Guidelines For The Provision Of Medical Care In South Georgia and other Antarctic Marine Areas By Seaborne Adventure Tourism Operators:

Prepared by World Extreme Medicine.

Commissioned by the Government of South Georgia & the South Sandwich Islands

Introduction

1. Antarctic tourism has grown increasingly popular in the last decade and diversified into an ever wider range of activities, transport modes and destinations. The continued success of Antarctic tourism is welcome. With this increase, and a number of incidents where medical attention has been required, there is a need for operators to assess and review the medical care on vessels and available on-shore to ensure a robust and safe medical provision.

2. The aim of this document is to identify the specific medical risks associated with travel to South Georgia with potential wider applicability to the southern oceans, assess the current medical professional standards being delivered and offer advice and guidance regarding appropriate medical provision of care.

3. The guidance offered in this document reflects expert medical advice prepared by World Extreme Medicine. The Government of South Georgia & the South Sandwich Islands (GSGSSI) has made these guidelines available for the purpose of assisting operators of vessels to determine the level of medical care provision that is appropriate for their vessels. These guidelines are advisory only and are not prescriptive or comprehensive. It is for operators to decide what medical care arrangements they should make for their vessels. Operators of vessels are responsible for the health, safety and welfare of passengers and crew on board their vessels and during on-shore excursions and GSGSSI accepts no liability arising from the use of these guidelines. Operators are strongly encouraged to read these guidelines carefully, take such further advice as they consider necessary and consider what level of medical care they should provide on their vessels.

Antarctic Tourism

4. The interest in the medical capabilities of visiting cruise vessels to South Georgia & the South Sandwich Islands became particularly acute after the unfortunate death of a visitor to South Georgia in January 2012. Acting on the recommendations of the Coroner, a review of activities and medical arrangements was commissioned by GSGSSI in 2013. The Coroner's recommendation to GSGSSI included:

   - Engagement with IAATO (including members) and any appropriate medical authorities and organisations to consider what improvements and/or minimum medical standards should apply to trips to such remote places as South Georgia and the Antarctic;

5. The following 2013-14 season GSGSSI reported in total 55 cruise ship visits, carrying 7,024 passengers. This was an increase of 1,232 passengers over the previous season, bringing visitor numbers back in line with figures recorded four seasons previously. This figure has since increased to >8700 passengers in the last season. Vessel feedback and the first hand experience at King Edward Point indicated that visiting cruise ships had variable levels of medical capability. Whilst some were able to function independently, others had to draw on the limited resources of the medical facilities at the British Antarctic Survey station.

6. The medical officers at King Edward Point are equipped and insured to provide daily medical care to the base staff and only to provide emergency assistance to visitors. This should be a rare event if the cruise operators ensure an independent medical infrastructure.

7. Over the same 2013-14 period there was also a slight increase in the number of yacht visits over the previous season with 18 visits by 15 different yachts, amounting to a total of 214 people. There were 4 overland expeditions, 3 of which were yacht supported and one that was supported by a cruise ship.

8. The expansion of tourism has also seen an increase in adventure tourism with a larger number of tourists engaging in scuba diving, kayaking, climbing and skiing expeditions and short trips.

Sub Polar Vessels And Categorisation

9. The environment and nature of tourist activity in the sub-polar regions influences the size and configuration of the ships. The International Association of Antarctic tour Operators (IAATO) categorises these vessels depending on the number of passengers:
   - C1 Traditional expedition ships that carry 13-200 passengers and are making landings
   - C2 Mid-sized vessels that carry 201-500 passengers and are making landings
   - CR Vessels that carry more than 500 passengers and do not make landings (except possibly at Grytviken, subject to the vessel passenger capacity).
   - YA Sailing or motor yachts that carry 12 or fewer passengers

10. The size of the vessel and number of passengers is important as many of the medical recommendations below are based on larger vessels operating in significantly quieter and safer waters.

Current Regulation of Medical Standards of Antarctic Tourism

11. Both the Antarctic Treaty System and the IAATO emphasize the importance of safety, the necessity for adequate contingency planning, search and rescue and appropriate insurance.

12. International Maritime Law provides some guidelines for the provision of medical care, but it covers all vessels at sea and the minimum medical standards have been developed for crew and not for tourists and are not specific for sub-polar waters.

13. The Cruise Lines International Association in 1998 in association with the American College of Emergency Physicians developed and published the guidelines on appropriate emergency care and health care maintenance for passengers and crew on board ships. They are thorough, however, the guidelines are relevant to vessels operating in less hostile environments than subpolar waters with different passenger demographics, a different collection of presenting medical conditions and do not refer to yachts, all of which significantly alter the medical provision of care.

14. Currently there are no formal guidelines or medical standards covering the delivery of medical care in subpolar waters.

Common medical conditions presenting in Antarctic tourism

15. There is very little published research on the common medical conditions presenting to medical staff providing clinical cover for vessels in subpolar waters. Two papers published in 2007 and 2014 followed over 3000 passengers on 37 voyages in one season in Antarctica. The main issues identified were:

    1. Motion Sickness
    2. Infections
    3. Musculoskeletal injury (approximately 33% ashore)
    4. Ear, Nose, Throat (ENT)
    5. Dermatology
    6. Psychiatric

16. The results of the papers are in keeping with previous research carried out over a number of years on expeditions to remote environments.

17. Looking at the research and drawing on experience, it appears there are 7 principal clinical areas and groups which need examination, assessment and preparation for intervention:

    1. Crew
    2. Passengers
    3. Ship related medical conditions
    4. Shore related medical conditions
    5. Environmental medical conditions
    6. Trauma and critical medical care
    7. Prolonged field care

Crew

18. Theoretically the crew should be experienced in the environment and should be less likely than the passengers to present with the 6 principal medical conditions above. They will however suffer and present with the standard medical problems seen by any primary care physician around the world. Their exposure to the passengers will result in an increase in non-endemic communicable diseases of aerosol and faecal oral origin. They may well present with specific diseases endemic in their country of origin or indeed

countries transited en-route to the embarking vessel. The most common conditions likely to present themselves among crew are:

1. Endemic diseases
2. Upper respiratory tract infections
3. Gastroenteritis infections
4. Environmental medical conditions

Passengers

19. The passengers are likely to present with the 6 principal medical conditions above. In addition the medical staff need to be prepared to manage the rare traumatic or medical emergency. The older demographic of the passengers will mean they have a predisposition to cerebrovascular and cardiovascular events in particular, which may be exacerbated by environmental factors such as cold, dehydration through motion sickness or infection. Passengers may also bring diseases endemic to their country of origin. The most common conditions likely to present themselves among passengers are:

    1. Motion Sickness
    2. Respiratory Infections
    3. Musculoskeletal injury (approximately 33% ashore)
    4. ENT
    5. Dermatology
    6. Psychiatric
    7. Endemic disease
    8. Trauma and medical emergencies

Ship Related Medical Conditions

20. The environment on board a vessel in the sub polar waters has the capacity to generate injuries and illnesses associated with movement and exposure to individuals from a diverse environmental background and hence potentially interesting communicable endemic diseases. Key ship-related medical conditions are therefore expected to be:

    1. Motion Sickness
    2. Musculoskeletal injuries
    3. Upper Respiratory Tract Infections
    4. Gastroenteritis infections
    5. Trauma

Shore Related Medical Conditions

21. From the point of embarkation from the main vessel until their return, the passengers and crew are exposed to a completely different set of risks. The primary risks during this period are related to:

    1. Movement across an unstable environment, whether that be a RIB, glacier, snow, uneven ground
    2. Environmental conditions: cold terrestrial and cold immersion

3. Cardiovascular disease (CVA) and Coronary Heart Disease (CHD) related to exertion
4. Wildlife: including seal bites

Hence the primary medical conditions anticipated will be:

1. Musculoskeletal injury
2. Cold injury
3. Trauma
4. Drowning and near drowning
5. Medical emergencies

Environmental Medical Conditions

22. The principal medical conditions will be related to the terrestrial cold and possible immersion. Hence the physician should predominantly be prepared to manage:

    1. Accidental Hypothermia
    2. Cold injuries; Non Freezing Cold Injury (NFCI), frostnip and frostbite
    3. Immersion hypothermia
    4. Ophthalmic conditions
    5. ENT medical conditions

Trauma and Critical Medical Emergencies

23. The predominant age of the passengers and some of the staff will mean they are at an increased risk of suffering from potential critical medical and surgical emergencies, in particular CVAs and CHD events. In addition there is always the risk of significant trauma at any stage in a voyage, both on shore and onboard the vessel.

Prolonged Field Care

24. The very nature of the environment and the relative isolation of the destinations means that the patient requiring medical intervention will likely require management for up to several days by the primary responsible physician. The capacity of the physician to be able to work independently is imperative and fundamental to the care of the sick patient. Infrastructures can be put in place, which allow telemedicine capability/satellite reachback and senior clinical advice and intervention, but the treating physician will require adequate skills and clinical facilities and equipment to diagnose, manage and transfer patients who are potentially critically unwell over a prolonged period of time.

Medical Professional Clinical Standards to Provide Adequate Medical Cover in South Georgia and Other Sub-polar Waters

25. In 2015 the Faculty of Pre-Hospital Care, Royal College of Surgeons of Edinburgh published their guidelines for the medical provision of care in wilderness environments. It was recognised that the scope of practice for wilderness medicine covers elements of primary healthcare, pre-hospital emergency medicine and preventative medicine. Some unique competencies were also identified. Further to this, the panel recommended the use of a matrix and advisory expedition medic competencies relating to the remoteness and medical threat of the expedition. Our proposals are based on this recommendation.

26. The following sections provide a sample guide to the medical kit, medical expertise, and medical facilities for vessels when operating in the sub-Antarctic. These are based on an assessment of the risks and conditions most likely to arise. They do not purport to be comprehensive and we encourage operators to refine these lists to suit the specific nature of their visits including vessel size, categorisation, clinical skills, product availability, medical support and passenger demographics among other factors. GSGSSI accepts no responsibility for the sample guides and it is for operators of vessels to determine the medical care provision for their vessels.

Medical Kit on Vessels

27. **We suggest a four tier modularised system based upon the size of vessels entering the sub polar waters as set out below and in table 1. These are directly related to the IAATO vessels categorisation which is already in use:**

    1. C1 1 clinical kit module, 5 guide kits, 1 deployable medical kit
    2. C2 2 clinical kit modules, 5 guide kits, 1 deployable medical kit
    3. CR 2 clinical kit modules, 5 guide kits, 1 deployable medical kit
    4. YA 2 guide kits

Table 1: Suggested medical kit by type of vessel

	Category			
Kit	**C1**	**C2**	**CR**	**YA**
Ship Clinical Kit Annex A	Yes 1 module	Yes 2 modules	Yes 2 modules	NA
Advance Airway Module Annex A1	Yes	Yes	Yes	NA
Advance Monitoring Module and CPR Annex A2	Yes	Yes	Yes	NA
Paediatric module Annex A3	If Applicable	If Applicable	If Applicable	NA
Medical Professional Onshore / Deployable Medical Kit Annex B	Yes 1 deployable kit	Yes 1 deployable kit	Yes (If landing 1 deployable kit	NA
Non Medical Professional onshore medical Kit / Guide Kit Annex C	Yes 5 guide kits recommended	Yes 5 guide kits recommended	Yes If landing 5 guide kits recommended	Yes 2 kits recommended
Supplemental Medical Kits for Adventure Activities Annex D	If Applicable	If Applicable	If Applicable	If Applicable

Medical Experience on vessels

28. We suggest that larger commercial vessels (including cruise ships) responsible for the care of passengers and crew and working in the remoteness of the environment in the subpolar waters should engage an advanced wilderness medicine practitioner with the capacity to function independently and over protracted periods and managing critically ill patients without the possibility of senior intervention and advice.

29. It is recognised that smaller vessels (including yachts) may not have the capacity to employ experienced medical professionals for the number of passengers. And it is accepted that under these conditions a non-health care professional with a nationally recognized first aid certificate, caring for patients as a secondary role would be acceptable.

30. However we feel that a robust system of telemedicine/medical reachback which allows the non-medical professional to seek expert advice would be essential on yachts (commercial and private) and other smaller vessels.

31. It would be sensible that those crew responsible for the care of passengers removed from the normal medical infrastructure of the vessel should have a nationally recognised first aid certificate. This would include boat handlers and guides.

32. The following table (table 2) provides a guide to the clinical qualifications, experience, certifications and skills for medical professionals and non-medical professionals on vessels visiting the sub-Antarctic.

Table 2: Suggested clinical expertise

	Medical Professionals (all C1, C2 and CR Vessels)	**Non-Medical Professionals (including Yachts)**
Qualifications and experience	1. All clinical staff hold current full registration and a license to practice. 2. All clinical staff have at least three years of post-graduate / post-registration experience in general and emergency medicine	1. Recognised first aid certificate covering a) Basic medical emergencies b) First on scene medical and trauma intervention c) Basic life support skills d) Comfortable delivering IM injectables e) Wound management and closure
Certifications	1. All clinical staff certified in advanced life support such as ACLS, ALS, PHLS and ATLS/BATLS or an equivalent certification or physician specialist training 2. Ships carrying children ≤ 12 years old should have at least one physician certified in PALS, APLS or an equivalent certification or specialist training 3. All clinical staff certified in MIMMS or equivalent 4. All clinical staff have an up to date Hep B immunity certificate 5. All clinical staff have an appropriate DBS or equivalent	
Skills	1. All clinical staff should be confident in a number of practical medical skills a) Orthopaedic procedures - fracture and dislocation management b) Minor surgical skills c) Patient procedural sedation d) Basic dental skills e) Basic gynaecological conditions and interventions f) Standard ENT and Ophthalmology conditions and emergencies **g)** Critical care skills and experience for prolonged field care	

Sample Medical Facilities, Equipment and Administration on-board Vessels and on-shore

The following provides a sample guide to the medical facilities, equipment and administration that could provide the basis of a minimum standard on board relevant vessels. Operators will wish to refine these lists to suit the specific nature of their visits including vessel size, categorisation, clinical skills, product availability, medical support and passenger demographics among other factors.

C1, C2 and CR Vessels Medical facilities

1. Contains adequate space for diagnosis and if possible treatment of patients with 360° patient accessibility around at least one bed.
2. Has hand wash sinks with hot/cold mixing tap, liquid antibacterial soap, paper towels and waste bin in or adjacent to all clinical exam rooms. For exam rooms without sinks, alcohol hand sanitizers should be available.
3. Has adequate space for storage of medical supplies, equipment and drugs.
4. Has an examination, treatment and inpatient area adequate for the size of the ship.
5. Has at least one examination / stabilization room.
6. Has the capacity to create at least one ICU room.
7. Maintains a minimum number of inpatient beds of one bed per 200 passengers and crew.
8. Maintains an isolation room or the capability to provide isolation of patients.
9. Refrigerator and freezer for the safe storage of medicines and supplies.

Equipment On Board Cruise Ships:

1. Vital signs equipment: Sphygmomanometers, stethoscopes, thermometers (including core/rectal temperature capabilities) and pulse oximeter (SaO2).
2. Airway equipment - bag valve mask, laryngeal mask airway/supraglottic airway, laryngoscopes, endotracheal tubes, stylet/bougie, lubricant, portable suction equipment, surgical airway capability.
3. At least two cardiac monitors. Capable of 12 lead ECG, automated BP, pulse oximetry and waveform capnography
4. At least two defibrillators, one of which should be a portable automated external defibrillator (AED).
5. Electrocardiograph (ECG) capability.
6. Nebulizer capability.
7. Automatic medical ventilator.
8. Oxygen cylinders CD and at least one oxygen concentrator and a sufficient number of flow regulators, rebreath face masks and connections
9. Wheelchairs.
10. Stair chair and stretcher.
11. Long and short back boards with cervical spine immobilization
12. Trauma supplies as in Annex A
13. Medical supplies as in Annex A
14. Paediatric supplies as in Annex A
15. Laboratory capabilities: Point of care testing

a. Near patient testing for Hb, electrolytes, blood gases, coagulation, cardiac enzymes
b. Urinalysis, with minimum of specific gravity, protein, red blood cells, white blood cells, nitrites, urobiligen, ketones, pH, glucose and albumin
c. Pregnancy: qualitative HCG
d. Blood glucose
e. Malaria RDT
f. Portable ultrasonography

16. All medical equipment is maintained in accordance with recognized biomedical quality control recommendations.

Vessel Pharmacy:

1. Maintain an evidence-based formulary on each ship with sufficient quantities of medications as listed in Annex A.
2. Maintain controlled drug documentation
3. Covering
   a. Gastrointestinal system
   b. Cardiovascular system medications
   c. Respiratory system medications
   d. Central nervous system medications
   e. Infectious disease medications
   f. Endocrine system medications
   g. Obstetrics, gynaecology and urinary tract disorder medications
   h. Fluids and electrolytes such as oral and parenteral.
   i. Musculoskeletal and joint disease medications
   j. Eye medications
   k. Ear, nose and throat medications
   l. Skin disease medications
   m. Vaccines
   n. Anaesthesia medications

Vessels Clinical Practice:

1. All passengers and crew will have a medical questionnaire prior to embarkation to enable appropriate risk analysis and medical estimate before the employed clinician becomes responsible for care.
2. The vessel will have an established and reviewed casualty estimate and evacuation plan for all regions of the voyage and planned activities.
3. An audit program of the medical facility and equipment that is conducted by healthcare professionals or persons experienced in health care audit before and after the voyage.
4. Medical facility shall have established medical policy and procedures which have been reviewed by a senior clinician.
5. Designated rapid medical response team, which is trained and exercised at least monthly in MIMMS and medical emergencies both on board and on shore.

6. A dedicated medical emergency telephone number is advertised for both passengers and crew and is placed on telephone around the ship.
7. When the ship is at sea, at least one clinician must be readily available to provide emergency medical care 24 hours a day.
8. When the ship is at anchor at least one clinical provider is available onboard.
9. Ready access to both telephone and confidential email in order to communicate directly with shipboard and shoreside healthcare providers.
10. All crew and passengers should receive treatment in accordance with the general medical councils (or equivalent body) guidelines on standards of care.
11. A chaperone system is in place for the treatment and examination of children and the opposite sex where appropriate.

Vessels Documentation:

A medical record system that provides:

1. Well organised, legible and consistent documentation of all medical care.
2. Patient confidentiality. All patient medical records should be regarded as strictly confidential medical information and should not be accessible to non-medical staff without the express written consent of the patient except as necessary to maintain safety on board or ashore, or to comply with any legal requirements to review, report or log the information.
3. All documentation is held in a secure location.
4. Documentation is kept for every medical intervention.

Medical Equipment On Shore For Responsible Medical Professionals:

The suggested medical bag and contents are in Annex B. It is also suggested that clinicians have access to advanced diagnostic and resuscitation equipment within a short time frame of at least 10 minutes. This may necessitate the carriage of all equipment on shore or may allow advanced emergency equipment to keep onboard but ready for emergency access.

Medical Equipment On Shore For Guide/non-medical professionals and equipment carried on yachts:

The suggested medical equipment for guides and those non-medical professionals responsible for medical care on shore or on yachts is in Annex C. We realize that the medical skills of non-medical professionals responsible for the care of clients on yachts are varied and if individuals and companies wish to take a more comprehensive medical kit we would only urge them to ensure they have the appropriate medical skills and training to use the kit and have appropriate patient group directives and clinical governance structures.

Medical equipment For Specific Events: Diving, Climbing, Skiing

Adventure activities which have specific inherent dangers require specific supplemental medical equipment. The supplemental kit lists are itemised in Annex D.

Annexes A – D: Sample Kit Lists

The following kit lists have been put together as an example of the suggested medical equipment and experience for vessels operating at South Georgia & the South Sandwich Islands. These are based on an assessment of the risks and conditions most likely to arise. They do not purport to be comprehensive; we also recognise that operators will wish to refine these lists to suit the specific nature of their visits taking into account such issues as vessel size, categorisation, clinical skills, product availability, medical support and passenger demographics among other factors. There may be different recommended practices for dealing with medical conditions in different countries: these sample modules have been designed by a UK-based team and some of the medication names may change or indeed may not be available in some countries where suitable alternatives may need to be considered.

Annex A: Sample Ship Clinical kit - 1 clinical module

IV MEDICATION	
Glucose 50%/50ml	5
Amiodorone 300mg/10ml	5
Atropine autoinject 600mcg/5ml	5
Adrenaline 1;10000 autoinj	5
Cefotaxime 1g	10
Metronidazole 5mg/ml 100ml infusion	10
Lidocaine 50mg/5ml	10
Paracetemol 1g/100ml	10
Pantoprazole 40mg	10
Water for injections 5mls	50
Tranexamic acid (500mg)	10
Chlorphenamine 10mg/ml	10
Dexamethsaone 4mg/ml	10
Furosemide 20mg/2ml	20
Metoprolol 1mg/ml - 5ml	10
Morphine 10mg/ml	20
Naloxone 400mcg/ml	10
Metoclopramide 10mg/2ml	10
Ondansetron 4mg/ml	10

Hydrocortisone 100mg	10
Haloperidol 5mg/ml	10
Midazolam 10mg/5ml	10
Lorazepam 4mg/ml	10
Flumazenil 500mcg/5ml	5
Ketamine 10ml (100mg/ml)	5
Glucagon	5
Clexane 60mg	10
Clexane 80mg	10
Lidocaine 1%	20
Streptokinase 1.5miillion units	2
Hydrocortisone 100mg	8
Metoclopramide 10mg/1ml	10
Adrenaline 1:1000	20
Novomix 30 Flexpen	10
Novorapid 100u/ml 10 mls	10
Syntocinon 10 units/ml	10
Tetanus protocol pack	10

IV ACCESS	
Venflons Grey 16	50
Venflons Green 18	50
Venflons Pink 20	50
Venflons Blue 22	50
Syringes 10ml	50
Syringes 50ml	50
Syringes 3ml + needle	50
Syringes 1ml	50
Syringes 5ml	50

Sharps Box 0.25l	10
Tourniquet	10
Butterflies green & blue	50
IV dressings	100
Needles 21G Green	50
Needles 25G Orange	50
Needles 19G White	50
Needles 23G blue	50
IV Giving Set	100
IV Bungs	100
IO access pack, automated and manual and appropriate needles	2

IV FLUIDS	
0.9% NaCL 1 litre	50
0.9% NaCL 500mls	10

AIRWAY MANAGEMENT	
1 set ET tubes paeds and adults	5
Bougie	5
IGel/LMA full set of sizes	5
High Concentration oxygen masks and connections	20
Chest Drain Kit	10
Hand Held Portable Suction unit	10
Laryngoscope and blades full set	2
Bag-Valve-Mask	5
Regulator	5
Aspiration catheters	5
Oxygen valves	5

NP Airways Size full set	10
Guedel Size full set	10
Oxygen tubing	10
Nasal Cannulae	20
Nebuliser masks	10
Peak Flow Meter and disposable mouth pieces	2
Spacer	2
Chest decompression needles	10
Portable chest drain	10
Chest seal with valve	10
Chest seal occlusive	10

WOUND CLOSURE	
Steristrips	100
Scalpels	20
Glue 3g	14
Sterile Gloves Size 8	5 BOXES
Sterile Gloves Size 6	5 BOXES
Non sterile gloves S/M/L	5 BOXES EACH
Suture Packs	20
Ribbon Gauze 5cm x 7.5cm	50
Instruments	20 SETS
Sutures 0	20
Sutures 3/0	20
Sutures 4/0	20
Sutures 5/0	20
Scalpel Blades	50

DRESSINGS	
Sleek 2.5cm	20
Elasticated tape 2.5	20
Zinc Oxide tape 1.5cm	20
Zinc Oxide tape 5.0cm	20
Nasal tampon	20
Sterile Swabs	2 BOXES
Granuflex	20
Non-adherent dresssings 20 x 10cm	100
Adhesive dresssings 10 x 9cm	100
Non-adherent dressings 5 x 5cm	100
Non-adherent dressings 10 x 10cm	100
Bactigras 5 x 5 cm	20
Non-sterile swabs	20 PACKS
Moleskin	20
Absorbent dressing pads 10 x 10cm	20
Non-adherent dressings 5 x 5cm	100
Jelonet 5 x 5cm	20
Jelonet 10 x 10cm	20
Atrauman 10 x 7.5	20
Honey dressings 10 x 10	20
Allevyn Heel pads	20
Kinesio Tex Tape	5 rolls
Eye pad	20
Large abdo wound dressing	4

UROLOGY PACK	
Foley Catheter Size 12	2
Foley Catheter Size 14	2

Foley Catheter Size 16	2
Foley Catheter Size 18	2
Catheter Bags	13
Conveen	2
Baird Urine Meter + bag 350ml + 2.85l	2
Pack inco nappies	1
Instagell	40
Female Bed Pan	1
Male Bed Pan	1
Catheter Insertion Kit	2
Travel John	18
"Go Anywhere Toilet Bag	2

HARDWARE	
Triage card set	20
Magic marker	1
White board and markers	1
MIMMs kit	5
Basic Life Support protocol	1
Medical Field Guide	1
Patient Report Form & Pencil	2
MEDIC fluorescent vest	2
Hand and foot warmers	6 boxes
Neck collars	4
Spinal board and head blocks (vacuum mattress)	2
stretcher	2
SAM splints	10
Kendrick traction device	4
SAM Pelvic Splint	5
Trauma Shears	5

Petzl Head torch +batteries	5
Pentorch	5
Scalpel size 10 and 11	1 box of each
Safety pins	3 packs
Pocket mask	10
Tongue depressors	5 boxes of 100
Hand sanitiser 5ml	1 box
Dental kit	10
Oxygen /tubing/regulators/face masks	Enough to allow critical care resus for 3 days
Nebuliser, tubing and masks for medication	2 + 20 tubing/mask systems
Oxygen concentrator	1

DIAGNOSTIC BOX	
BraunTympanicThermometer and oral thermometer/rectal thermometer	2 of each
Low recording thermometer	1
Pulse Oximeter	2
Urine Dipstix	4 boxes
Pregnancy test	50
Boso Profitest Sphygmomanometer	4
Tendon Hammer	1
Stethoscope lithman	2
Otoscope and ophthalmoscope	2
Glucometer and sticks	2
Malaria RDT	10
Point of care technology as above	2

MEDICATION	
Paracetamol 500mg	500

Ibuprofen 400mg	500
Diclofenac 50mg	500
Codeine 30mg	500
Tramadol 50mg	500
Buprenorphine (=Temgesic) 200mg	500
Aspirin 300mg	100
Clopidogrel 300mg	100
Suscard Buccal 2mg GTN tab	50
Bisoprolol 2.5mg	100
Glucogel Hypostop	20
Furosemide 40mg	100
Lisinopril 2.5mg	100
Prochloperazine (Buccastem)	50
Omeprazole 20mg	100
Loperamide 2mg	500
Chlorphenamine (=Piriton) 4mg	100
Cetirizine 10mg	100
Prednisolone 5mg	500
Salbutamol inhaler	20
Salbutamol nebules 5mg	50
Atrovent nebules 250mcg	50
Acetazolamide 250mg	100
Dexamethasone 2mg	100
Nifedipine 20mg	100
Co-amoxiclav 500/125mg	500
Flucloxacillin 250mg	500
Cephalexin 500mg	500
Ciprofloxacin 500mg	500
Erythromycin 250mg	500
Metronidazole 400mg	500

Diazepam 5mg	100
Otomise ear spray	10
Ear tampons	10
Norethisterone 5mg	90
Nasonex nasal spray	5
Chloramphenicol ointment	20
Tetracaine minims	50
Carbomer 980 for dry eyes	40
Fluroscein minims	50
Cyclopentolate minims	20
Aloe Vera	10
Doxycycline 100mg	80
Amitryptyline 10mg	100
Malaria treatment pack containing diameter and quinine	5

The following modules are part of the clinical module on the vessel but are deployable should there be the need on shore. As such they need to be kept in a state of readiness and in a robust packing system such as a pelican case.

Annex A1: Advanced Airway Module

Guidelines which necessitate that physicians have anaesthetic advanced airway skills with RSI capability would preclude many physicians from being able to work in subpolar waters. The advanced airway module follows the PALM guidelines to enable good and safe management of airways during medical and traumatic emergencies.

McGill's forceps	1	
KY jelly	5 sach	
Portable suction device	2	And tubing
I-gel/LMA		1 of each size appropriate to the age range on the vessel
Laryngoscope	1	And age appropriate blades

Mini tracheostomy set	1	
Bag & Valve Mask + reservoir, tubing and connections	1	
oxygen	1	CD cylinder or appropriate alternative
Portable automatic ventilator	1	
Anaesthetic drugs according to skill of physician		Morphine, midazolam and ketamine are in the iv pack

Annex A2: Advanced Monitoring Module and CPR

The medical professional will carry in their on shore kit, a basic monitoring and diagnostic kit. However for more advanced intervention and monitoring the medical professional may wish to consider their capacity to monitor adults and children in areas such as:

1. Blood Pressure
2. Blood glucose
3. Oxygen Saturation
4. Heart Rate
5. ECG 12 Lead
6. ETCo2, waveform capnography
7. Defibrillation (manual)

They will also need to have the medication to carry out advanced life support with medication recommended in the ALS and PALS protocols pertinent and current at the time of debarkation.

The advanced monitoring and CPR Module will be heavy and could be rapidly deployable from the vessel if required. This system of rapid deployment will require testing to ensure the crew are competent in the system of deployment.

Annex A3: Paediatric module

Additional paediatric medication and hardware may be required depending on the clients on the vessel. The medication should mirror the clinical module above and be age appropriate.

Annex A4: Evacuation module

An injured patient on shore may need rapid transport to the medical facilities on board the ship to stabilise and initiate medical intervention. You should consider including the following within a module for evacuation:

Spinal board/scoop stretcher
Head blocks

Cervical collar
Hypothermia blanket
Bubble wrap or blanket system
Vacuum mattress

This should be ready to deploy with the appropriate modules above

Annex B: Sample Medical Professional on shore medical kit: deployable medical kit: can be broken down to 2 modules depending on the time ashore. (Red designates items considered to be high priority; blue designates items for consideration when undertaking longer landings or more isolated activities).

Item	Dose/size
Casualty report form and pencil	1
Marker Pen	1
Trauma Care	
CAT tourniquet	4
Novel haemostatic agent	gauze
Pressure dressing	2
Nasopharyngeal Airway	Size 6 x2
Nasopharyngeal Airway	Size 7 x2
chest seal	4
Decompression needle	4
Scissors Tuff Cuts	1
SAM splint pelvis	2
Kendrick traction device	2
Dressings	
Scissors Sharp	1
Bandages assorted	
Ambulance dressing No 3	2
Eye pad and bandage	2
Nitrile Examination Gloves pairs appropriate to clinician	4
SAM splint	1
Swabs: 10x10 (5)	
Jelonet: 10x10	2
Non-adherent Dressing: 10x9	2

Adhesive Dressing:10x9,10x15	2
Granuflex: 10x10	2
Steristrips pack	1
Wound glue	1
Antiseptic wipes	10
Band-aids: various	
Blister dressing (eg Compeed)	5
Elastic Tape 2.5cm	1
Sleek Tape 2.5cm	1
Zinc oxide Tape 2.5cm	1
Finger tubigrip	1
Clingfilm roll	1
Iodine solution 10ml	2
Water for Injection 10ml	2
Burn bags	2
Safety pins large	10
Disposable scalpel No 10	2
Diagnostic kit	
Thermometer oral	1
Pulse Oximeter	1
Otoscope and ophthalmoscope	1
stethescope	1
Manual BP Cuff	1
Blood glucose monitor	1
Creams	
Aloe vera gel 10ml	1
Suncream 10ml	1
Anusol	1
Ibuprofen Gel	1

Betamethasone Oint 0.1%	1
Fuscidic acid cream	1
Clotrimazole 1%	1
Aciclovir (=Zovirax)	1
Painkillers	
Paracetamol 500mg	32
Ibuprofen 400mg	12
Diclofenac 50mg	12
Codeine 30mg tabs	12
Tramadol 50mg capsules	32
Oral analgaesic gel	1
Buprenorphine 200mcg tabs	24
Antibiotics	
Cefalexin 500mg	21
Ciprofloxacin 500mg	14
Metronidazole 400mg	21
Allergy / Respiratory	
Chlorphenamine 4mg tabs	16
Cetirizine 10mg tabs	4
Adrenaline/epipen	2
Salbutamol Inhaler (100mcg)	1
Gastrointestinal	
Buccastem 3mg	12
Loperamide 2mg tab	32
Omeprazole tabs 10mg	8
Senna	8
Cardiac	
Aspirin 300mg dispersible tab	4
Suscard Buccal 2mg	12

Other	
Pseudoephedrine tab (Sudofed)	16
Handwarmers pair	6
Diazepam 5mg	4
Eyes	
Chloramphenicol eye oint	1
Carbomer 0.2% gel tears	1
Tetracaine 1%	4
Fluorescein 2%	1
Cyclopentolate 1%	4
injectables	
3ml syringe and needle	2
10ml syringe and needle	2
IV cannulae	16 and 18 x2
IV site dressing	4
Sharps box	1
IO Device	1
IO Needles	assorted
0.9% NS 500mls	2
Giving set	2
Tranexamic acid 500mg/5mls	4
Morphine 10mg/1ml	2
Naloxone 400mcg	2
Metoclopramide 10mg	2
Midazolam 10mg	2

Annex C: Non Medical Professional on shore Medical Kit: Guide kit

Item	Dose/size	Qty	Notes
Hardware			
Heat pads		4	
Gloves	Pair	20	
Syringe 5ml		10	
Needles	green /blue	20	
Scissors - small		1	
Scissors - trauma		1	
Combat Application Tourniquet		2	
Novel haemostatic agent	gauze	4	
Combat pressure dressing		4	
Nasopharyngeal airway	Size 7	2	
Nasopharyngeal airway	Size 6	2	
chest seal		2	
SAM Splint		1	
Alco-wipes		20	Cleaning wounds
Plasters/Bandaids	medium	20	Small cuts/abrasions
Paraffin gauze dressing (eg Jelonet)	10 x 10cm	5	Non-stick dressing for graze or wound
Blister Dressing (eg Compeed)		10	
Granuflex	10 x 10cm	5	Cut to size for blisters / hot spots
Gauze	assorted	50	Wiping/absorbing blood etc, padding
Adhesive dressing (steroplast)	10 x 9	10	
Non-adherent dressings	assorted	10	Non-stick dressing for any wounds

Finger tubigrip		1	To hold dressing on finger
Zinc Tape		2	Adhesive tape
Sleek Tape		1	Adhesive tape
K-lite bandage	7 cm	5	Bandage to hold dressing on, can give some support
Ambulance dresssing No 3	20 x 28cm	5	Dressing and bandage all in one
Steristrips	6 x 75mm	2pa	Closing small wounds
Skin glue		2	Closing small wounds
Injectable			
Adrenaline for IM injection	1 in 1000	4	0.5ml IM can repeat every 5 minutes - life-threatening allergy (anaphylaxis)
Medications			
Paracetamol	500mg	100	2 tabs four times a day (max 8 tabs/day) for pain
Ibuprofen	400mg	84	1 tab three times a day for pain/inflammation
Codeine	30mg	100	1-2 tabs four times a day (max 8 tabs/day) for severe pain
Buprenorphine	200mcg	50	1 -2 tabs, three times a day (max 6 tabs/day) very severe pain
Aspirin	300mg	2	1 tab daily for heart attack
Suscard Buccal	2mg	2	1 tab three times a day for heart attack - place between lip & gum (after discussion with doctor)
Buccastem	3mg	30	1-2 tabs 2x a day for nausea/vomit - place between lip & gum
Loperamide	2mg	32	2 tabs after loose stool, 1 tab 4hourly (max 8 tabs/day) for diarrhoea
Chlorphenamine	4mg	28	1 tab four times a day for allergy-itch can make you drowsy
Prednisolone	5mg	48	
Salbutamol inhaler	200 doses	2	2 puffs inhaled for relief of asthma/wheeze/shortness of breath

Antibiotics			
Cefalexin	500mg	10	1 tab 2 to 4 times a day depending on severity of infection
Erythromycin	250mg	56	
Flucloxacillin	500mg	28	
metronidazole	400mg	21	1 three times a day for 7 days
Eyes			
Chloramphenicol ointment	4g	1	4 times a day eye - for infections & snow blindness
Tetracaine 1%	Single use	1	Anaesthetic eye drops removing foreign Foreign bodies and snow blindness

Annex D: Sample Supplemental Medical Kits for Specific Adventure activities

a. Diving

Diving necessitates the availability of a ready supply of oxygen until a decompression chamber can be reached

b. Skiing

Skiing injuries can be managed by the kit in the medical professional module or the guide kit

c. Kayaking

Kayaking injuries can be managed by the kit in the medical professionals module or the guide kit

d. Climbing

Climbing injuries can be managed by the kit in the medical professionals module or the guide kit

e. Altitude

The combination of cold temperatures, low barometric pressures and altitude can result in altitude related illness at a lower than anticipated altitude. The medication below is recommended for any trips above 2000m

Medications			
Dexamethasone (IM)	4mg/2ml	10	8mg IM then 4mg 4 times/day - HACE unconscious
Salbutamol inhaler	200 doses	1	2 puffs inhaled for relief of asthma/wheeze/shortness of breath
Azetazolamide (= Diamox)	250mg	10	1 tab twice a day for altitude sickness
Dexamethasone	2mg	10	4 tabs then 2 tabs four times a day for HACE
Nifedipine retard	20mg	7	1 tab twice a day for HAPE