

Medical kit for single-handed offshore yacht races

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ABSTRACT

Background: The medical kit is the basis of medical support in maritime environment; it is defined by international or national regulations and guidelines. For offshore races, rules and recommendations are proposed by national or international sailing federations. Sailing and racing offshore alone presents specificities that sometimes make it difficult to apply the usual recommendations. The epidemiology of single-handed offshore race is dominated by traumatic risks. Medical events are relatively rare because competitors are high-level athletes, generally young and subject to complete medical assessments. The scarcity of available scientific data makes it necessary to choose appropriate methods for developing recommendations. The purpose of this work is to propose a medical kit adapted and applicable to these situations.

Materials and methods: The method used was that of “Professional recommendations by formal consensus of experts” derived from the Rand/UCLA method. After a critical analysis of the literature, a panel of 19 experts having expertise in medicine in maritime environment was gathered from various medical specialties (cardiologist, internist, intensivist and emergency physician, ear-nose-throat physician and general practitioner) and from varied medical activities. They had not declared any direct conflict of interest.

Results: A medical kit proposal has been developed. The choice of drugs was based on the analysis of the epidemiology of medical events observed during the last offshore races. The experts’ choice was to reduce the quantity of medication and medical devices in order to limit the risk of confusion of medicines and dosages. Drugs with significant side effects or requiring third party monitoring have been removed. Medical devices designed to do an intervention impossible to perform on oneself have also been eliminated.

Conclusions: Solo sailing remains a marginal maritime activity with specific risks. The development of single-handed races requires an adaptation of medical support through the development of a specific medical kit and adapted training. The formalised consensus of experts seems to be an appropriate method for developing recommendations in the field of maritime medicine.

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Key words: medical kit, single handed, offshore yacht races

INTRODUCTION

The medical kits, with medical training and telemedical advices, are the basis of the medical support in the maritime environment. They are defined by international or national regulations [1, 2]. Scientific societies have also proposed recommendations mainly in the field of cruising. For offshore yacht races regulations and recommendations are proposed by the national or international federations [3]. The practice of single-handed offshore races presents specificities that sometimes make it difficult to apply the usual recommendations. The epidemiology of single-handed offshore races

is dominated by traumatic risks [4, 5]. Medical events, apart from dermatological problems [6], are rare because skippers are high-level athletes, generally young and subject to full medical assessments. The purpose of this work is to propose a medical kit adapted and applicable to this activity.

MATERIALS AND METHODS

The method used was that of “Professional recommendations by formal consensus of experts” derived from the Rand/UCLA method. After a critical analysis of the literature, a panel of 18 experts (Appendix 1) having expertise in med-

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icine in maritime environment was gathered from various medical specialties (cardiologist, internist, intensivist and emergency physician, ear-nose-throat physician and general practitioner) and from varied medical activities. They had not declared any direct conflict of interest. The members of the rating group were required to complete the questionnaires submitted to them in their entirety. Next to each item of the questionnaire is placed a numerical scale graduated from 1 to 9, the value 1 means that the contributor judges the proposal totally inappropriate (or not indicated, or not acceptable), the value 9 means that the contributor judges the proposal is entirely appropriate (or indicated, or acceptable), the values 2 to 8 reflect the possible intermediate situations, the value 5 corresponds to the indecision of the contributor. Two rounds of quotation are carried out. The final ranking of the various proposals was made by calculating the median and the distribution of quotations in strong agreement, relative agreement, indecision, lack of consensus. For the final recommendations, only proposals with strong or relative agreement were selected [7].

RESULTS

A proposal for a medical kit has been developed (Table 1). The organisation of the kit should allow for intuitive use, possibly using colour-coded modular arrangements, and should include an easily accessible list of content. The drugs are listed Anatomical Therapeutic Chemical (ATC) code (The ATC Classification System) [8] and by generic name followed by the indication for use and whether or not to contact the Telemedical Advice Service (TMAS) before a procedure or administration of a drug.

DISCUSSION

The choice of the medicines was based on the analysis of the epidemiology of medical events observed during the last offshore races [4, 5, 6, 9]. In the same therapeutic class, an analysis of the recent recommendations of learned societies or health authority organisations has made it possible to choose the most relevant medicine according to evidence-based medicine. The experts' choice was to reduce the quantity of medicines and medical devices in order to limit the risks of confusion of the medicines and their dosages, taking into account the limited space and weight allotment on board, and the cost to the skippers for whom it is not a priority. Medicines with significant side effects or requiring special monitoring have been eliminated.

Medical devices designed to perform techniques impossible to execute on oneself have also been eliminated. The other criteria of choice were to promote a compact and light presentation, biochemically and environmentally stable. These recommendations represent the basic minimum endowment, and can be supplemented according to local

regulations or requests from race organisers. Skippers with specific pathologies and who have passed the selection tests will have to complete the medical kit by the specific drugs of their pathologies.

CARDIOVASCULAR DRUGS

They are present in all medical kit for the management of heart failure, acute coronary syndrome or a rhythm disorder. In the case of single handed offshore race, epidemiology [5, 9] does not show any major cardiovascular events, although they are still possible. The population of offshore skippers is essentially a young population, high-level athletes, prepared and medically followed before their departure. In addition, if an acute coronary syndrome occurred it would be difficult to start an anti-platelet or anticoagulant treatment with haemorrhagic risks without diagnostic confirmation. Only DL-lysine acetylsalicylate acid in oral sachet was kept [10]. The furosemide, often recommended, has not been retained, the possibility of cardiac or renal decompensation with hydro saline inflation that would not have been revealed before the race is unlikely, the risk in the maritime environment is rather the risk of dehydration.

ANALGESICS

Level one is represented by paracetamol, for more intense pain paracetamol/nonsteroidal anti-inflammatory drugs combination is recommended [11, 12]. In case of major pain or failure of previous measures, an opioid, morphine sulphate 10 mg, should be administered. Given the risk of side effects and the difficulty of performing a titration under good conditions, the choice of the oral route is preferred. To avoid any risk of confusion and overdose, all other medicines have been eliminated as well as presentations involving several medicines.

PSYCHOTROPIC AND SEDATIVE DRUGS

Psychotropic agents and anxiolytic sedatives, mainly benzodiazepines, are proposed in medical kit for the management and treatment of agitation states, panic attacks or sleep disorders [13]. These drugs can be useful in commercial navigation or crewed sailing but can be dangerous in solitary navigation. They can lead to a decrease in alertness and combativeness and drowsiness, more rarely can they be responsible for paradoxical effects and hallucinations [13]. For all these reasons they have been eliminated from the medical kit.

VASOPRESSIVE CATECHOLAMINES

The only indication in these situations is the treatment, in emergency, of acute anaphylaxis (stage II and III) of food or drug origin. Under these conditions, the recommended medicine is adrenaline in intramuscular injectable solution with 0.3 mg pre filled syringes in self-injectable device, two

Table 1. Recommended medicines and equipment on board off-shore racing yachts

Medical Support for single-handed Offshore Yacht Races – Medical Kit Inventory*

X indicates that Telemedical Advice Service (TMAS) should be contacted before a procedure or administering a drug.

LIST OF RECOMMENDED MEDICINES AND EQUIPMENT ON BOARD OFF-SHORE RACING YACHTS				
World Health Organization Format				
Item no.	ATC code	Recommended medicine and dosage strength representing best practice on board off-shore racing yachts	Indications on board off-shore racing yachts	Need to contact TMAS
MEDICINES				
1	A02AE03	Lansoprazole 30 mg tablet	To treat gastro-oesophageal reflux; to treat ulcer disease	x
2	A03AX12	Phloroglucinol 80 mg	To relieve intestinal or urinary spasms	x
3	A06AB02	Bisacodyl 5 mg tablet	For treatment of constipation	
4	A07CA	Oral rehydration salts sachets	To prevent or treat dehydration	
5	A07XA04	Radecadotril 100 mg tablet	Antidiarrheals	
6	C05AX	Haemorrhoid preparations – proprietary preparation of choice	Haemorrhoid preparations	
7	B02AA02	Tranexamic acid tablet 500 mg	Treatment of haemorrhage	x
8	C01CA24	Adrenaline auto-injector 0.5 mg	To raise blood pressure in anaphylaxis; to dilate airways in severe asthma or anaphylaxis	
9	D01AC02	Miconazole 2% ointment (30 g)	To treat fungal skin infections	
10	D06BA01	Silver sulfadiazine cream (50 g)	Treatment of burns	
11	D06BB03	Acyclovir 5% cream (10 g)	To treat cold sores	x
12	G01AF02	Clotrimazole 500 mg pessary	To treat vaginal fungal infections	x
13	J01XX01	Fosfomycin tablet	Single dose treatment of uncomplicated acute cystitis in women	x
14	J01CR02	Amoxicillin + clavulanate 1000/200	To treat infections responsive to this antibiotic	x
15	J01DD04	Ceftriaxone 1 g ampoule	To treat infections responsive to this antibiotic	x
16	J01FG01	Pristinamycin tablets 500 mg	To treat infections responsive to this antibiotic	x
17	J01MA02	Ciprofloxacin 500 mg tablet	To treat infections responsive to this antibiotic	x
18	P01AB01	Metronidazole 400 mg tablet	To treat intestinal infections responsive to this antibiotic	x
19	H02AB07	Prednisone 10 mg tablet	To treat severe asthma; to treat other inflammatory conditions	x
20	M01AE01	Ibuprofen 400 mg tablet	To treat inflammation; to reduce mild to moderate pain, especially if associated with inflammation	
21	N01BB02	Lignocaine gel (6 mL)	Local anaesthetic	
22	N02AA01	Morphine sulphate (oral) tablet 10 mg	Opioid analgesic (treatment of moderate to severe pain)	x
23	N02BA01	Acetylsalicylic acid 300 mg	To inhibit formation of blood clots in angina pectoris, myocardial infarction, stroke	x
24	N02BE01	Paracetamol 1 g tablet	To reduce pain and fever	
25	N07CA02	Cinnarizine 25 mg tablet	To prevent and treat motion-sickness	
26	R06AE07	Cetirizine tablet 10 mg	Anti-histaminic, anti-allergic	x
27	S01AA09	Tetracycline eye ointment (4 g)	Eye infection	x
28	S01AA16	Rifamycin ophthalmic ointment	Eye infection anti-infective preparations for ophthalmological use	x
29	S01CA01	Tobramycin/Dexamethasone eye/ear drops (10 mL)	To treat eye and ear infections	x
30	S01XA02	Retinol eye ointment	Topical preparation for repairing eye	x
31	S02AA12	Rifamycin ear drop	Ear infection	

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Table 1. cont. Recommended medicines and equipment on board off-shore racing yachts

LIST OF RECOMMENDED MEDICINES AND EQUIPMENT ON BOARD OFF-SHORE RACING YACHTS				
World Health Organization Format				
Item no.	ATC code	Recommended medicine and dosage strength representing best practice on board off-shore racing yachts	Indications on board off-shore racing yachts	Need to contact TMAS
EQUIPMENT				
DRESSING MATERIAL AND SUTURING EQUIPMENT				
32		Wound closure strips	Adhesive skin closures	
33		Skin stapler × 35 staples	Wound staplers	
34		Stapler remover	Wound staplers	
35		Assorted wound plasters	Adhesive dressing	
36		Adhesive wound dressing 10 × 10 cm	Adhesive dressing	
37		Sterile gauze compresses 10 × 10 cm	Sterile gauze compresses	
38		Low adherent dressing 10 × 10 cm	Gauze dressing with non-adherent surface	
39		Tulle gras dressing	Healing dressing	
40		Haemostatic dressing	Haemostatic agent	
41		Elastic fixation bandage 6 cm × 4 m	Bandage	
42		Tubular bandage 5, 8, 10 cm × 10 m	Bandage	
43		Adhesive surgical tape 2.5 cm × 10 m	Bandage	
44		Chlorhexidine solution S02AA09	Antiseptic	
45		Sterile gauze swabs 5 × 5 cm	Sterile swabs	
46		Adhesive elastic bandage 7.5 cm × 4.5 m	Bandage	
47		Cohesive bandage 7.5 cm × 4.5 cm	Bandage	
48		Trauma tourniquet	Compressing device (bandage), to control bleeding	
49		Gloves non-sterile, disposable	Gloves	
INSTRUMENTS				
50		Bandage scissors (tough cut scissors)	Scissors	
51		Artery clamp	Haemostatic clamp	
52		Splinter forceps (tweezer)	Forceps	
53		Scalpel, sterile, disposable	Disposable scalpels	
EXAMINATION AND MONITORING EQUIPMENT				
54		Stethoscope		
55		Sphygmomanometer manual	Blood pressure set	
56		Sphygmomanometer automatic	Blood pressure set	
57		Large blood pressure cuff	Blood pressure cuff	
58		Thermometer digital	Thermometer	
59		Pulse oximeter	For monitoring of oxygen saturation	
60		Urine testing strips 10 parameters	Reactive strips for urine analysis	
61		Blood glucose testing kit/25 strips + 25 needles	Reactive strips for blood analysis	
EQUIPMENT FOR INJECTION, INFUSION AND CATHETERISATION				
62		Syringes 5 mL	Equipment for injection	
63		Needle 23 G hypodermic	Equipment for injection	
64		Needle subcutaneous	Equipment for infusion	x

Table 1. cont. Recommended medicines and equipment on board off-shore racing yachts

LIST OF RECOMMENDED MEDICINES AND EQUIPMENT ON BOARD OFF-SHORE RACING YACHTS World Health Organization Format				
Item no.	ATC code	Recommended medicine and dosage strength representing best practice on board off-shore racing yachts	Indications on board off-shore racing yachts	Need to contact TMAS
GENERAL MEDICAL AND NURSING EQUIPMENT				
65		Ethanol 70% hand cleanser gel 250 mL	An alternative to hand washing	
66		Medical guide		
67		Medical observation forms		
68		Cold pack	To reduce swelling and pain	
69		Dental repair kit		x
IMMOBILISATION AND TRANSPORTATION EQUIPMENT				
70		Malleable splint	For immobilizing bone and soft tissue injuries	
71		Neck collar, semi-rigid, adjustable	For neck immobilisation	

*List of recommended medicines and equipment as stated in SFMM Consensus Paper on Medical Support for Single handed Off Shore Yacht Races – Medical Kit Inventory

doses must be available and the treatment must be carried out in connection with a TMAS.

DEVICES AND PERFUSION SOLUTION

The setting up of an intravenous and prolonged infusion seems difficult to achieve in single-handed navigation and not without danger. Emphasis should be placed on the early detection of dehydration states and its correction by electrolytic supply via the digestive tract.

It was not included in these proposals anything which relates to hygiene products (sunscreen, lipstick, dermatological soap, hand protection products and for seat and feet). No survival bag has been proposed as in some other recommendations.

CONCLUSIONS

The single-handed offshore yacht race remains a marginal practice with specific risks. The development of this type of races requires an adaptation of medical support through the development of a specific medical kit with adapted training. The formal consensus of experts seems to be an appropriate method for the development of recommendations in the field of maritime medicine. The evolution of the medical kits over time is inevitable by adapting to the new epidemiological collections available and according to the evolution of the human constraints of the boats.

REFERENCES

- World Health Organisation. International medical guide for ships: including the ship's medical chest. <http://www.who.int/iris/handle/10665/43814>.
- Genton B, D'Acremont V. To prevent and deal with medical problems on board. *Rev Med Suisse*. 2017; 13(561): 934–937, indexed in Pubmed: [28627850](https://pubmed.ncbi.nlm.nih.gov/28627850/).
- Nikolić N, Nilson R, Briggs S, et al. A Medical Support in Offshore Racing - Workshop on Medical Kit Inventory in Offshore Yacht Racing, 12-13 May 2017, Lorient, France. *Int Marit Health*. 2018; 69(3): 214–222, doi: [10.5603/IMH.2018.0035](https://doi.org/10.5603/IMH.2018.0035), indexed in Pubmed: [30270422](https://pubmed.ncbi.nlm.nih.gov/30270422/).
- Nathanson AT, Baird J, Mello M. Sailing injury and illness: results of an online survey. *Wilderness Environ Med*. 2010; 21(4): 291–297, doi: [10.1016/j.wem.2010.06.006](https://doi.org/10.1016/j.wem.2010.06.006), indexed in Pubmed: [21168780](https://pubmed.ncbi.nlm.nih.gov/21168780/).
- Jacolot L, Gabart C, Chauve JY. Traumatologie en course au large. Étude épidémiologique de 2008 à 2015. *J de Traumatologie du Sport*. 2018; 35(1): 60, doi: [10.1016/j.jts.2017.12.018](https://doi.org/10.1016/j.jts.2017.12.018).
- Mahé C, Jacolot L, Loddé B, et al. Pathologie dermatologique chez des skippers avant et après une transatlantique de haut niveau. *Ann de Dermatologie et de Vénérologie*. 2013; 140(12): S476–S477, doi: [10.1016/j.annder.2013.09.263](https://doi.org/10.1016/j.annder.2013.09.263).
- Fitch K, Bernstein SJ, Aguilar MD, et al. The RAND/UCLA appropriateness method user's manual. Santa Monica (CA): RAND. 2001.
- Tayebati SK, Nittari G, Mahdi SS, et al. Identification of World Health Organisation ship's medicine chest contents by Anatomical Therapeutic Chemical (ATC) classification codes. *Int Marit Health*. 2017; 68(1): 39–45, doi: [10.5603/IMH.2017.0007](https://doi.org/10.5603/IMH.2017.0007), indexed in Pubmed: [28357835](https://pubmed.ncbi.nlm.nih.gov/28357835/).
- Carron M, Coulange M, Dupuy C, et al. Preparation and medical follow-up for a single-handed transatlantic rowing race. *Int Marit Health*. 2017; 68(1): 7–11, doi: [10.5603/IMH.2017.0002](https://doi.org/10.5603/IMH.2017.0002), indexed in Pubmed: [28357830](https://pubmed.ncbi.nlm.nih.gov/28357830/).
- Juliard JM. Antiplatelet and anticoagulant agents during acute coronary syndromes. *Réanimation*. 2010; 19: 95–102.
- Russell KW, Scaife CL, Weber DC, et al. Wilderness Medical Society practice guidelines for the treatment of acute pain in remote environments. *Wilderness Environ Med*. 2014; 25(1): 41–49, doi: [10.1016/j.wem.2013.10.001](https://doi.org/10.1016/j.wem.2013.10.001), indexed in Pubmed: [24462332](https://pubmed.ncbi.nlm.nih.gov/24462332/).
- Recommandations formalisées d'experts 2010: sédation et analgésie en structure d'urgence. *Ann Fr Med Urgence*. 2011; 1: 57-71.
- Martindale the complete drug reference. The pharmaceutical press, London. www.medicinescomplete.com.

APPENDIX 1. SFMM Position Paper. Medical Support for single handed Offshore Yacht Races – Expert group

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