

A first response bag with standardized contents for medical emergencies on cruise ships

Ellif Dahl^{1–3}, Art Diskin³, Angela C. Giusti³, Anne Bilé³, Steve Williams³

¹Institute of Medicine, University of Bergen, and the Norwegian Centre for Maritime Medicine, Department of Occupational Medicine, Haukeland University Hospital, Helse Bergen HF, Bergen, Norway

²Division of Liver, Gastrointestinal and Paediatric Surgery, Oslo University Hospital, Oslo, Norway

³Royal Caribbean Lines, Miami, Florida, USA

ABSTRACT

Background. There are no international rules regarding which medical supplies to bring when the nurse-on-duty is called to emergencies **outside** a cruise ship's infirmary. Ideally, **one** First Response Bag should contain all that is needed to manage the initial 10–15 minutes of any medical emergency until the patient can be safely transported to the ship's infirmary.

Royal Caribbean Cruises Ltd recently decided to establish a fleet-wide standardized First Response Bag for initial management of cardiac and other emergencies encountered by the nurse-on-duty outside the ship's infirmary.

Material and methods. A prototype First Response Bag was tried out on one ship. A PowerPoint presentation of the bag with its contents was then circulated by e-mail to all 33 infirmaries of the fleet, and comments from all 181 medical staff members were invited. All responses were discussed fleet-wide for consensus.

Results. Responses from 18 ships triggered eager discussions. The resulting First Response Bag was considered by all an improvement compared to the solutions practiced previously on most ships of the fleet. The bag is a lightweight combined roller and backpack with 12 compartments, and it has well-organized, easily accessible, fleet-wide standardized minimal supplies. It contains what is needed to manage the initial phase of a cardiac arrest and other emergencies.

Conclusions. This initiative may inspire other companies in standardization efforts and trigger cruise industry-wide cooperation—with the ultimate goal of an internationally accepted first response bag standard.

Key words: emergency medical equipment, cardiac arrest, cruise ship

INTRODUCTION

There are no international rules for medical equipment on passenger vessels. However, the American College of Emergency Physicians has published guidelines for medical care on cruise ships, now widely accepted as a standard for cruises marketed from North America [1]. They include medication and equipment for the ships' infirmary, but do not address which supplies to bring when the nurse-on-duty is called to attend to an unspecified emergency **outside** the infirma-

ry. Hence, it is up to each cruise company — or even the medical staff on individual ships — to decide what the first responder should bring. On some ships, most of their emergency equipment is hauled on stretchers and wheelchairs to every emergency call because supplies tend to be added rather than removed following medical staff turnover.

Ideally, **one** First Response Bag should contain all that is needed to manage the initial 10–15 minutes of any medical emergency until the patient can be safely transported to the

□ Professor Ellif Dahl, MD, MHA, PhD, Division Liver, Gastrointestinal and Paediatric Surgery, Oslo University Hospital, 0027 Oslo, Norway, Tel.: +47 23 07 00 00; Fax: +47 22 56 31 12; e-mail: ellifdahl@hotmail.com

Potential conflicts of interest: The authors have not received any financial support or funding of any kind for this study. All have worked or work for Royal Caribbean Cruise Lines.

ship's infirmary for further diagnostic work-up and treatment. The contents must be well organized and easily accessible.

The bag has to be kept with the nurse-on-call at all times. With increasingly large ships, the bag must therefore be light and easy to move. Cruise lines often have to move their medical personnel between vessels, so the First Response Bag and its contents should be standardized fleet-wide to ease familiarization and enhance safety.

Royal Caribbean Cruises Ltd is a cruise company operating 38 modern ships with a passenger capacity of approximately 81 000. It recently decided to standardize the First Response Bag for three of their five cruise companies. Here we describe the consensus process and the resulting bag with contents.

AIM

Establish a fleet-wide standardized First Response Bag for initial management of a cardiac or respiratory arrest, critically ill or injured patient, or other common emergencies encountered by the nurse-on-duty when responding to an unspecified or unclear request **outside** the ship's infirmary.

MATERIALS AND METHODS

The three cooperating companies (Royal Caribbean International – 21 ships, Celebrity Cruises – 10 ships, Azamara Cruises – 2 ships) have a common owner, and a common coordinating medical department at their headquarters in Miami, which administers the medical staff on all 33 ships with a total complement of 66 physicians (1–3 per ship), 103 registered nurses (2–6 per ship), and 12 medical secretaries (0–1 per ship).

Based on previous experience with first responses outside medical centres ashore and at sea by the members of the company's medical department, a prototype First Response Bag was set up and tried out on **Oasis of the Seas**, presently the world's largest cruise ship (225 000 gross tons, 361 m long and 20 decks high).

A detailed PowerPoint presentation of the bag and its proposed contents was then circulated by e-mail to all 33 infirmaries of the fleet. Comments and suggestions from all 181 medical staff members were invited. All responses were distributed fleet-wide for further discussions, while the final decisions regarding the contents were made by the company's medical department.

RESULTS

Within a few days, responses arrived from 18 ships, some of which triggered eager discussions. All participants welcomed a lightweight bag on wheels. Some proposed additions were accepted (pen light, glucagon kit, metoclopramide, and zip-lock plastic bags), while others (more anti-

notes, various equipment for blood tests, intraosseous fluid administration, and endotracheal intubation) were not.

THE FIRST RESPONSE BAG

Bag characteristics

A commercial Advanced Life Support bag on wheels with a 40 + 10 cm telescopic handle, plus handles on two sides for carrying, as well as backpack straps, was chosen (**'ALS Wheeled Back Pack'** by **Thomas Transport Packs**, Salt Lake City, Utah, USA). It is impermeable, soft-sided, easy to clean and disinfect, measures 60 × 40 × 50 cm, and weighs < 2 kg. Inside there is a laminated contents card with photographs to assist in item localization. With the contents listed below, the bag weighs about 17 kg. It has 5 outside pockets and 7 colour-coded, securely fastened but easily removable pouches inside.

Bag contents

1. Outside pockets (Table 1):

The upper/top pocket has a small sharps container and equipment to diagnose hypoglycaemia. There was agreement across the fleet to keep remedies for treatment of hypoglycaemia (glucose, glucagon) in this outside pocket for easier access – instead of in the inside drug module (**see also Table 2**).

The middle pocket holds equipment helpful for quick cardiopulmonary management. The lower pocket contains the Automated External Defibrillator (AED) and necessary equipment for its use. One side pocket has scissors and dressings, while the other side pocket holds elastic bandages and a standard size Sam Splint, which is easy to mould and cut.

2. Inside pouches (Table 3):

One translucent and three blue/green pouches contain equipment to assist respiration, while two red ones hold equipment for injections and infusions, as well as a nasogastric tube. The tube, when attached to the 60 ml syringe, is also meant as a suction device. The seventh module, coloured bright yellow, contains all of the drugs except for the remedies for hypoglycaemia (**Tables 1 & 2**). The drug module has a special compartment with an extra seal for narcotics. For contents of the yellow drug module, **see Table**.

Bag maintenance/follow-up

The main compartment of the bag is sealed with a numbered breakaway seal. If the seal is broken when responding, the nurse-on-call is responsible for replacing whatever was used and re-sealing the bag after returning to the infirmary, at the latest prior to ending the on-call. The bag shall be checked monthly by breaking the seal, checking for expired drugs, and ensuring that the controlled drugs are present.

Table 1. First Response Bag: Contents of the five outside pockets

	<p>Upper/top pocket Glucometer, alcohol pads, lancets, test strips, 1 vial dextrose 50% 50 ml, 24 g oral glucose solution, 1 glucagon 1 mg kit, 1 syringe 60 ml, 8 needles 4 × 18G, 4 × 21G, 5 band-aids, 1 small sharps container</p>	
<p>Side pocket 1 1 Sam Splint, standard size Elastic bandages: 2 wraps 5 cm 2 wraps 7.5 cm 2 wraps 10 cm 2 wraps 15 cm</p>	<p>Middle pocket Manual sphygmomanometer, stethoscope, Fingertip pulse oxymeter, CPR face shield, pocket mask, pen light/flashlight, thermometer, 20 Mass Casualty Incident triage tags, Large non-sterile gloves</p>	<p>Side pocket 2 Scissors, 2 zip lock plastic bags Sterile pads: 15 gauze 2 × 2 cm, 25 gauze 4 × 4 cm, 5 non-adherent 7.5 × 10 cm</p>
	<p>Lower pocket Automated External Defibrillator (AED) with cardiac rhythm monitor (attached to adult pads), monitor cables with electrodes, 6 extra electrodes in zip lock bag, 2 disposable razors, 1 pair large non-sterile gloves</p>	

At the start of every shift, the nurse-on-duty is responsible for ensuring that the seal is present on the bag. If the seal is present, the bag does not have to be checked. The bag is standard across the fleet. All remedies must be kept in the same well-marked space in every bag across the fleet. No items on the checklist shall be taken out and none added. All the fleet's infirmaries will be audited on a regular basis to ensure that the bag is unchanged and that all medical staff members are thoroughly familiar with the contents, as well as with locations and use of all items.

DISCUSSION

If medical attention is needed outside the ship's infirmary, there is a phone number to reach the nurse-on-call. The 24-hour emergency number listed on or near all phones is answered on the Bridge (Safety Control Centre) by a seafarer who will primarily focus on location. The Bridge will then contact the nurse-on-call for further action or – if the situation appears to be urgent – immediately sound an alarm (Code Alpha – by loud speaker and/or radio/wireless phone) that will bring all medical personnel to the scene, including the nurse-on-call with the First Response Bag. Code Alpha will also activate Security personnel who will mobilize further resources, such as a wheelchair, stretcher, and

transport team. The presented First Response Bag contains all that is needed to manage the initial phase of a cardiac or respiratory arrest as well as other common emergencies encountered when on call, such as injuries, hypoglycaemia, anaphylaxis, seizures, grave emesis, chest pain, and other conditions with severe pain.

All responders to an emergency, especially the nurse-on-call, should also carry a pen, paper, a wireless phone, and a radio. The radio is especially useful for location directions, updates, back up, etc. when phone lines to the Bridge and to co-workers are jammed.

Because ships keep getting larger, and mess rooms and nurses' cabins are quite far from the infirmary on many vessels, the First Response Bag must be kept with the nurse-on-call at all times. Therefore, it must be light, easy to move, and only contain that which is absolutely necessary. These goals have been reached with the resulting First Response Bag, a lightweight combination of roller, hand-carried bag, and backpack with well-organized, easily accessible, fleet-wide standardized minimal contents. According to the participants of the consensus process, it is a considerable improvement over the solutions practiced previously on most ships in the fleet.

Cardiovascular emergencies are not uncommon on cruise ships [2]. The main focus of the bag is on cardiac

Table 2. First Response Bag: the drugs in alphabetical order

Generic name	Administration form	Concentration	Size	No
Acetaminophen/paracetamol	Tablet 325 mg	-	-	20
Amiodarone	Vial 150 mg	50 mg/ml	3 ml	2
Aspirin/Acetylsalicylic acid	Tablet 325 mg	-	-	20
Atropine sulphate	Pre-filled syringe 1 mg	1 mg/ml	1 ml	3
Dextrose*	Vial 25 mg	0.5 mg/ml (50%)	50 ml	1
Diazepam	Vial 2 ml	2.5 mg/ml	2 ml	2
Diphenhydramine	Vial 50 mg	50 mg/ml	1 ml	2
Epinephrine/adrenaline	Pre-filled syringe 1 mg	0.1 mg/ml (1:10 000)	10 ml	6
Epinephrine/adrenaline	Vial 1 mg	1 mg/ml (1:1 000)	1 ml	2
Epinephrine/adrenaline	Autoinjector (Epi-Pen)	0.3 mg/injector	-	1
Furosemide	Vial 40 mg	10 mg/ml	4 ml	2
Glucagon*	Kit 1 mg	-	-	1
Glucose*	Tube, per oral liquid	24 g/tube	31 g	1
Hydrocortisone	Vial 250 mg	250 mg/vial	-	2
Ibuprofen	Tablet 200 mg	-	-	20
Ketoralac	Vial 30 mg	30 mg/ml	1 ml	2
Lidocaine	Pre-filled syringe 100 mg	20 mg/ml (2%)	5 ml	1
Metoclopramide	Vial 10 mg	10 mg/ml	1 ml	2
Morphine	Vial 10 mg	10 mg/ml	1 ml	2
Nalaxone	Vial 0.4 mg	0.4 mg/ml	1 ml	2
Nitroglycerine	Spray 200 doses	0.4 mg/dose	Spray	1
Nitroglycerine	Sublingual tablet 0.4 mg	-	Bottle	1
Promethazine	Vial 50 mg	25 mg/ml	2 ml	2
Salbutamol	Inhaler 200 doses	0.1 mg/dose	Inhaler	1
Saline solution (NaCl)	Vial 180 mg	9 mg/ml (0.9%)	20 ml	2

*Located in outside upper pocket rather than in the yellow drug module inside

Table 3. First Response Bag: Seven inside pouches with contents

Respiration 1 (Laryngeal mask airways, LMA): 1 LMA # 3 with 20 ml syringe 1 LMA # 4 with 20 ml syringe 2 packs of 1 ml surgical lubricant		
Yellow Drug Module (Contents, see Table 2)		
Respiration 2 (Nebulizer equipment): 1 adult non-rebreather mask, 1 paediatric nebulizer mask, 1 nasal oxygen cannula	Respiration 4: 1 Oxygen aluminium cylinder size D, ready to connect	Intravenous equipment: alcohol disinfection pads, 1 tourniquet, 2 primary iv sets 15 drops/ml, 2 × 250 ml normal saline solution, 2 iv start kits (with gauze, tourniquet, alcohol pad, adhesive, roll of tape), Autoguard venous catheter/venflon (2 × 18 G, 20 G, 22 G, 24 G), 3 male plugs
Respiration 3: Ambu-bag (connected to O ₂), 1 mask # 5, 4 oral airways (Mayo tube 100 mm, 90 mm, 80 mm, infant), 2 tongue depressor		Syringes and needles: 1 syringe 20 ml, 1 syringe 60 ml, 2 needles 18 G, 8 syringes safety lock 3 ml with 21 G needle, assorted alcohol disinfection pads, 1 nasogastric tube 16 French 1 roll of tape

arrest. The contents reflect current guidelines for initial advanced cardiac life support (ACLS) and the view that 'if ACLS care in the field cannot resuscitate the victim, emergency

department care will not resuscitate the victim' [3]. External cardiac chest compressions are crucial to survival in out-of-hospital cardiac arrest, and **anything** that interrupts com-

pression is deleterious to outcome [4]. Tracheal intubation has been considered the ‘gold standard’ for airway management during cardiac arrest, but there is no high level evidence that it improves outcome [5]. Current literature supports the following: For at least the first 5 to 10 minutes of resuscitation, providers should prevent interruptions of chest compressions for anything other than single defibrillatory attempts and should intentionally delay tracheal intubation before return of spontaneous circulation [4]. Hence, in the First Response Bag, intubation equipment was replaced with laryngeal mask airways, which are easier to handle, provide equivalent ventilation, require less and lighter auxiliary equipment, and can be inserted during compressions [3]. This compromise caused a lively e-mail discussion, but it was pointed out that the primary goal is to transport any patient as soon as safely possible to the ship’s infirmary, and if intubation is indicated, it should be done there. Doctors that were unhappy with this decision were encouraged to put together their own intubation kit to be carried by them while on call. However, in the bag there is

also equipment for passive oxygen insufflation (oropharyngeal airway insertion and high-flow oxygen by non-rebreather facemask, without assisted ventilation), another viable out-of-hospital treatment alternative in cardiac arrest [6]. An AED with a screen for rhythm monitoring should be standard as it lets the medical team see if there is any cardiac activity, which also facilitates decisions to continue or to stop futile resuscitation efforts outside the infirmary.

It will be necessary to improvise in some situations. There is no suction device **per se** in the bag, but the 60 ml syringe + nasogastric tube 16 French might be helpful. Burn gel and cold packs were turned down in favour of resealable plastic bags since cold water and ice cubes are readily available all over cruise ships.

The e-mail discussion demonstrated the need for firm fleet-wide standardization of the contents. The resulting bag is filled to capacity and neither volume nor weight allow more items, so if anything has to be added, something else should be removed. Several medical staff members suggested equipment that others did not consider crucial for the first



Figure 1. The First Response Bag – ready to go



Figure 2. The First Response Bag – open, showing the 7 removable pouches inside

responder, and it is easy to understand why in the past on many ships it has taken several responders to bring their first response equipment to the emergency scenes. The consensus process gave all fleet physicians, nurses, and medical secretaries the opportunity to influence actively the decision making, triggered useful discussions, and helped settle disagreements. The company's medical department ashore will have to follow up the use of the bag closely, and during drills, training sessions and audits on board focus on areas where weak compliance might be expected. After a certain period of fleet-wide routine operation, the present standardized bag and its usefulness will be re-evaluated. The fleet ships have an international medical staff; they cruise worldwide and may have to replace medical supplies in many countries. Therefore, only generic substance names and no trade names should be used. It should, however, be noted that even some **generic** names vary around the world: in the present bag, epinephrine in the USA is adrenaline, and acetaminophen in the USA is paracetamol elsewhere. We hope that this initiative can inspire other companies in

standardization efforts, and we look forward to cruise industry-wide cooperation, with the ultimate goal of an internationally accepted first response bag standard.

REFERENCES

1. American College of Emergency Physicians. Health Care Guidelines for Cruise Ship Medical Facilities. October 2007. Available at <http://www.acep.org/practres.aspx?id=29500>. Accessed 18 January 2010.
2. Novaro GM, Bush HS, Fromkin KR, Shen MY, Helguera M, Pinski SL, Asher, CR. Cardiovascular Emergencies in Cruise Ship Passengers. *Am J Cardiol* 2010; 105: 153–157.
3. 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 2005; 112 (Suppl 1).
4. Bobrow BJ, Spaite DW. Do not pardon the interruption. *Ann Emerg Med* 2009; 54: 653–655.
5. Nolan JP, Lockey D. Airway management for out-of-hospital cardiac arrest – more data required. *Resuscitation* 2009; 80: 1333–1334.
6. Bobrow BJ, Ewy GA, Clark L, et al. Passive Oxygen Insufflation is Superior to Bag-Valve-Mask Ventilation for Witnessed Ventricular Fibrillation Out-of-Hospital Cardiac Arrest. *Ann Emerg Med* 2009; 54: 656–662.