernon II, a Royal Navy physiological laboratory, then located at Peel Cottage, Alverstoke. One of the principal areas of research at the time was the investigation of the effects of explosions on personnel in or under water. These included military divers who were required to clear the European ports of mines and booby-traps left behind by the Germans. Val was one of the volunteers who exposed himself to the effects of underwater explosions by standing up to his neck in the sea whilst explosive charges were detonated closer and closer to him.

At the end of the War he returned to university and completed his degree, leaving with a First Class Honours degree in Chemistry. His first job came in 1946 in the Wellcome Physiological Research Laboratory in Beckenham, Kent, where he used electrophoretic techniques to produce chemotherapeutic agents to fight pertussis infections. However, the allure of the Royal Navy physiological research proved too great and in 1949 he re-joined Vernon II, now renamed the Royal Naval Physiological Laboratory, as a scientific officer.

Val’s career in decompression table development started immediately and he willingly became a human guinea pig to test his own theories. On one occasion he nearly died from mercury vapour poisoning when a mercury thermometer accidentally broke whilst he was confined under pressure inside a steel chamber.

Perhaps Val’s single, most notable achievement came in 1952 when he published his new theory on decompression procedures and the calculation of safer decompression schedules. The Royal Navy at the time needed the capability to dive deeper than ever before, largely because submarines could now operate deeper. Should a Royal Navy submarine ever need rescuing, then divers needed to be able to reach it. It was Val Hempleman to whom they turned to provide the essential, safe decompression procedures.

Exactly fifty years ago, in 1956, the Royal Navy proved to the world that divers could reach the world record depth of 600 ft. Lieutenant George Wookey successfully reached 600 ft from HMS Reclaim in a Norwegian fjord and, despite overstaying his planned duration at depth due to an entanglement of his gas hose and life line, was safely decompressed.

In the 1960s, Val turned his attention to the plight of caisson tunnel workers who traditionally had suffered very badly from the effects of working under pressure. In 1966, he produced a set of decompression tables that virtually eliminated the cases of decompression sickness. The tables were very successfully adopted at a major caisson tunnel project in Blackpool and the tables themselves hence became known as “The Blackpool Tables”. They have since become globally accepted as the industry standard.

Val took over as Superintendent of the Royal Naval Physiological Laboratory in 1968 shortly after gaining his Doctor of Philosophy for his research into the prevention of decompression sickness. About this time, researchers around the world had concluded that the limit of deep diving was around 1,200 ft and that there was a “helium barrier” that prevented divers going any deeper, without risk of convulsions and death. With a dedicated team of scientists led by Dr Peter Bennett, and Val’s essential decompression procedure, the Laboratory successfully debunked the so-called helium barrier in 1970 when two of its scientists,
John Bevan and Peter Sharphouse, carried out a world-record simulated dive to 1,535 ft. The achievement was heralded by the Americans as “a hyperbaric moon-landing”. Congratulations poured into the Laboratory from eminent scientists in all parts of the world. Another leap forward was made in 1980 when two more scientists, Martin Garrard and Mark English, reached a simulated depth of 2,165 ft in the same chamber.

Val was honoured to receive the prestigious Albert R Behnke Jr Award of the Undersea Medical Society in 1976. This was the first time the award had ever gone to a non-American citizen. The following year he received the Queen’s Silver Jubilee Medal and when he retired in 1982 he received the Imperial Service Order.

Val had been a founder member of the Underwater Engineering Group of the Construction Industry’s Research and Information Association and of the European Undersea Biomedical Society. He was also a member of the Undersea and Hyperbaric Medical Society, the Ergonomics Research Society and the Medical Research Council’s Panel on Decompression Sickness.

Val was the quintessential gentleman scientist. Despite a formidable international reputation he remained the embodiment of modesty and humility. He was endowed with patience, tolerance, compassion, old-world charm and a lively, self-effacing sense of humour. Val leaves a widow, Barbara, and two married sons, Andrew and Robert.

Editor’s comment:
I vividly recall our band of long-haired students being allowed to sit in on a morning session in the library attended by, amongst others, Val, Barnard, a newly-arrived young surgeon-lieutenant called David Elliott and a famous applied mathematician. A vigorous debate ensued regarding the mathematics of gas exchange dynamics under pressure, much of which went over my head. After the mathematician left, Val, with his inimitable chuckle and wry grin (see photo), concluded that it was all very well, but took no account of what actually happened in the body!

Over the ensuing years, Val repeatedly supported a fledgling United London Hospitals Diving Group in our amateur research endeavours, probably completely against Navy regulations, lending us equipment and manpower. He was always cheerfully willing to give advice on our enthusiastic student endeavours. He was indeed the “quintessential gentleman scientist”!

Michael Davis

Key words
Obituary, decompression, models, tunnelling, saturation diving, research