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MASTER THESIS

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„Emergency Medical Services in low- and middle-income countries – explored for Rwanda (East Africa)“

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Emergency Medical Services in low- and middle- income countries – explored for Rwanda (East Africa)

I Table of content

II Table of figures

III Table of tables

IV Table of abbreviations

A	
AED	Automated External Defibrillator
AFEM	African Federation of Emergency Medicine
AutRC	Austrian Red Cross
B	
BLS	Basic Life Support
C	
CHW	Community Health Worker
CPR	Cardiopulmonary Resuscitation
E	
ECA	Emergency Care Assistant
ECSSA	Emergency Care Society of South Africa
ED	Emergency Department
EM	Emergency Medicine
EMS	Emergency Medical Service
EMT	Emergency Medical Technician
ETA	Estimated Time of Arrival
G	
GP	General Practitioner
I	
INGO	International Non-governmental Organisation
M	
MoH	Ministry of Health
N	
NAS	National Ambulance Service
NKA	Notfallsanitäter/in mit allgemeiner Notfallkompetenz Arzneimittel Lehre
NKI	Notfallsanitäter/in mit besonderer Notfallkompetenz Beatmung und Intubation
NKV	Notfallsanitäter/in mit allgemeiner Notfallkompetenz Venenzugang und Infusion
P	
PECTS	Prehospital Emergency Care Training School
PHTLS	Prehospital Trauma Life Support
R	
RAHPC	Rwanda Allied Health Professions Council
RRCS	Rwanda Red Cross Society
S	
SAMU	Service d'Aide Medicale Urgente
(S)GBV	(Severe) Gender Based Violence
SOP	Standard Operating Procedure

U

UK	United Kingdom

W

WDA	Workforce Development Authority

1. Introduction

Emergency Medical Services are an integral part of health services in high- income countries (cf. Sasser *et al.*, 2005), mainly they are the first contact for a person experiencing an emergency. Without these services the treatment of critical ill patients would be delayed significantly. In low- and middle- income countries, particularly in Africa, such services are not available to large parts of the population (cf. Mould-Millman *et al.*, 2017). Therefore, the mortality rate after accidents (cf. Husum *et al.*, 2003) and medical emergencies (cf. Seymour *et al.*, 2014, Zahn *et al.*, 2001) is higher than in countries with a well-functioning service. In addition, EMS is a topic surrounded by myths. “EMS only transport people, but they do not treat them” and “EMS are extremely expensive”, are two examples which were falsified by studies already (cf. Kobusingye *et al.*, 2005).

This master thesis deals with the situation of Emergency Medical Service (EMS) in low- and middle- income countries, focuses on Africa and particularly Rwanda. The overall situation of systems is investigated, spotlighting issues, risks and chances, and not a particular subarea (e.g. trauma).

Firstly, this thesis will explore the current situation of EMS, including indicators which allow benchmarking such systems. In the following chapters, the methodology will be described in more detail, the project which is analysed will be introduced and a focus will be set on Emergency Medical Technician (EMT) trainings. Lastly, the primary data will be analysed, a conclusion will be drawn, and a possible way ahead will be depicted.

Kobusingye et al. (2005) has provided a broad overview of the situation of EMS in low- and middle- income countries, in his paper 2005. He provides an overview of the task and stakeholders of a context specific EMS. Furthermore, he integrates the public into the chain of survival (Kobusingye *et al.*, 2005). The study of Mould-Millman et al. (2017), creates a basic understanding of the situation in Africa. Furthermore, it provides a good overview of existing and non- existing EMS on the continent (Mould-Millman *et al.*, 2017).

Based on the literature cited, the thesis shall expound the current situation of EMS in Rwanda, in Africa, and in other low- and middle- income countries. Furthermore, it shall expound the present limitations and possibilities of further development of Emergency Medical Services in low- and middle- income countries. By means of the available primary data, the situation in Rwanda shall be evaluated. Furthermore, the needs and possibilities of further development shall be pointed out.
Two different approaches are used to investigate this topic. Firstly, a literature research is carried out and the literature is interpreted, and the hypothesis are tested against it. Secondly, primary data is analysed, interpreted and the hypotheses are tested against the data. The primary data was obtained through two surveys in Rwanda, a baseline, and a midterm survey of a project dealing with Emergency Medical Services.

2. Hypothesis and research questions

2.1. Generic research questions

- Will a standardised EMS reduce the patients' mortality rate?
  The first contact a person makes in a medical emergency, is with the EMS. A standardised EMS should be able to reduce the waiting time of people, treat and transport the patient accurate and therefore reduce the mortality rate.
- Is a standardised EMS needed in a health care system?
  A health care system is only as strong as its weakest chain link. First Aid is often seen as the first chain link and the EMS as the second. Is this chain link necessary for a functioning health system?
- How will the public experience changes in the Emergency Medical Service?
  The public is the costumer of an EMS and should therefore be satisfied with the available service.
- Is there an interest on the labour market in the new profession "Emergency Medical Technician"?
  To successfully establish a new profession, it is key that the labour market is interested in it. Otherwise, there will not be any applicants for the training.
- How many participants will graduate as EMTs, completing a European style training, in a low- income country?
  Due to cultural differences, in Africa, trainings are normally conducted in a different way, than in Europe. The introduced training is held the way it would be held in Europe as well.

2.2. Hypothesis and related research questions

By implementing a standardised Emergency Medical Technician training, the quality of patient care will increase.

- Is the response time reduced?
- Is the level of patient care during transport increased?
- Is the organisational level higher than in the already existing system?

Introducing the profession Emergency Medical Technician will reduce the staff shortage in the medical sector in Rwanda.

- Does the labour market show interest in the new profession?
- How many percent of the trainees will graduate?
- Will the new profession be accepted by other health professions?

3. Present Situation of Emergency Medical Service

3.1. General overview

Often Emergency Medical Services (EMS) are not provided to the public as they should, one of the reasons for this situation are myths. These myths, often found in low- and middle- income countries, have, as the name states, no scientific basis. However, such myths say that, e.g. EMS is not taking care of patients, only transporting them. Another myth, to be pointed out, is the cost of EMS, often it is seen very expensive, but there are possibilities to create an effective low-cost system. These myths, even not correct, limit the investments in EMS by governments and donors. (cf. Kobusingye *et al.*, 2005)

EMS is the next step in the pre- hospital care. Pre- hospital care starts with the community, providing first aid or any kind of assistance and covers all steps until the injured/ sick person arrives at a health facility. Hence, the EMS is one chain link to a successful treatment, providing evidence based simple procedures. However, most of the world's population does not have access to an EMS, yet.

Ambulances are often used to transfer patients between health facilities, not to respond to emergencies in the public area or at home. These can be seen as a waste of resources, as basic skill trained responders at the scene can significantly reduce mortality. There is a big difference in response times between high- income countries and low- and middle- income countries. Especially in the countryside, where in less developed countries there is a bad road access to the villages. Often also resulting from centralised duty stations instead of satellite stations distributed within the response area. (cf. Kobusingye *et al.*, 2005)

The equipment of EMS should always be aligned with the competencies of the staff, even the "lowest" trained personnel needs a sufficient basic equipment to use their skills appropriately. As communication and quick, qualitative transport are key, all units need to be equipped with state-of-the-art communication devices. Thus, to ensure quick responses and advanced notification of the receiving hospital.

The lack of efficient or even available transportation of people with injuries or serious medical conditions, is one of the main reasons, that patients aren't accessing emergency care in a relevant time frame. The fastest intervention on the landside is the helicopter, next to short transportation times, helicopter medical systems use highly trained staff. This combination ensures a low mortality with trauma patients. However, establishing such a helicopter system in low- and middle- income countries would only benefit a small percentage of the population. Those who can afford such a transport, hence it may not solve any problems in low- and middle- income countries.

Next to the mobile EMS units, the system of clinics and hospitals is key in the care of emergency cases. Systems and availability often vary not only between countries, but also within countries. An efficient system needs clinics and hospitals and more important an efficient distribution of patients among the facilities. Therefore, the triage skills of EMS staff are key. The direct transport of patients to the correct facility is often not ensured as Standard Operation Procedures (SOP) define the nearest health facility as the transportation target.

Due to the lack of personnel and financial resources, health facility staff in low- and middle- income countries is not always proper trained. Some facilities are even understaffed. In high- income countries, doctors and nurses are often specialised in one field, like trauma, paediatric care or obstetrical care, due to the mentioned lack of resources, in low- and middle- income countries, the same staff has to deal with all kinds of emergencies. International standardised trainings are often too expensive or use not available equipment for health care staff in most low- income countries. Hence, these trainings are not conducted in these countries, even they proof efficient in all kind of settings. To develop the emergency care further, there is a need to define national standards in each country and provide the related trainings on local level.
Another aspect of not using a provided emergency service are the costs. In many low- and middle- income countries, the services have to be paid by the patient directly – no payment, no treatment. This creates a barrier especially for the poor and most vulnerable in the country to access the health care services. This issue can be addressed in many different ways and needs to be addressed to further develop the emergency medical service in low- and middle- income countries. (cf. Kobusingye *et al.*, 2005)
Obermeyer et al. (2015) finds in his systematic review, that despite best practice examples from high- income countries, policy makers of low- and middle- income countries could not be convinced to make significant new investments in the EMS in their countries. One reason might be the lack of available data in low- and middle- income countries. The lack of data is also a challenge for the scientific world, up until now, simple data like patient care reports are missing, no standard procedures are established, and facilities are widespread and not interlinked. Different to high- resource countries, patients presenting in the Emergency service are in low- and middle- income countries are rather young and without chronic disease. This fact would allow a well-functioning Emergency Care to decrease the mortality rate significantly. As a first step to improve the system, more data would be needed and also an understanding of patient's motivation to seek medical care has to be created. (cf. Obermeyer *et al.*, 2015)
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3.2. Africa

A survey from Mould-Millman et al. in 2017 found, that one third of the population of Africa were served by an Emergency Medical Service in 2012. Underdeveloped

prehospital care services contribute to high mortality rates, even compared to low- and middle- income countries on other continents.

The study distributed 227 questionnaires to medical professionals in Africa and had a return rate of 21.6%. 49 returned questionnaires could be used for the study, retrieving data for 49 out of 54 African countries (see Figure 1).

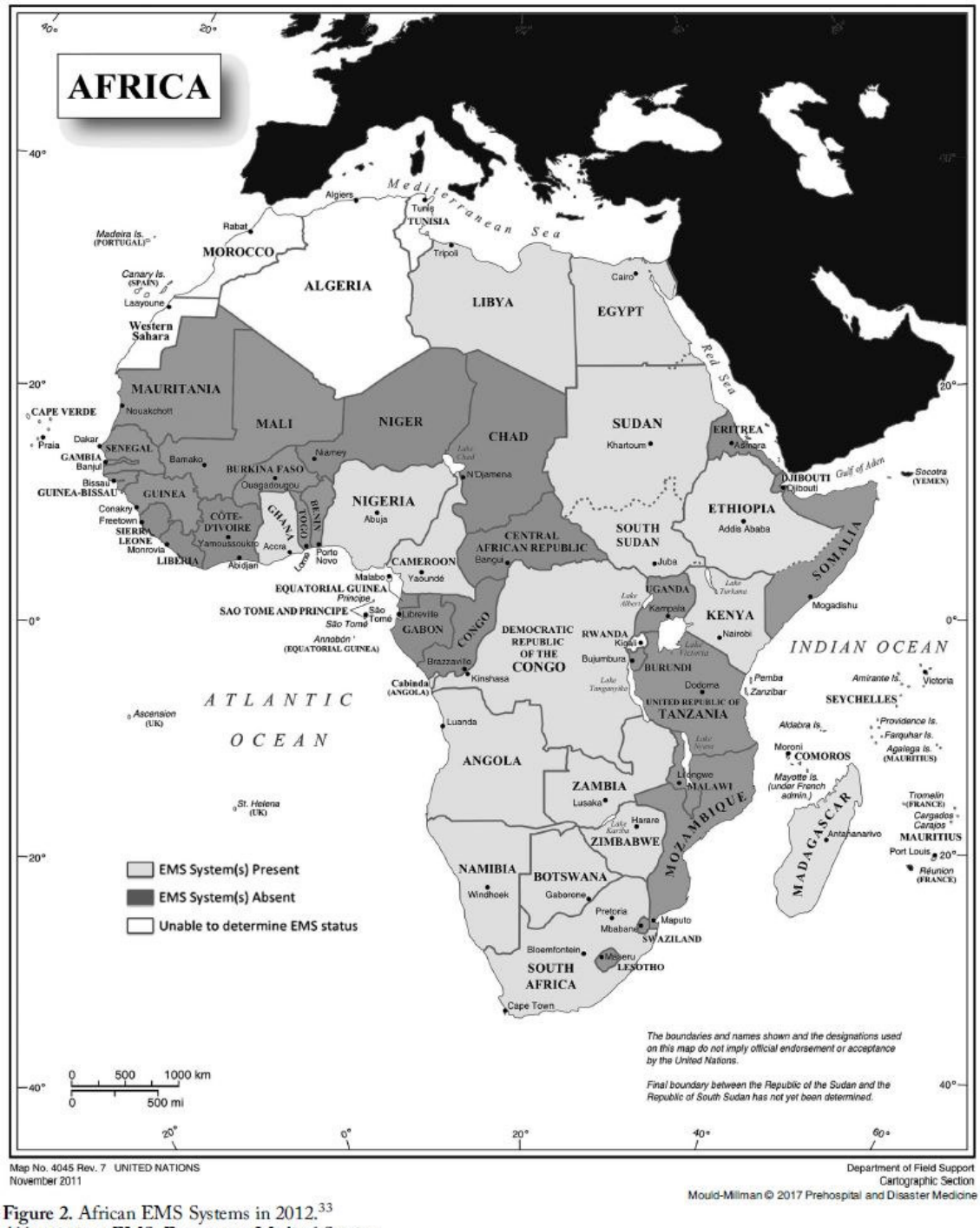

Figure 2. African EMS Systems in 2012.[33]
Abbreviation: EMS, Emergency Medical Services.

Figure 1: EMS in African Countries, Source: Mould-Millman *et al.*, 2017, p. 4

Especially West Africa appeared underserved, with only two of 16 countries reporting an EMS. The service is better developed in urban areas, with a mean response time

of 24 minutes compared to rural areas with a mean response time of 109 minutes. Also, South- and East- Africa countries have a higher density of EMS than West- and Middle- Africa countries. The systems are mainly financed by the government, only a few privately, e.g. through service fees.
All of the responding countries had some form of regulations and legislation. Most of the services (96%) used professional and medical trained personnel next to lay persons and First Aid trained staff (compare Table 1).

Table 1: Type of staff in African EMS, Quelle: (Mould-Millman et al., 2017, p. 6)

			Tier-Two					
		Tier-One	Basic			Advanced		
Country	System Study ID	First Aid	EMT Basic	EMT Inter-mediate	EMT Advance-d	Paramedics	Prehospital Nurses	Prehospital Physicians
Angola	ANG 1		+				+	+
Botswana	BOT 1	+	+		+	+	+	+
Cameroon	CMR 1	+	+	+		+	+	+
D.R. Congo	COD 1					+	+	
Egypt	EGY 1	+	+					
Ethiopia	ETH 1	+	+				+	
Ghana	GHA 1		+	+				
Kenya	KEN 1	+	+					
	KEN 2							
	KEN 3	+	+	+	+			
Libya	LBA 1	+	+	+				+
Madagascar	MAD 1	+	+	+				
Namibia	NAM 1		+	+	+	+		
	NAM 2		+	+	+			
Nigeria	NGR 1						+	
	NGR 2	+	+	+		+	+	+
South Africa	RSA 1		+	+		+		
	RSA 2		+	+		+		+
	RSA 3		+	+	+			+
	RSA 4		+	+	+	+		
	RSA 5		+	+		+		
	RSA 6		+	+	+	+		+
(North) Sudan	SUD 1	+	+		+			+
Zambia	ZAM 1	+		+		+		+
Zimbabwe	ZIM 1	+	+	+	+	+		
Total with + variable, n (%)		12 (48)	21 (84)	16 (64)	9 (36)	12 (48)	7 (28)	10 (40)

Mould-Millman © 2017 Prehospital and Disaster Medicine

Table 3. Prehospital Providers in African EMS Systems
Note: (+) Yes, (Blank) No.
Abbreviations: EMS, Emergency Medical Services; EMT, emergency medical technician.

In addition, the most common emergency patterns, which the EMS responds to were evaluated. By far the most responses are regarding trauma emergencies, followed by obstetrical and respiratory emergencies (compare Figure 2).

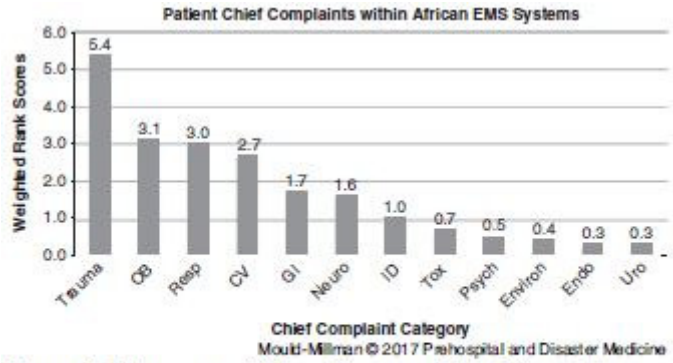

Figure 3. Histogram of Most Common Chief Complaints Encountered.
Abbreviation: EMS, Emergency Medical Services.

Figure 2: Emergency patterns in Africa according to EMS responses, Source: (Mould-Millman *et al.*, 2017, p. 7)

Acknowledging all limitations of a questionnaire-based survey and the missing response of some countries, this study gives the first broader overview of EMS in Africa. The findings can guide the further development of the Emergency Medical Systems in Africa and can address problems in each country.
Especially in Africa the EMS is used to transfer patients from one health facility to another. Often the reason ae underequipped and understaffed primary health facilities in the rural areas of the countries. Specialised treatment is only available in the urban centres, often even only in the capital. A key aspect to guarantee a low level access to the EMS is a toll free number for the population, this was already implemented in most of the countries. (cf Mould-Millman *et al.*, 2017)

3.3. Sub Saharan Africa

Mainly there are no well- developed systems in the sub-Saharan region, an exception is South Africa, where the system is well developed in centres and on the countryside, and the centres of Botswana and Namibia. Beyond these regions, the EMS is not very well developed. Furthermore, there is a lack of standardisation, training, and research of emergency care in the region. In South Africa, the “Emergency Care Society of South Africa (ECSSA)” was founded to address these problems and also to interlink with other organisations in other countries. This effort is supported by the “African Federation of Emergency Medicine (AFEM)” on the level of the whole continent. However, not many countries have followed this example yet and interaction is not on a high level. (cf. Naidoo, 2011)

3.4. Indicators of an Emergency Medical Service

Often, not even in high- income countries, a strategic plan for EMS is available. A study from Joyce et al 2009 investigates this topic for Australia. The number of rendered services is increasing, due to a number of factors, as for example overburdened primary health care systems, aging of the population and an increased number of chronical ill people. Those developments are also seen among the population of low- and

middle- income countries. The different professions in EMS are undergoing changes, starting from a purely transportation service, now the responsibilities are increasing, the expectations of the public are higher and new standardised trainings and referral paths are introduced. In the past, the training was often a post-employment training, meaning that staff was hired and trained on duty. This now changes to a pre- employment training, which can be found in training centres as well as at university level. For sure this new educational path includes the clinical placement during training as well. The whole sector is undergoing a professionalisation process. In Australia, the need of a central registered profession, with standardised curricula is seen and the process to reach it is support by the authorities. Another advantage of a registered profession, is, that students are no longer depending on the private training programs of providers. Graduates can work all over the country without the necessity of undergoing another training.(Joyce *et al.*, 2009)

The study of AlShammari, Jennings and Williams 2018 shows, that the development of EMS has come a long way in many countries, including Saudi Arabia. Throughout a scoping review, including 25 relevant publications, this study identifies some core competences for the EMS. It is limited to workforce in the EMS, not trained as other health professionals (e.g. physician, nurse).

Communication is listed as one of the key competences in the EMS. Especially listening and interdisciplinary communication skills proof necessary for professional work. The study of Wloszczak-Szubzda, Jarosz and Goniewicz 2013, focuses only on the communication skills trained during paramedic education, and proves a clear necessity of communication training during the education path for EMS personnel. (Włoszczak-Szubzda *et al.*, 2013).

Different clinical skills have to be used to address the variety of emergency pattern, paramedics are confronted with on duty. Hence also the clinical skills investigated in different publication vary. To ensure proper clinical skills, a combination of theoretical knowledge and practical training is necessary. New paramedic education programmes try to combine these two aspects even on university level. The competence cannot be seen as marked-off but is core in interaction with other skills.

As next competence, teamwork emerged throughout the study. This so-called soft skill is especially important, as EMS staff is working with other medical professions as well as with personnel outside the health sector. This core competence can be trained throughout simulation exercises or short courses.

On the scene, EMS personnel has to be flexible and often to decide quickly and under pressure. Hence, critical thinking and decision making is yet another core competence. Often the decision between the two main approaches in the EMS has to be taken, “load and go” versus “stay and play” – which translates as either you treat the patient on scene, or you delay treatment and start the transport immediately.

The last researched competence was the professional behaviour, which includes a variety of factors. Next to the technical skills and the commitment to excellence, it also applies to the interpersonal skills and the daily routines.

The study shows, that the core competencies are fully interlinked and have to be used simultaneously on the scene. (AlShammari, Jennings and Williams, 2018)

3.5. Rwanda

Rwanda is a landlocked country in Eastern Africa. It has a population of around 12.1 million on an area of 26.338 km², which gives a density of 467 people per km²(National Institute of Statistics of Rwanda, 2019). Compared to Austria with a density of 106 people per km², it is a highly dense country. Taking into account the mountainous and natural preservative areas, the density would even be higher. Rwanda's health infrastructure was more or less fully destroyed during the genocide in 1994.

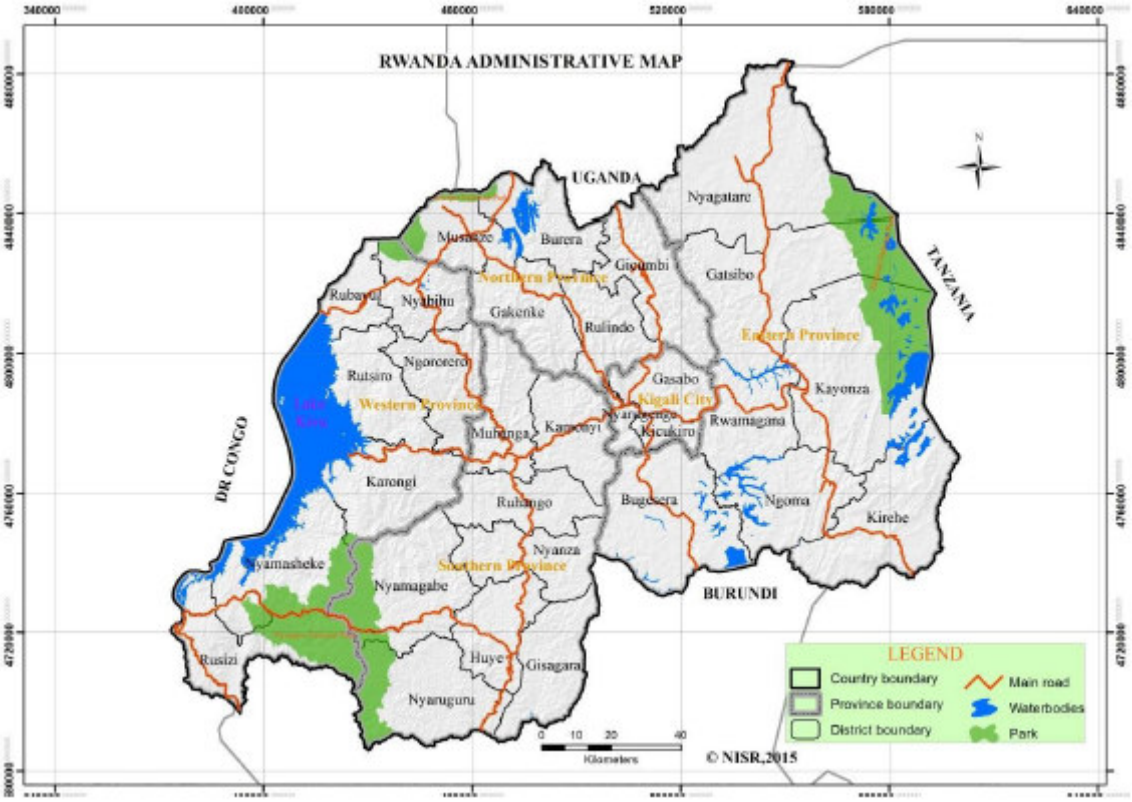

Figure 3: Map of Rwanda, Source: National Institute of Statistics of Rwanda, 2019, p. 17

Rwanda has a decreasing number of mortalities in hospitals, still respiratory infections remain the main cause of hospitalisation for children under five years of age as well as cumulated over all age groups. (National Institute of Statistics of Rwanda, 2019)

Since then, significant efforts have been made to rebuild and develop the health system further.

Estimated 65% of the budget of the health care system are created through International Non-Government Organisations (INGO), who have done a significant investment in the national health system. Therefore, Rwanda is often posted as an example for other developing countries, particularly those "re-starting" after a conflict.

The study from Wen and Char 2011 used two different methods to examine the health care situation in the country. First direct observation of six health facilities was used and second, a face to face, open questions, interview with 54 health care workers in the respective facilities which were observed.

Emergency Medicine (EM) is practised on all levels of health care facilities. Starting with low level care on community level, emerging to higher quality care on referral

hospital level in the capital Kigali. Prehospital care/ Emergency Medical Service is almost completely missing. During the observation, severe injured people were brought to community health centres, those not staffed and equipped to treat them. Nevertheless, took it many hours to transfer them to a higher-level health facility. Resulting from a lack of ambulances and trained staff. Even the community health centres are only reachable within some hours for people residing in rural areas. Physicians in the health care centres and even in the referral centres are mainly general practitioners, only a few specialists can be found. Furthermore, Wen and Char found the leading problems, according to the interviewed staff, to be resources, no specialised training and absence of prehospital care. Especially the training opportunities for staff (doctors, nurses, students) are very limited in the country. However, 98% of the interviewed personnel was very positive about the development in the last 10 years.

According to the authors, this findings can contribute to the way forward in Rwanda's health system and be useful for other African countries as well. (cf. Wen and Char, 2011)

Kabeza et al. finds in his study 2013 quite similar problems to the study from Wen and Char 2011. The main causes of death in the country are named as HIV/AIDS and related diseases, road traffic accidents, malaria and cancer. The Ministry of Health (MoH) is generating a five-year strategic plan for the health sector. Emergency care is provided ad health facility level by health professionals with only little formal training. Also, Kabeza et al. (2013) defines the lack of specialised training as a main challenge for the Emergency Medicine in Rwanda. There are efforts from the government, together with US and UK based universities to provide specialised training for general practitioners (GP) and students. GP already practicing in health facilities will receive further training in emergency medicine, the best performing will be granted a next step training. However, in the first phase, this next step training will only benefit the two university hospitals and the referral centres in Kigali. The governmental EMS was found in 2009, but up until today it renders its services only in the capital. In the emergency departments (ED) of hospitals as well as in the EMS, emergency nurses are used. Nurses have the possibility to graduate on three different levels, A2 (secondary school level), A1 (nursing school), A0 (bachelor degree), only around ten percent of nurses have yet reached A1 or higher. With an additional emergency nursing training, provided in the capital, the government is willing to increase the competencies in emergency situations (Kabeza *et al.*, 2013).

Mbanjumucyo et al. (2016) states in the study on trauma patients in Rwanda, that the mortality in low- and middle- income countries is significantly higher than in the global average. As one reasons he discovered the coverage with EMS, which is better developed in high- resource settings. At the time of the review the EMS was relatively new to Rwanda and there are many factors influencing the alert of such a service, e.g. insurance status, knowledge of availability. Furthermore, the study was not able to investigate the quality of care within the service. (cf. Mbanjumucyo *et al.*, 2016)

4. Research design/ Methodology

4.1. Description of Methodology

This master thesis uses a literature research and a questionnaire to investigate the topic Emergency Medical Service in low- and middle- income countries. Furthermore, the main approach is a qualitative description, but also quantitative data is used to strengthen the arguments.
Research in the field of EMS is young, first studies from the early 1990s were an exception, only since 2010 there is a growing number of publications in this scientific area (cf AlShammari, Jennings, and Williams, 2018).

4.2. Literature research

Initially two search engines were utilised for the literature research, Google Scholar and Scopus. The terms used to search in both search engines were *Emergency Medical Service (EMS*, *low- and middle- income countries*, *competencies for EMS*, *Indicators for EMS*, *Situation Analysis of EMS*, *Paramedic*, *Emergency Medical Technician*, *Prehospital Care* and *Emergency Care)*. Those key words were combined with an *AND* to obtain most narrow results. The results were reviewed in their actual title and if the title fits to the topic of the master thesis, the abstract was reviewed to define the relevance of the publication for the thesis. Many results had to be refused, as they are discussing the EMS but not including low- and middle- income countries. It was a particular challenge to find articles dealing with the situation in Africa, as most of the research on prehospital care is carried out in the northern hemisphere.
In addition, the snowball method was used to find additional sources. While using the selected publication for the thesis, the reference list of those publications was used to select additional articles for the thesis.
Another challenge occurred with the topicality of the data. Publications found are often five or more years old, in respect to low- and middle- income countries and their development over the last years, some of this data is not representing the present situation in the country fully. The author is aware of this limitation, but it is still the most accurate scientific data available. An additional limitation is the fact, that often studies are very specific, e.g. focusing on traumatology only or maternity only, and only a few publications focus on the overall situation of the system. The inclusion and exclusion criteria is shown in Table 2.

Table 2: Inclusion and Exclusion of literature

Inclusion	Exclusion
Publication in English or German language	Publications in different languages
Reports of official entities (e.g. Governments)	Reports of unofficial sources
Literature focusing on the EMS in its entirety	Literature focusing on only a single aspect of the EMS

4.3. Survey

Throughout the post of the author in Rwanda a survey was developed to investigate the present situation of EMS in the country. The planed survey was conducted two times already:

- Baseline (04th June to 14th June 2019)
- Midterm (10th August to 14th August 2020)

and will be conducted a third time:

- end line (June 2021).

The survey is designed to gain an understanding of the present situation and to compare this data to the future surveys in the same areas.

Study participants

With a baseline overview document, the roles and responsibilities of the participating partners were set out. The author, in his position as an Austrian Red Cross delegate, lead the process. Rwanda Red Cross and the University of Rwanda, college of Medicine and Public Health, School of Nursing and Midwifery were found as partners to conduct the survey and interpret the results for different use. To create a full picture of the situation, different questionnaires (Annexe G – Baseline questionnaires, Annexe H – Midterm questionnaires) were used to interview different target groups, the target groups are:

- Health facility staff, not actively working in the ambulances (baseline: 15, midterm: 4)
- Health facility staff, directly working in the ambulances (baseline: 38, midterm: 21)
- Ambulance drivers (baseline: 26, midterm: 11)
- Population (baseline: 2,714, midterm: 1,743)

While the first three groups are targeted to understand the inside and generate quantitative data on the effects of the training (outcome) and the outreach of the project, the population is targeted to gain knowledge on the quality of the system (impact).
Even though the answers of the population are subjective of the interviewee, it helps to create an understanding of the “costumer” needs. The population was additionally targeted to gain an understanding of the First Aid knowledge in the country, this aspect will not be discussed in this thesis.

Study design

The study was designed to be carried out as face-to-face interview. To avoid mistakes, as much as possible, closed ended questions were used, but if needed, the possibility to specify answers with additional comments was granted. A mixture of single- and multiple choice was used, and in some cases, the maximum number of choices was specified. KoBoToolbox was used to collect the data via smartphones and make them easily available in a digital form.

Study interpretation

As the report created by Rwanda Red Cross and the University of Rwanda, college of Medicine and Public Health, school of Nursing and Midwifery was not finalised, nor was a draft available for the author, the author interpreted the raw data of the survey. Hence, the report is not applicable to this thesis. The raw data was interpreted with Microsoft Excel.

4.4. Comparison of data

On the one hand, the data gained through the baseline and the midterm survey is interpreted in the conclusion part. In addition, the two different data sets are compared to each other. These data will be analysed according to findings in the baseline and possible changes in the midterm survey.

On the other hand, the data gained is compared to the findings of the literature research, to proof or falsify the hypothesis of the author.

5. Concept of the project “Establishing the Emergency Medical Technician profession” in Rwanda

5.1. Introduction

The project “Establishing the Emergency Medical Technician profession in Rwanda” was designed by the Austrian Red Cross in cooperation with the Rwanda Red Cross Society (RRCS). It is financed by the Elke Kröner-Fresenius-Stiftung and implemented by the designing organisations in close cooperation with the authorities in Rwanda.

5.2. Concept

The main objective is to establish a new profession within the health sector, the first in Rwanda without a higher school or university degree. Transferring Austria’s EMT curricula to Rwanda and adapting it to the local context, shall provide a base for future developments.

One of the most important factors is the self- sustainability of the system established. As also mention in Wen and Char, 2011, it is of utmost importance to transfer the knowledge into a country. As part of all international engagements, no matter if non-government organisations (NGOs) or governments, at the end the supported system should be able to carry on without external funding or international human resource needs.

The close cooperation with the health authorities of Rwanda, shall enable a long-lasting impact. By developing a Rwanda specific curriculum and training of trainers, the responsibilities and the knowledge will be with the local project partner from the beginning.

5.3. Engagement of the author

The author of this thesis is part of the project team since the beginning of 2018, in two mission (February/March 2018 and August 2018 to June 2019), he was in Ruanda designing and implementing the project. Since then, he is involved as remote support for the project team on the ground.
The author was engaged in the development of the questionnaire used and also in the conduction of the baseline and midterm survey of the project.

6. Emergency Medical Technician Training

6.1. Development of EMT training

There are many different terms used for prehospital care staff. The most common ones are Emergency Medical Technician and Paramedic. These two terms differ in the competencies they gain during training. While an EMT is mostly seen as basic level trained prehospital personnel, the paramedic is a higher educated staff member with more competencies. Especially EMTs are often divided into basic EMT and advanced EMT. The term used often depends on the country or region.

As Kilner (2004) describes, the education of prehospital care staff has undergone a massive development since the publication from the Ministry of Health of Scotland in 1966. The report pointed out the importance of training of the ambulance workforce, in technical (first aid) and non-technical (communication) skills. Already this first proposed training was skill oriented, which most of the curricula are still today. However, sometimes the curriculum may define the attributes of the trained staff, instead that the desired attributes define the curriculum. Even the ambulance system in the United Kingdom (UK) is well established and associated with a national certification, the desired key attributes of personnel are not defined. The study found clinical skills as the most and mental health skill as the least desirable skills. Which relates to the priorities of the curriculum used. Honesty was found as the most desirable attribute. While topics like ethics and cultural sensitivity can be addressed during the training, honesty is an attribute which has to be considered when recruiting new staff already. Other skills/ attributes, which are not yet in the scope of the curriculum, like evidence-based practice and research, reached also relatively high scores.
As there are new roles evolving in the ambulance system, which are staffed by trained EMTs and paramedics, there is a need for specific job descriptions and a correlating training curriculum.
In the short time of professional ambulance services, there has been a huge development. However, Kilner (2004) finds that, still until today, the curricula define the attributes of the staff more, than the desirable attributes define the curricula. (cf Kilner, 2004)

The South Carolina School of Medicine Greenville included the Emergency Medical Technician Training in the curriculum of medical students. Based on the need of

practical experience in the first phase of the study already, the EMT curriculum was found appropriate. Russ- Sellers documented in her review of the first two classes, which were exposed to this curriculum, that a high percentage of the students referred to an experience during their duty in the Emergency Medical Service. For the students, the shifts on an ambulance car, were the first exposure to real patients. The benefit for the students is described with the exposure to all kinds of the society, all types of illness and injuries as well as environment of the health system in the state of South Carolina. Thus, the inclusion in the medical student curriculum will be kept and reviewed. (cf Russ-Sellers and Blackwell, 2017)

6.2. General overview of trainings

Patients in low- and middle- income countries do not have the same access to emergency medicine as patients in high- income countries. Efforts to strengthen the in-hospital emergency care are limited, as patients are untreated for too long outside the hospitals. Before the early 2000s prehospital care was informal in Ghana, most patients were transported by commercial transport services to the hospitals, leading to a death rate of 50 % when severely injured, even in urban centres. Ghana established its National Ambulance Service (NAS) in 2004, which became fully operational in 2006. The first curriculum was developed from representatives from the NAS and EMT experts from the North Dakota Army National Guard. Therefore, the EMTs were able to be certified according the EMT certification by the United States National Registry of Emergency Medical Technicians. In addition, a further training program was established to ensure the continuous learning of all EMTs. The first curriculum consisted of Basic Life Support (BLS), Prehospital Trauma Life Support (PHTLS) and other core topics for prehospital care staff. After the pilot process had proven successful, the professionalisation of the NAS, including the staff training, carried on. In 2012 Ghana opened a school dedicated to the EMT education, the Prehospital Emergency Care Training School (PECTS). Nowadays, two different levels of certification can be reached, basic EMT and advanced EMT. Next to the care of patients outside the hospital (primary care), another important aspect is the qualified transportation from one health facility to another. Especially in low- and middle- income countries, a lack of resources in the rural health facilities creates a high demand of interhospital patient transport, which has to be carried out by trained staff and well equipped ambulance cars. (cf Zakariah *et al.*, 2017)

In Ghana the National Ambulance Service (NAS) is carrying out the Emergency Medical Service and training Emergency Medical Technician (EMTs), since 2004. During the further development of the NAS, a Prehospital Emergency Care Training School (PECTS) was included in the service. It offers two different types of EMT training, one basic and one advanced. Flaherty et al. (2020), investigates the curricula and the paramilitary education in his paper 2020. Before the research process, the training had no simulation part, this was introduced during the study. The normal curriculum consisted of classroom training (theoretical part), hospital placement and EMS placement. The newly introduced simulation was done in the areas of neonatal care and obstetrics.

First the EMT trainers were trained on the new equipment for the study. Afterwards the trainers created simulation scenarios and conducted the sessions with the students, while a researcher, not involved in the educational process, observed the new lessons. A high engagement of all participants was noted, and the common tenor was, that the simulation is a good method to prepare students for the reality. This was also observed by the research, as the engagement of all participants, patients and EMTs, led to realistic environment. Different other studies, cited in Flaherty et al. (2020), have proven the effectiveness of simulation-based training in all kind of medical staff trainings. However, after this study the PECTS has expressed its willingness to include the simulations in the curricula for basic and advanced EMTs. (cf Flaherty *et al.*, 2020)

According to Sobuwa and Christopher, the emergency care training in South Africa has also undergone changes in the last decades. This finding is coincided with the findings of studies around the world. With a new law on the education of prehospital care staff in 2017, South Africa ended the era of short trainings in this sector by end of January 2020. The training will be replaced by country wide unitary regulations and job descriptions. These new regulations know three different types of Emergency Care Education, which is standardised and implemented by different education facilities. The qualifications are shown in the following table

Table 3: Emergency Medical Care Education in South Africa, Source: Sobuwa and Christopher, 2019, p. 3

	Qualification	Credits	Duration	NQF level		Higher education institution
Postgraduate	PhD EMC	360 credits	Minimum 2 years	NQF 10		DUT
	Masters EMC	180 credits	Minimum 1 year	NQF 9	Research based qualifications	DUT, CPUT, UJ
Undergraduate	Bachelor EMC	480 credits	4 years	NQF 8	Emergency care practitioner	DUT, CPUT, UJ, NMU
	Diploma EC	240 credits	2 years	NQF 6	Emergency care technician	CPUT, UJ, NEFECC, ME
	Higher Certificate EC	120 credits	1 year	NQF 5	Emergency care assistant	CPUT, SMHU

DUT: Durban University of Technology; CPUT: Cape Peninsula University of Technology; UJ: University of Johannesburg; NMU: Nelson Mandela University; NQF: National Qualifications Framework; EMC: Emergency Medical Care; EC: Emergency Care NEFECC: Netcare Education Faculty of Emergency and Critical Care; ME: MediCinic Education' SMHU: Sefako Makgatho Health Sciences University

In Austria, the training for pre- hospital care staff is regulated since 2002, this regulation was created as a response to the changing and developing environment of the profession. There are five different education levels in Austria, which can be translated as Emergency Medical Technician (Rettungssanitäter/in), Paramedic (Notfallsanitäter/in), Paramedic with general Emergency competencies pharmaceutics (NKA), Paramedic with special emergency competencies venous access (NKV) and Paramedic with special emergency competencies intubation and ventilation (NKI). The whole education is designed as a modular system, meaning everyone has to start with the Emergency Medical Technician training and can afterwards enter to the next level. Furthermore,

this regulation gives exact hours for each discipline taught and also a range of people which are allowed to teach the different disciplines. Furthermore, the law defines the duties and responsibilities of EMS personnel. However, the training can be caried out by every recognised EMS provider and is not centralised at universities. (cf. Lissel and Gepart, 2004)

6.3. Development and implementation of the Rwanda EMT curriculum

As outlined in 3.5, Rwanda lacks specialised training for prehospital care staff. At present, the ambulances are staffed with a driver (with no formal training) and a nurse, which is trained for in-hospital care, but has not received a specialised prehospital training.

In 2015 the Rwanda Red Cross Society (RRCS) approached the Austrian Red Cross (AutRC) with the idea to establish a Red Cross EMS in the country. After some preparations, the project finally started in February 2018. The first step was to design a curriculum for the training of Emergency Medical Technicians and to get this curriculum approved by the Rwandan health authorities. In the country, the Rwanda Allied Health Profession Council (RAHPC) has to review and approve a new training curriculum before the graduates are allowed to practice.

In a workshop in February 2018, the author, the RRCS, a representative of the state emergency service, Service d'Aide Medicale Urgente (SAMU) and representatives of the University of Rwanda, College of Medicine and Health Sciences, School of Nursing and Midwifery started to develop a country specific curriculum. This work was based on the Austrian EMT curriculum and influenced by health professions already existing in Rwanda.

The first step was to set up the structure and the main topics to be covered in the curriculum. These main topics are:

- First Aid
- Anatomy and Physiology
- Pharmacology
- Handling the equipment
- Emergency patterns
- Legal and organisational basics
- Communication
- Internships

This first version was then submitted to the RAHPC in March 2018, for review. The review process took longer than expected, therefore, the training of the first EMTs started already in parallel.

After the first feedback of the RAHPC, the curriculum had to be revised according to its format. Only one technical input was given in addition, the curriculum has to include also basics of physics and chemistry. These two topics were included in the second version of the curriculum (cf. Annexe I – ECA curriculum). To meet the format criteria of the Rwanda Allied Health Professions Council, a curriculum development expert was hired. Additionally, the name of the job was change to Emergency Care Assistant (ECA).

The second version of the curriculum is structured different, but includes all topics of the first version, the structure is:

- Fundamentals Emergency Care
  - Introduction to Emergency Medical Services
  - Communication
  - Pre- hospital care equipment
  - Ambulance communication, documentation, and reporting
  - Legislation, law, ethics, and health care
  - Medical rescue safety
  - Evidence Based Medicine
  - Principles of Emergency Services Operation and First Aid
- Anatomy, Physiology and basic physics and chemistry
  - Human Anatomy
  - Human Physiology
  - Basic physics and chemistry
- Emergency Medical Care
  - Airway management, respiration, and artificial ventilation
  - Patient assessment
  - Cardiopulmonary resuscitation
  - Trauma emergencies
  - Medical emergencies
  - Obstetric and gynaecological emergencies
  - Psychiatric emergencies and psychosocial support
  - Disaster management
  - Gender based Violence and Child abuse
  - Pharmacology of emergency drugs
- Clinical practice
  - Prehospital ambulance service
  - General Emergency department
  - Paediatric emergency department
  - Maternity department

By date, this curriculum is still in the approval process by the Rwandan authorities. Nevertheless, the first training of EMTs/ ECAs could be finished already in May 2019, since then the EMTs/ ECAs which have graduated are on duty in two stations. As they are not allowed to work self-responsible until the curriculum is approved, an additional nurse joins the team when responding to an emergency.

7. Analyses of the data

7.1. Baseline Survey

The data was obtained through a questionnaire as outlined in chapter 4.3 and pre-sented in

The sample was not chosen to be representative for the population of Rwanda. The chosen sample is based on people living in the catchment area of a hospital or health centre. Two regions were chosen, because a project by the Rwanda Red Cross will establish an Emergency Medical Service there and the other two were chosen due to their similarity to the other two regions.
With the baseline data, a basis of understanding the ambulance system in Rwanda should be laid out. Furthermore, these initial findings will be compared with the mid-term- and the end line survey. By these means, the development of the system can be monitored.
2,805 people were approached. As shown in Annexe A – Baseline demographic data, only twelve people (0.43 %) did not consent to participate.
The gender of the population was collected from all participants approached, while the age was not asked anymore, if the participants did not agree to participate. Moreover, the questionnaire for nurses and midwives was omitted the question about the age.
As the population of the country is generally young, this is also represented in the age distribution of the participants. 64 % of the participants 21 to 40 years of age, while 36 % are older than 41 years and only 9 % represent the oldest group of 60 years of age and over.
The gender distribution of the participants shows that almost three quarters (71 %) of participants are female and only 29 % are male. This differs from the average gender distribution of the country, being 46 % male and 54 % female (cf. National Institute of Statistics of Rwanda, 2019).

The interviews were conducted within different groups of people, as shown in Table 4. The different groups consider different points of view on the service and shall give a brought inside. These different experiences are grouped into four groups, which will be discussed in the following subchapters.

Table 4: Baseline participants' overview

Interviewee	count
Ambulance staff (nurses/ midwives)	38
nurses	26
Midwives	10
Head nurse of service	2
Hospital management staff	15
Director general	2
Clinical director	7
Hospital coordinator	3f
Fleet manager	2
logistician	1
Ambulance driver	26
Population	2,714
Total	2,793

7.1.1. Nurses and midwives

The questionnaire for the nurses and midwives was designed to create basic knowledge on the general situation of the ambulance service in the respective hospital. 38 answers were analysed.

Organisational level of the Emergency Medical System

First of all, it was interesting to detect, if, in the staffs' opinion, an organised system is currently available. As shown in Figure 4, the answer is no, 32 out of 38 participants respective 84.2% of nurses and midwives participating in the questionnaire do not perceive an organised system in Rwanda. The most frequently mentioned reasons for, why the system is not seen as organised are:

- Lack of (trained) staff [17 mentions]
- Lack of equipment [11]

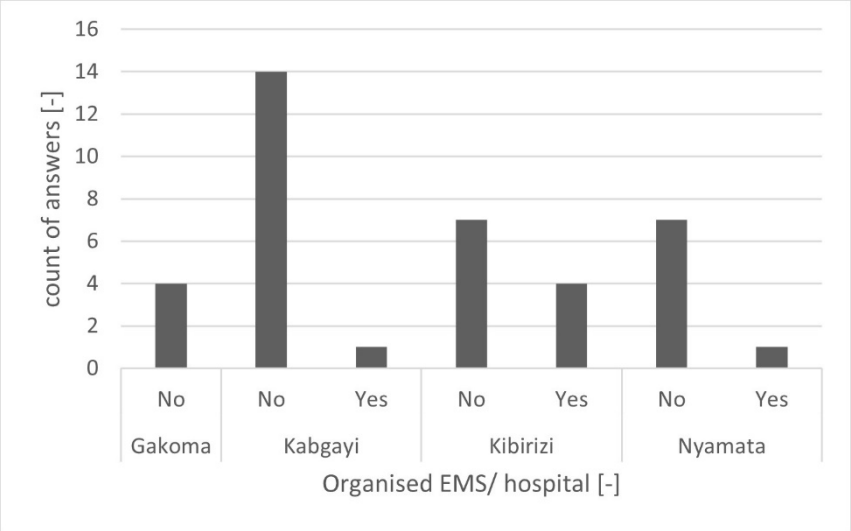

Figure 4: Availability of an organised Emergency Medical System

Knowledge of Emergency Medical Technicians

Due to these findings, also the high percentage of 63.2 % (24 out of 38) of participants not knowing what an Emergency Medical Technician is, is easily explainable. As shown in Figure 5, only 36.8% of the participants state that they have knowledge of an EMTs education and job profile. Even those who answered with yes, did not, according to the question "please specify an EMT" know what this profession is. The most common answers were:

- Trained for/ responding to emergencies [6 mentions]
- Trained in First Aid [3]
- Transport of patients [3]
- Drivers [2]

One participant answered that only a nurse or a midwife can be an EMT and one stated that the whole team on an ambulance car has health knowledge (sic!).

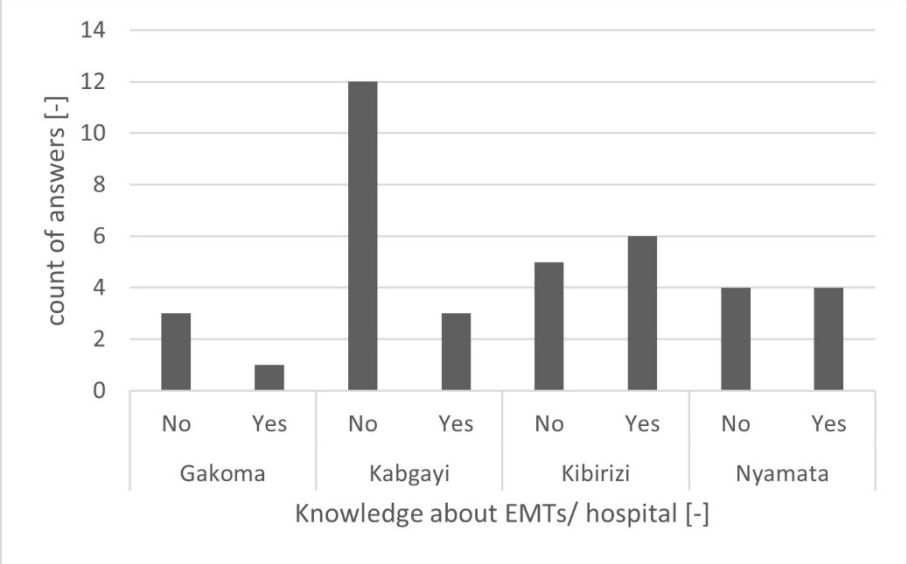

Figure 5: Knowledge about EMTs, compiled by the author

Ambulances

As shown in Figure 6 (n=36), the available and operational ambulances per hospital are quite different. As well as the number of ambulances given by the participants of one hospital. Therefore, the average is used in the following figure.
In Gakoma, two ambulances are dedicated to the catchment area and in average 1.75 (87.5%) are operational. In Kabgayi, 10.5 ambulances should be available, while only 3.4 (32.4%) are. In Kibirizi, 12.4 ambulances are assigned to the catchment area and 10.9 (87.9%) are operational in average. In Nymata, 8.5 should be available, and 7.75 ‘(91.2%) are.

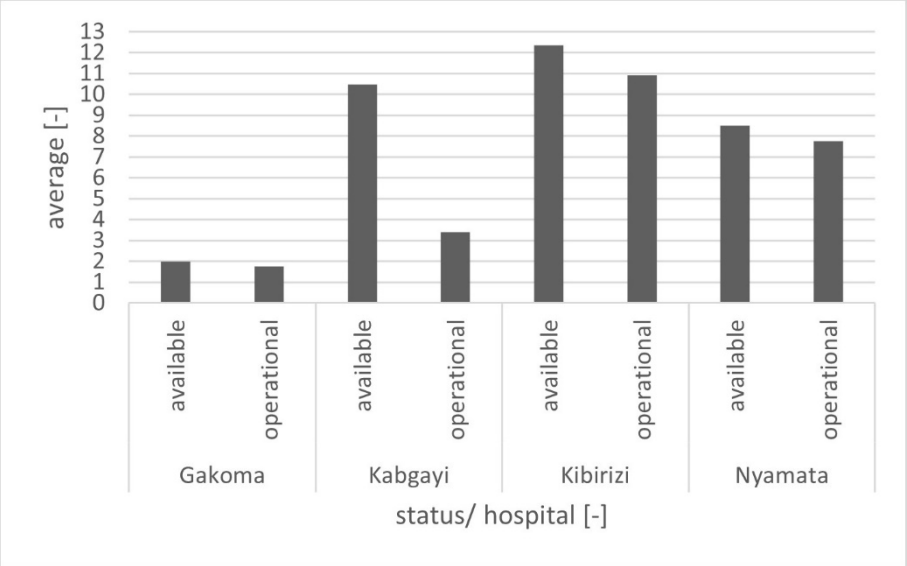

Figure 6: available and operational ambulances

Ambulance staffing

In Rwanda, an ambulance team should consist of an ambulance anaesthetist, an ambulance nurse and an ambulance driver (Rwanda Ministry of Health, 2021, p. 19). In order to understand the real situation in the field, particularly in more rural areas, the actual situation of ambulance staffing was included as a question.

As shown in Figure 7 (n=38), the reality is still far away from the proposed staffing, only in Kabgayi district almost 47% of the ambulances are staffed with all three professions. In Nyamata and Gakoma district, there are no doctors and non-physician anaesthetists available for the ambulance service, in Kibirizi district the rate is only 9%. This finding provides additional evidence that the staff shortage in the Rwanda Emergency Medical System is present all over the country, with a possible exception in the capital Kigali.

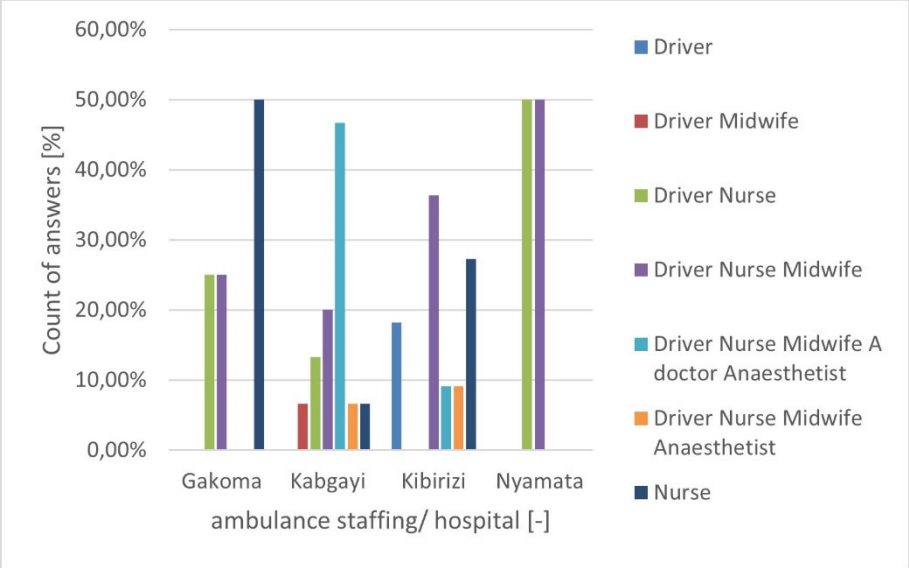

Figure 7: ambulance staffing

Furthermore, the question “Do you have enough staff to operate all available ambulance cars” was answered with no by 32 people out of 38 of this group, which means 84.2 % (Figure 8). In Gakoma and Nyamata all participants negated this question.

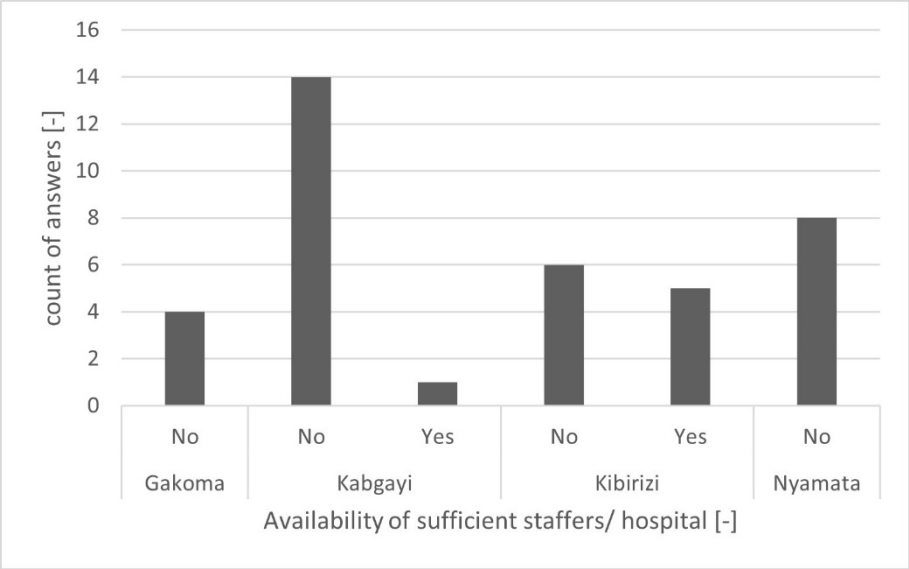

Figure 8: Availability of sufficient staff for ambulances

Lack of professions in the ambulance service

Additionally, the question “Staff of which profession are you lacking” was asked. As Figure 9 shows, all participants (n=37, one participant did not answer this question), mentioned nurses and midwives. Next to these professions, drivers were mentioned 18 times (48,.6%), doctors 16 times (43.2%) and non-physician anaesthetist 14 times (37.8%). This data shows, that the lack of health professions in Rwanda’s pre-hospital medical care system is evident.

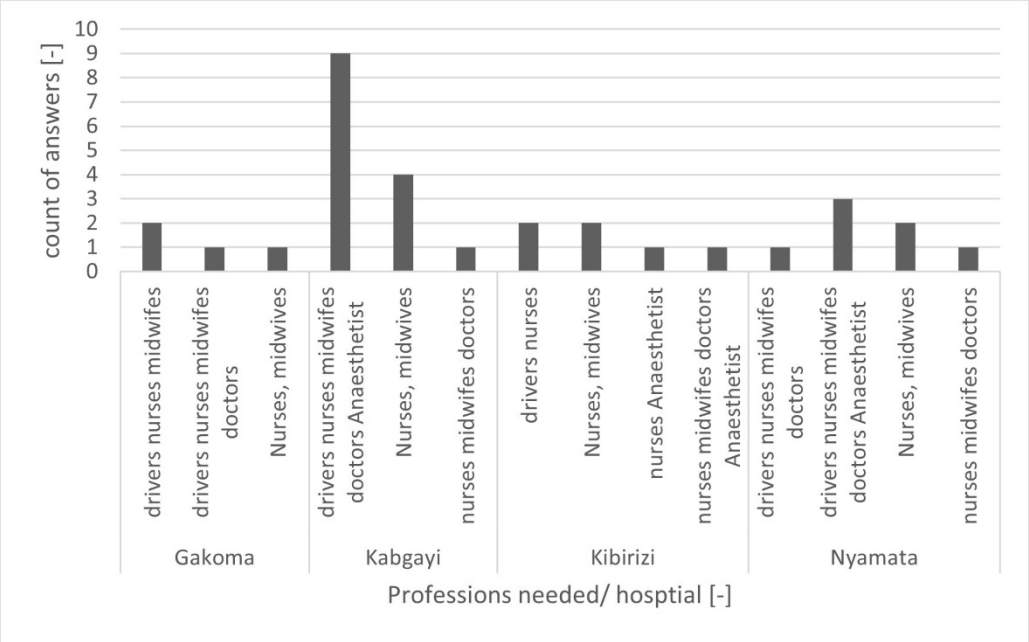

Figure 9: Lack of professions in the ambulance service

Lack of specialised training

As described in the literature (paragraph 6), many EMS, particularly in low- and middle-income countries, lack specialised training, is also true for Rwanda. The EMS is staffed with in-hospital trained nurses and midwives, but they often lack education to operate outside the hospital setting. Some major differences occur in patient treatment within in-hospital and pre-hospital settings, even the treatment's aims are different. While EMS focuses to stabilise and transport the patient, in-hospital treatment aims to recover a patient fully in the midterm or long run. These differences are reflected in the curricula of specialised pre-hospital trainings around the world.
However, 38 answers were received concerning specialised training for ambulance nurses and midwives. Out of these 38 answers, 15 or 39.5% received no specialised training and an additional 3 or 7.9% only completed a First Aid training, which normally targets the public. Only 3 people or 7.9% received a trauma training (PHTLS – Pre-hospital trauma life support), which is considered to be essential within pre-hospital care, as the trauma is one of the main reasons for ambulance deployments.

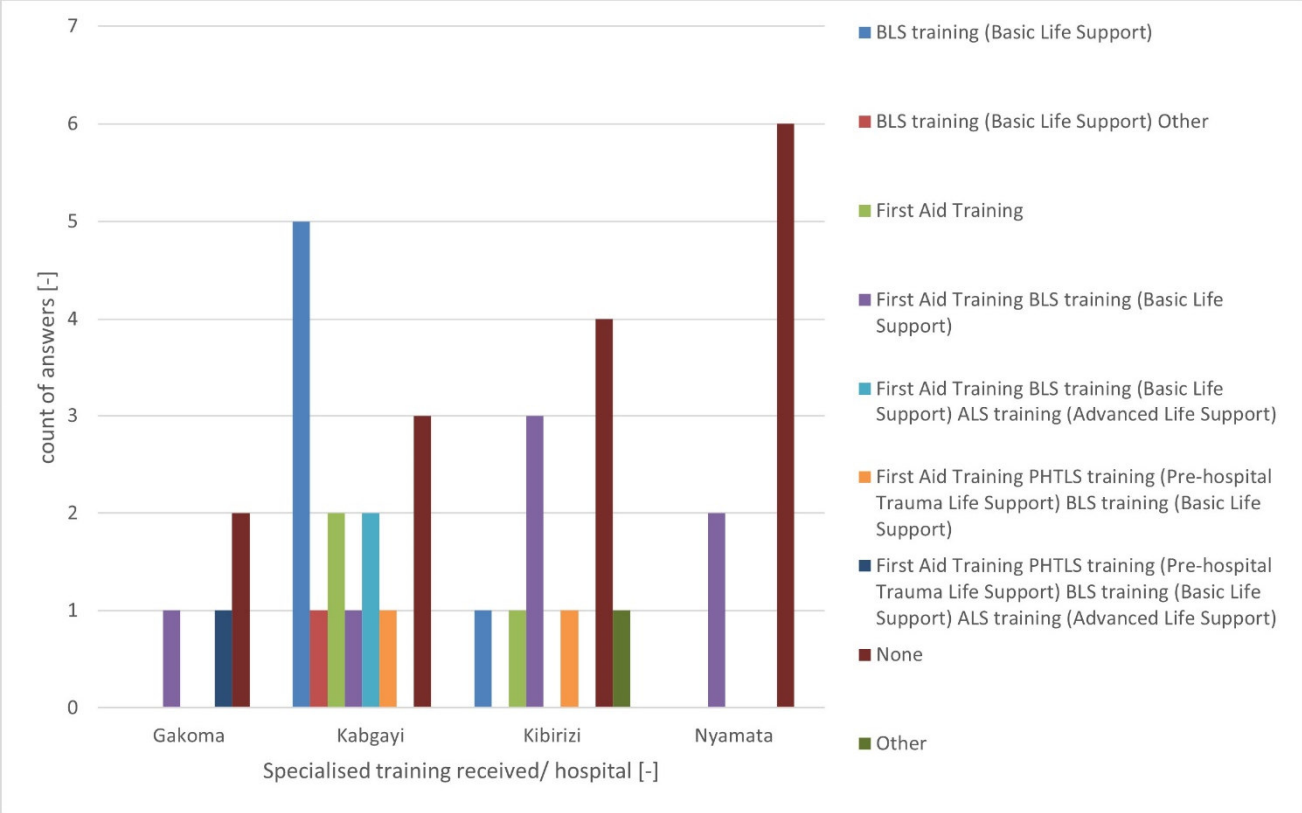

Figure 10: Specialised training for nurses and midwives

Ambulances' equipment according to emergency patterns

As (Obermeyer *et al.*, 2015) points out, a thought-through and well maintained equipment is also key for a successful EMS.
The questions, concerning EMS' equipment, were split up. Each question suits one or more emergency pattern/s.
The first question relates to medical and neurological cases and was only answered by 12 participants. As shown in Figure 11 (n=12), out of them two respective 16.7% did not have any equipment on board of the ambulances they are operating. Not one of the participants stated that all of the questioned equipment is available and only 1 respective 8.3% did have an Automated External Defibrillator (AED) available.
Seven or 58.3% have oxygen available in their ambulance car, but only six (50.0%) have a ventilation bag available to use the oxygen in case of a resuscitation. A manual blood pressure monitor including a stethoscope is available in 50.0% (six) of the ambulances. A blood glucose monitor only in 41.7% (five) and a oxygen saturation measurement device in 33.3% (four) of the cases.

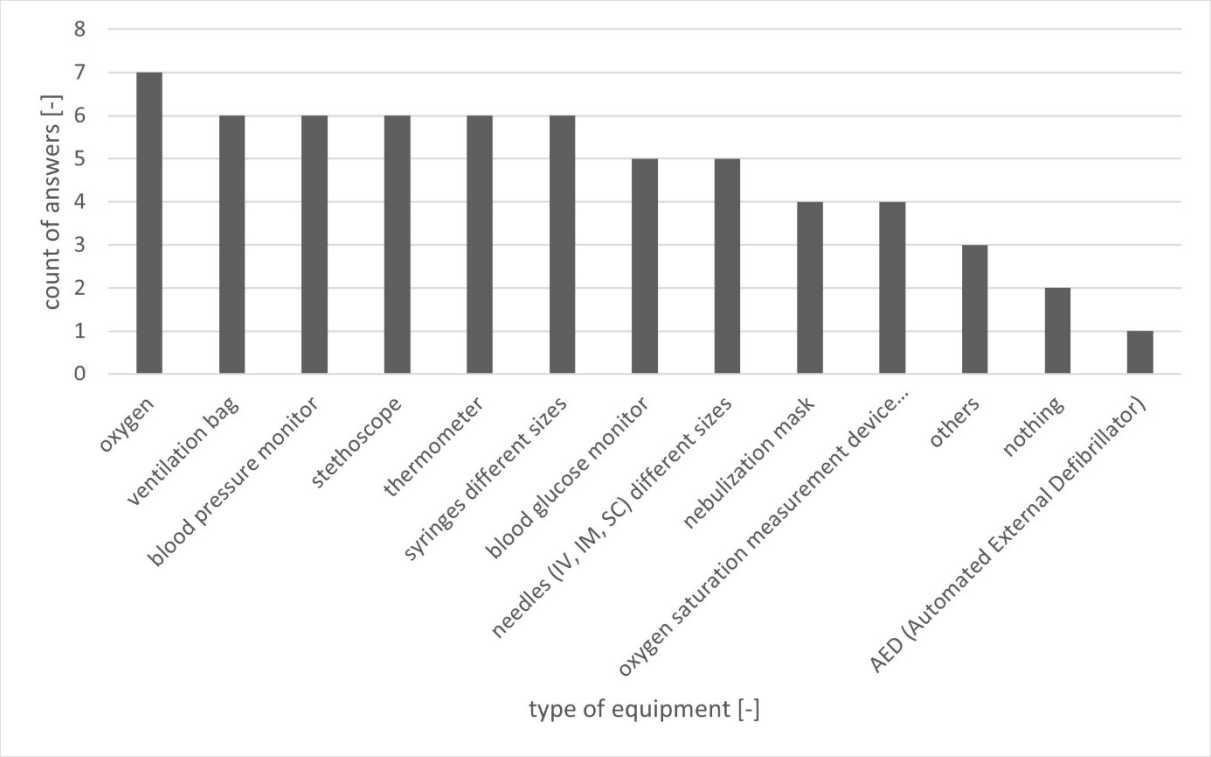

Figure 11: available equipment to respond to internal medicine and neurological cases

As shown in Figure 12 (n=12), only twelve answers were received, three (25%) did not have any equipment in their ambulance car. A c-collar, to stabilise the cervical spine, is only available in two (16.7%) of the ambulances, a leg splint in three (25%), a arm splint in three (25%) and a vacuum mattress in four (33.3%) of the ambulances. The most common materials available in the ambulances are disinfectant (seven, 58.3%) gauze (six, 50%), adhesive tape (six, 50%), dressing (six, 50%) and bandages (five, 41.7%).

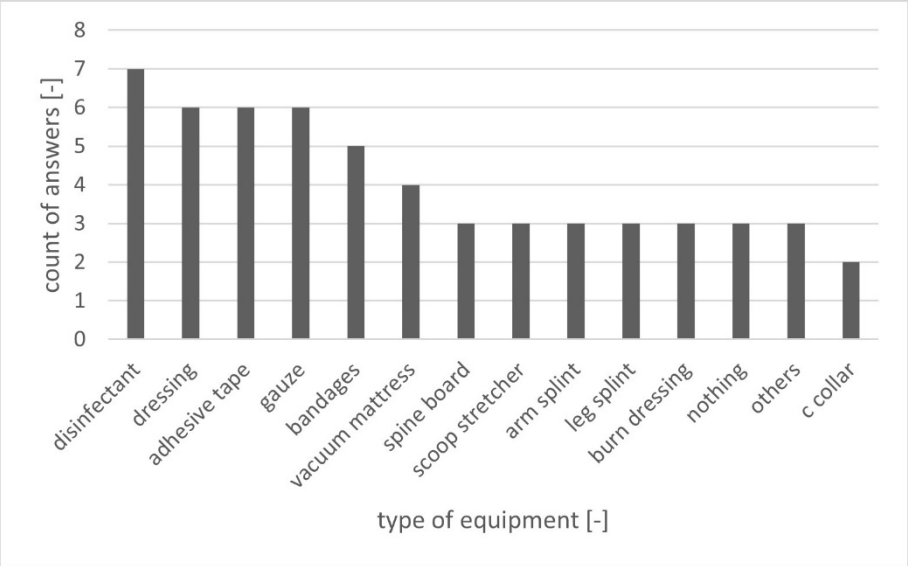

Figure 12: available equipment to respond to trauma cases

Figure 13 (n=12) shows availability of equipment concerning maternity cases in the already existing ambulance service. As well as with equipment for internal and neurological cases and trauma cases, some of the ambulances do not carry any equipment (three respective 25%). Eight answers (66.7%) indicate the availability of cord clamps and sterile cord scissors. Towels, a neonatal suctioning device, and a container for the placenta are available in seven cases (58.3%). Here one has to remember, that according to Figure 19 and the Rwanda Ministry of Health, maternity cases are one of the main three reasons for ambulance deployment. Sterile gloves and a ventilation bag for neonate are available in six cases (50%).

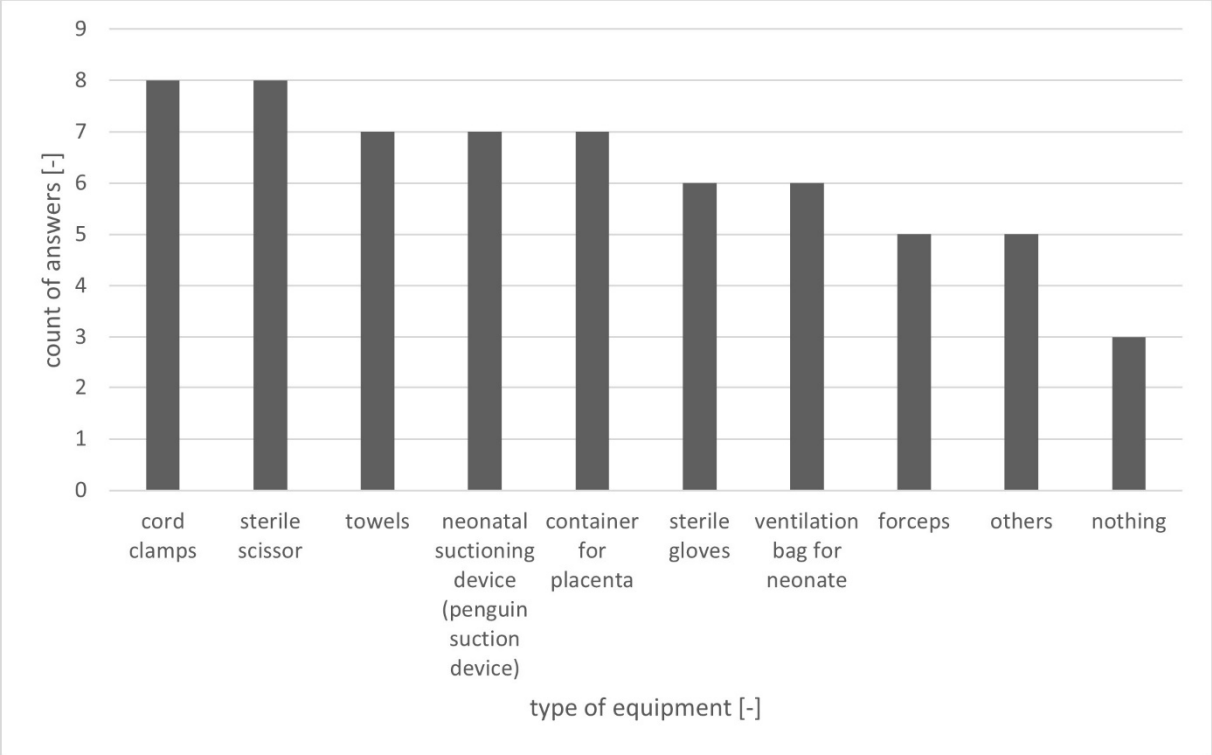

Figure 13: available equipment for maternity cases

At this point a limitation according to Figure 14 (n=12) has to be pointed out, the baseline survey was conducted prior the SARS-Cov-2 pandemic, hence the findings of this question cannot be used to analyse the protection against Covid-19.
Furthermore, twelve answers for this question were received. This question does not focus on protection against infectious diseases, rather than on personal protective equipment within danger zones such as construction sites.
In three cases (25%) no equipment is carried when deployed to respond to a medical emergency situation. Gloves are available in eight cases (66.7%), face masks in six (50%), aprons in five (41.7%), a helmet and shoe cover in two (16.7%) and goggles only in one case (8.3%).

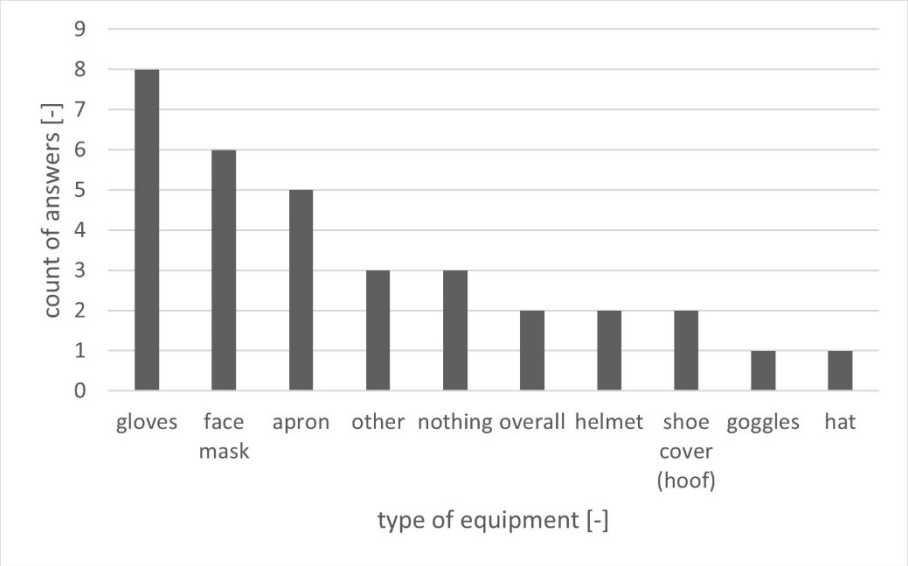

Figure 14: available personal protective equipment

Figure 15 (n=12) shows the availability of equipment for the staff to clean their hands during a deployment. Five (41.7 %) of participants indicated that they have nothing available to clean/ disinfect their hands during a deployment. One answer included here was “other” and specified as “when back we use water and soap”. Alcohol is available in six cases (50%), hand sanitizer and antiseptic in three (25%) and water and soap only in one case (8.3%).

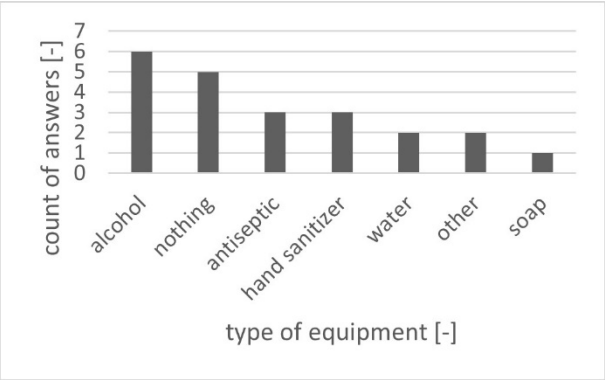

Figure 15: available personal hygiene equipment

As shown in Annexe D – Emergency Drugs, emergency drugs are also very rare. Most of the ambulances do not carry a standardised set of drugs.

The last question about the equipment was “Have you ever experienced a surprise in the ambulance equipment?”, it was answered by twelve participants (Figure 16).
Five participants (41.7%) have not experienced any surprises/ problems, one specified “You come with your own materials” and another one specified “Mostly cause we prepare it ourselves”. One participant did not specify his/ her answer “others”.

Five participants (41.7%) have experienced problems with damaged/ not working equipment, four (33.3%) that equipment was not available (out of stock) and three (25%) that equipment was missing in the ambulance car.

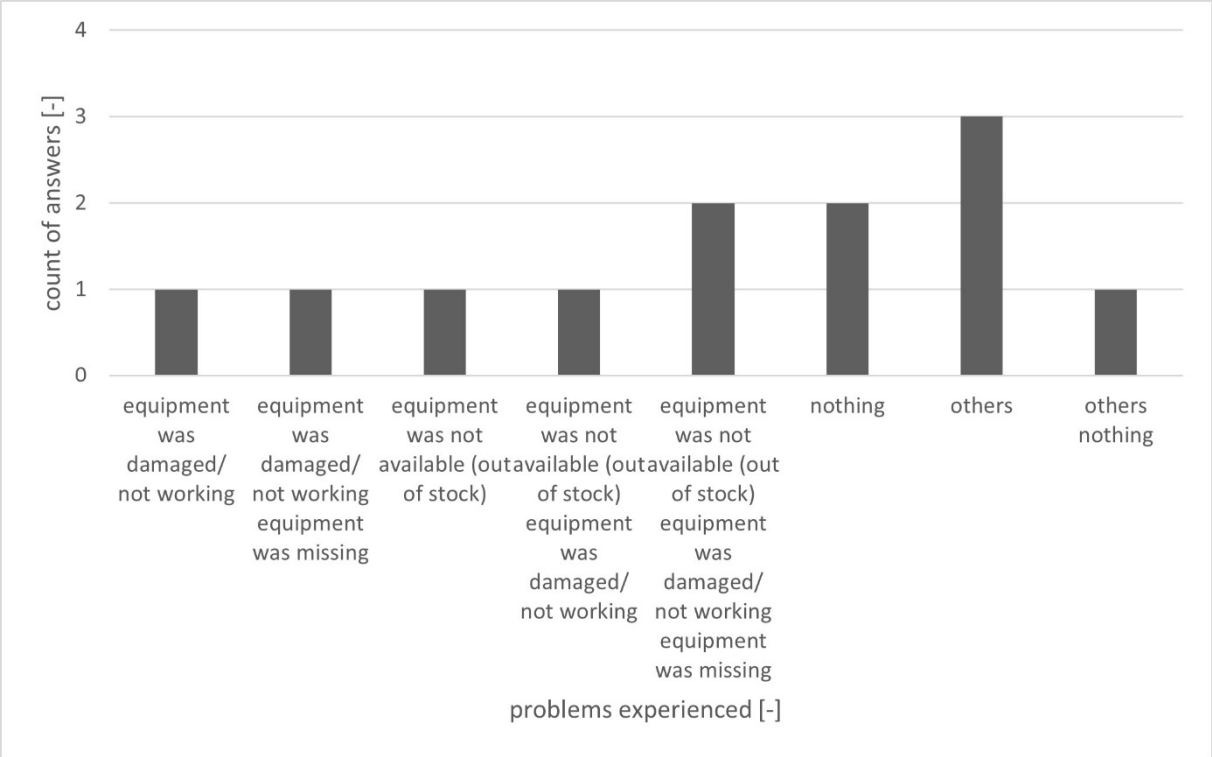

Figure 16: "surprises" experienced with ambulance equipment

Supply chain responsibility

As shown in Annexe E – Supply chain responsibility, the responsibility of the supply chain is widespread. There is no single position which could be determined to be responsible in all hospitals.

Cleaning and disinfection of ambulances

As shown in Annexe F – Ambulance cleaning and disinfection, the responsibility of ambulance cleaning and disinfection varies between the drivers, the nurses/ midwives and the hospital cleaners. In addition, the frequency is not standardised either.

Number of ambulance deployments

The number of deployments of ambulances within 24 hours, varies between the regions and depends on the number of available ambulances. The participants were asked to provide an average number of ambulance deployments within 24 hours. As we can see in Figure 17 (n=38), the answers are not very reliable. In Gakoma and Nyamata the numbers vary between four and eight and two and five and can be seen

as almost reliable. However, in Kabgayi and Kibirizi, the numbers vary from 5 to 50 and 2 to 24, meaning the range is too big to retrieve reliable information.

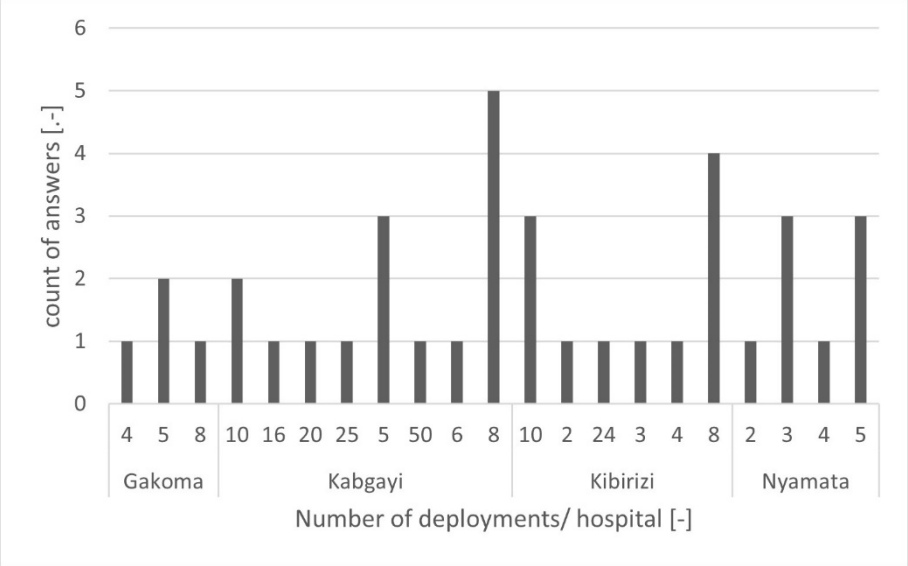

Figure 17: Ambulance deployments within 24 hours

Documentation

The result as shown in Figure 17, leads directly to the next question about the documentation of ambulance deployments (Figure 18, n=38). In the questionnaire, all 38 participants answered this question with the majority (22 respectively 57.9%) saying no. An exception within the hospitals is Kibirizi, where nine or 81.8% say that a standard report format is used and only two or 18.2% answer this question with no. Therefore, it is interesting, that the numbers of actual deployments vary that much in Kibirizi, but understandable for Kabgayi. Another question, which is not answered, is, if the reports are properly filed and the cases are discussed after a deployment is finished. Only a proper filing system guarantees reliable numbers and a discussion of the deployments enables the staff to learn rom each case.

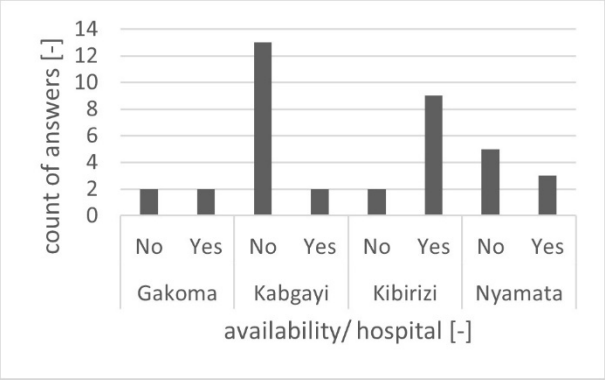

Figure 18: Availability and use of standard patient care report

Nature of deployments

In order to understand, to which emergency cases, Emergency Medical Services in Rwanda respond to, the question “To which emergency cases do your ambulances respond?” was included in the questionnaire. Multiple answers were possible. In the data (n=38) of Figure 19, one can see that 34 respective 89.5% of the participants mention trauma/ surgical cases and 37 respective 97.4% of the participants mention maternity cases. Also 31 respective 81.6% give paediatric cases as reason for deployments. The least often mentioned reasons for deployments are psychiatric cases (5 respective 13.2%) and internal medicine cases with 29 respective 76.3% mentions.
These answers correlate with the data from the Ministry of Health of Rwanda, which states that the two most common reasons to call an ambulance are “Road Traffic Accidents” (trauma) and “Labour and Delivery Related Problem” (Maternity cases) (cf. Rwanda Ministry of Health, 2021). These findings provide further evidence, that specialised training, as discussed in Figure 10, is highly needed for staff in an Emergency Medical Service.

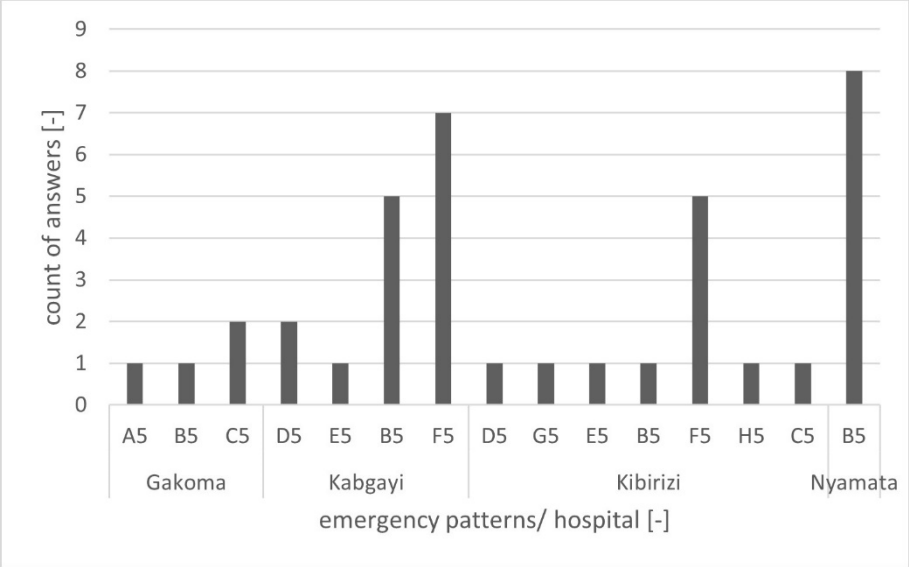

Figure 19: Emergency patterns responded to, A5: maternity cases paediatric cases, B5: trauma / surgical cases internal medicine cases maternity cases paediatric cases, C5: trauma / surgical cases maternity cases paediatric cases, D5: maternity cases, E5: trauma / surgical cases internal medicine cases maternity cases, F5: trauma / surgical cases internal medicine cases maternity cases paediatric cases Psychiatric, G5: trauma / surgical cases, H5: trauma / surgical cases maternity cases

Pathfinding and communication

As further elaborated in Annexe C – Pathfinding and communication the means of navigation and communication are not state of the art.

As shown in Figure 20 (n=12), all staff (100 %) reported to communicate the vital parameters to the admitting hospital, eleven (91.7 %) do also share the diagnose, the treatment received and the time of the accident/ symptom’s onset. On the other hand,

no one communicates the Estimated Time of Arrival (ETA) and only six (50 %) communicate the emergency treatment needed at the hospital and the number of the client.

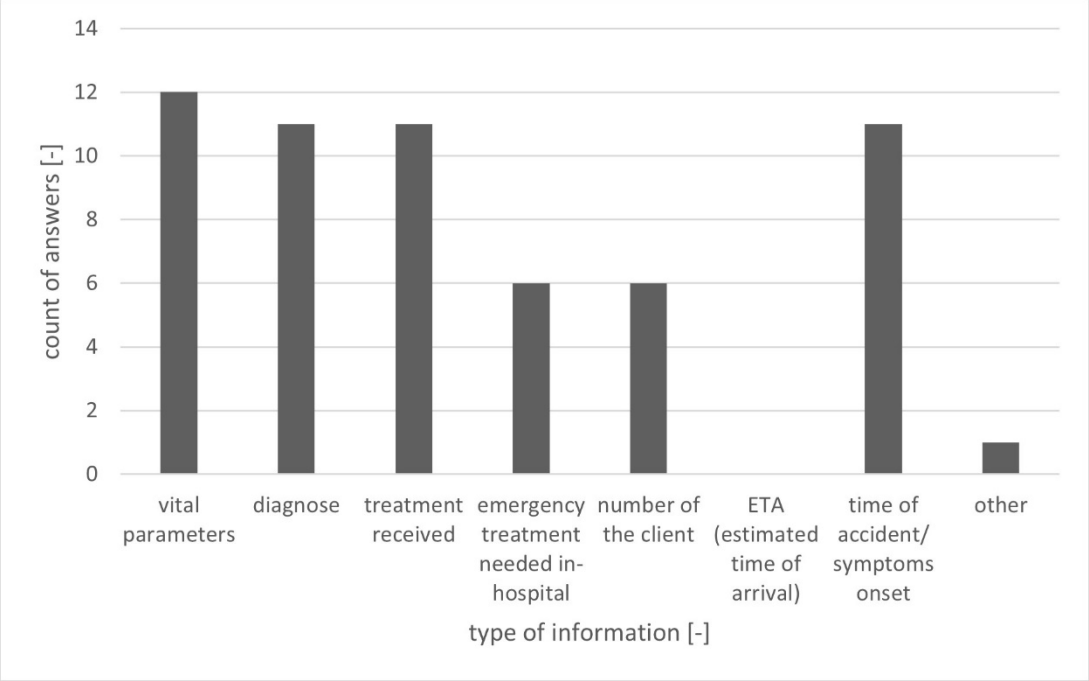

Figure 20: Information shared with the admitting hospital

Costs and Payment/ Insurance

An aspect of Emergency Medical Service's accessibility for the public are the costs for the patient. As Figure 21 (n=38) shows the social insurance in Rwanda covers the full amount only according to three participants (7.9%), whereas according to 35 participants (92.1%) the insurance covers them only partly.

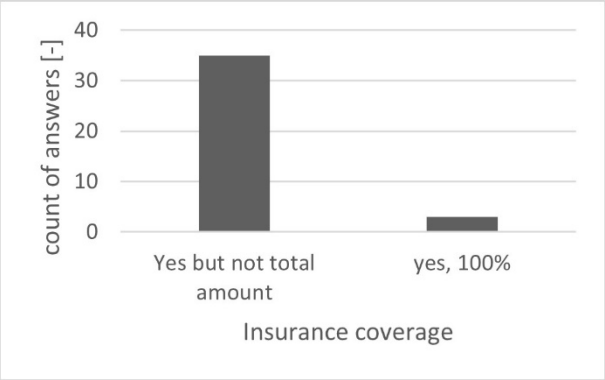

Figure 21: Ambulance costs coverage by social insurance

The percentage of costs the patient has to cover himself/herself varies according to the answers shown in Figure 22 (n=38) widely. Starting at 0% from the three answers from Figure 21 stating a 100% coverage by the insurance. One participant (2.6%) states that only one percent has to be covered by the patient, one (2.6%) that 75% and

one (2.6%) that 80 have to be covered by the patient. The most common answer on the retention percentage is ten percent, which was stated by 32 participants (84.2%).

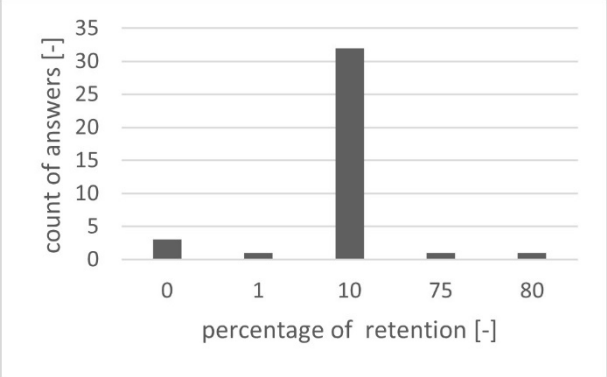

Figure 22: Percentage of retention of ambulance transports

Generally, the retention has to be paid by the patient. Since Rwanda counts as a low-income country, this can lead to financial problems for patients. As shown in Figure 23 (n=35), the retention is covered mainly by the patients themselves (24 respective 68.6%), additionally, in rare cases the hospital will cover the costs (3 respective 8.6%). Eight participants (22.9%) answered this question with “other”, this was specified as:

- Medical treatment first – financial aspects later (sic!) [3 mentions]
- This is not our business (sic!) [2]
- Patient – social service – clinical director – district (sic!) [1]
- We do not deal with financial aspects in case of emergencies (sic!) [1]
- It depends on the situation (sic!) [1]

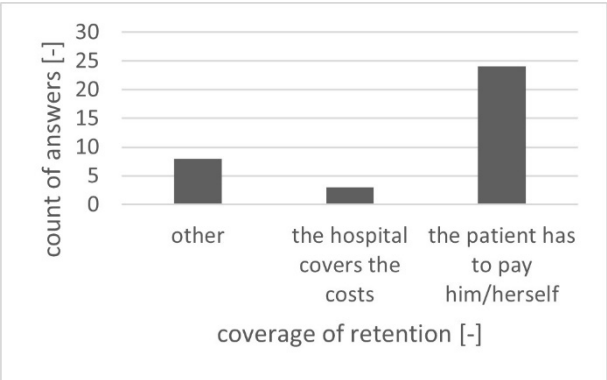

Figure 23: Means of retention coverage

Availability and use of guidelines

Another aspect is the availability and use of guidelines within an EMS. In Rwanda, as shown in Figure 24 (n=38), only eleven participants (28.9%) stated to have guidelines available and 27 (71.1%) stated that they do not have guidelines.

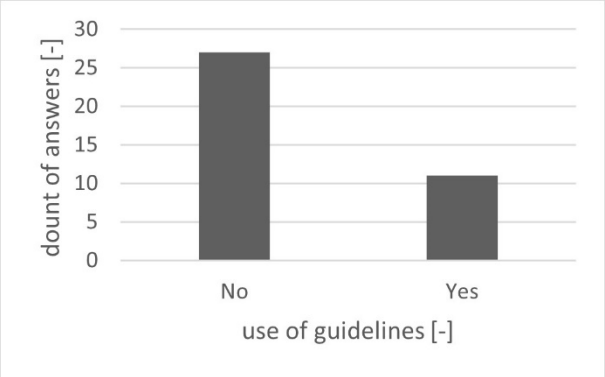

Figure 24: Use of guidelines in ambulance service

Figure 25 (n=11) shows, that out of the eleven cases were guidelines are used, six (54.5%) use their hospitals' ambulance guidelines/policies, which is not regulated and not further specified. The following guidelines are each used by one participant (9.1%)

- Give the first aid first (sic!)
- In case of fracture, immobilize the area, monitoring labour and control bleeding (sic!)
- Malaria management (sic!)
- Prematurity and nurses within patient (sic!)
- SAMU guideline (sic!)

This indicates that there is no commonly used guideline, even if one is used.

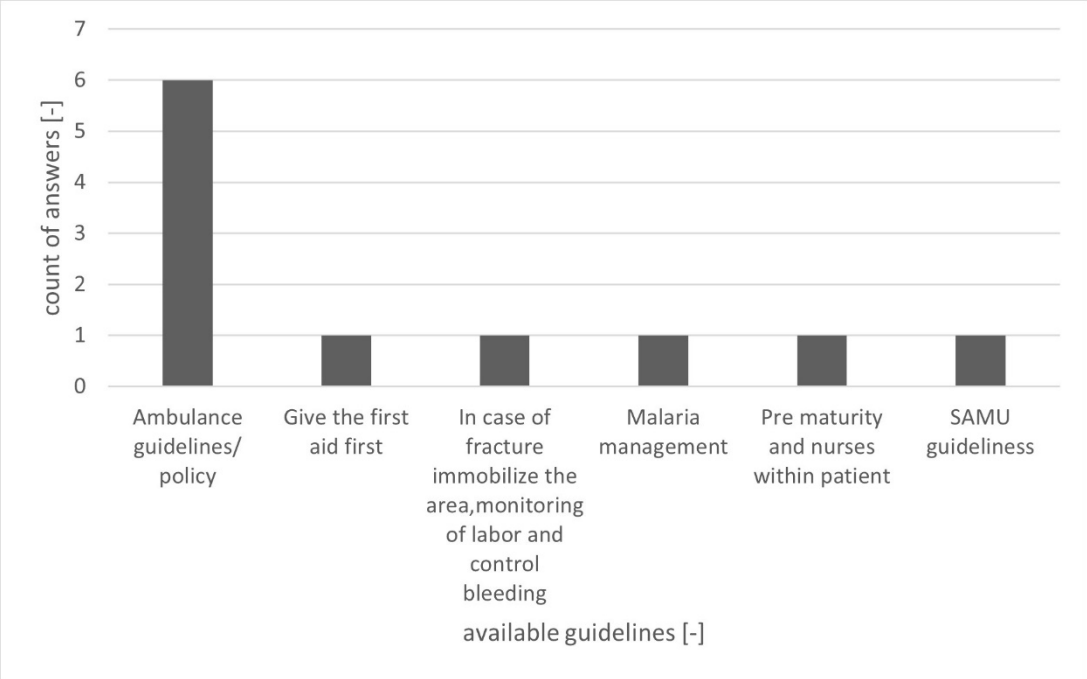

Figure 25: Types of guidelines used

<u>Need for further development</u>

As the nurses and midwives questioned in the study are the ones who daily operate the ambulances, the question whether they see the need to further develop the system or not was integrated. As shown in Figure 26 (n=38), almost all participants (36 out of 38, 94.7%) see the need for further development. Only two participants (5.3%) do not see any need.

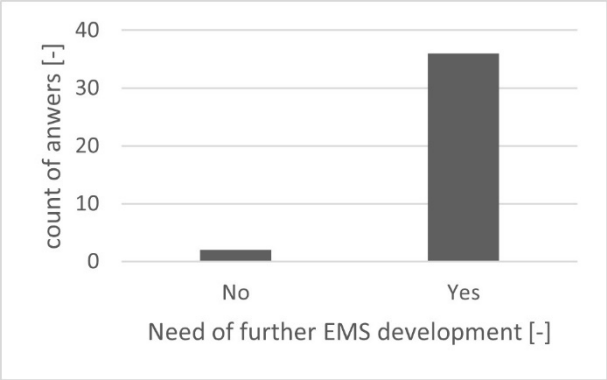

Figure 26: Need for further EMS development

The participants were also asked to specify the main topics which should be further developed. A vast majority (32 out of 36, 88.9%) describes either one, two or all three of the following as priority as shown in Figure 27 (n=36):

- Training/ staff
- Equipment
- Number of ambulances

Two of the participants (5.6%) described the need to decrease the mortality rate within the service. One (2.8%) mentioned the need to develop the dispatch and one (2.8%) stated that there are no needs, despite stating yes before.

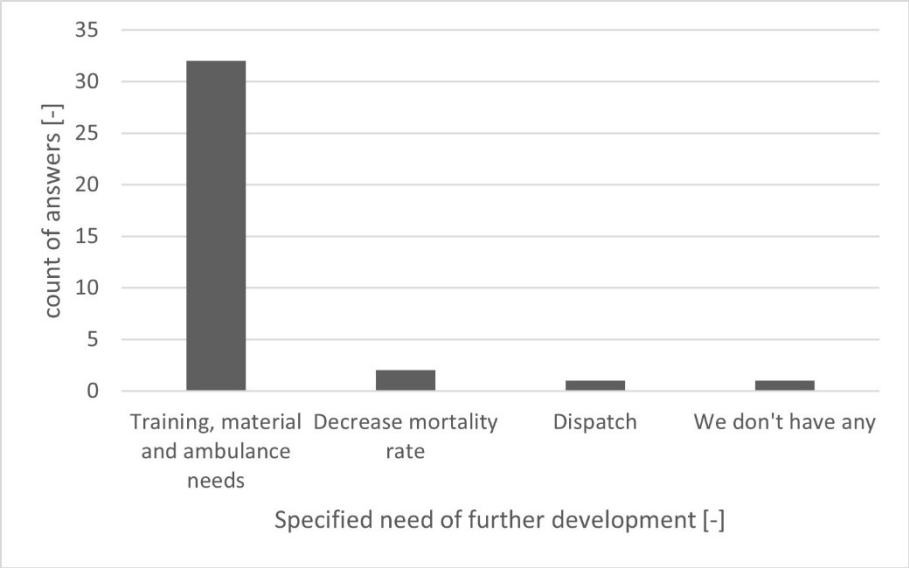

Figure 27: Specified needs for the EMS development

7.1.2. Hospital management

Hospital management, meaning, clinical directors, hospital coordinators, fleet managers, logisticians and director generals (n=15) were interviewed in this subchapter. They are not only from district hospitals, but also represent health centres. 16 staffers were approached and 15 took part in the questionnaire, one did not consent to the interview.

Organisational level of the Emergency Medical System

As with the nurses and midwives, one of the questions was related to the organisational level of the EMS in Rwanda. From the management staff, as shown in Figure 28(n=15), the majority stated “yes”, 10 out of 15 respective 66.7%. The other five (33.3%) do not feel so. These findings depict a different reality than the one provided by operational ambulance staffers (cf. Figure 4).

In addition, the participants were asked to specify their answers. Those who do not feel like an organised EMS has yet been established (n=5), mentioned the following reasons:

- Not enough ambulances (sic!) [1 mention]
- No triage system, not enough materials and staff (sic!) [1]
- Shortage of staff (sic!) [1]
- Only SAMU can be organised in case (sic!) [1]
- Because for us in paediatric ward we are not involved in transfer but receive patient transferred (sic!) [1]

The majority of those, who feel like an organised EMS has already been established, mentioned SAMU as the reason for their answer (five, 50%), three (30%) simply repeated their “yes” and did not provide further details. One (10%) mentioned a possibility to develop further “It will be better if it is all over the country (sic!)” and one (10%) mentioned the not yet established service of the Rwanda Red Cross as an organised system.

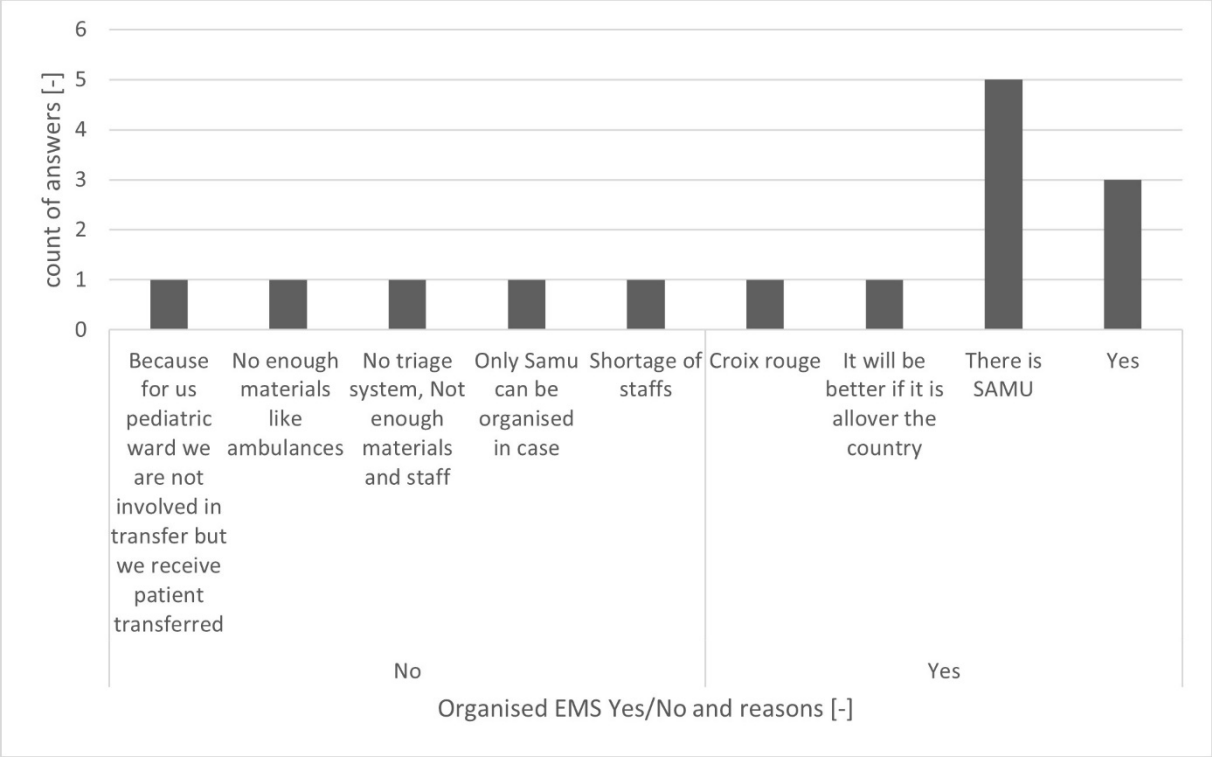

Figure 28: Availability of an organised EMS including reasons

Ambulances

As shown in Figure 29 (n=15), the available ambulances differ between the hospitals and between the answers of staffers of the same hospital. Therefore, an average was used to design the figure.
While in Gakoma an average of two ambulances is dedicated to the hospital's catchment area, 1.7 (85%) are operational in average. Three ambulances are assigned to Kabgayi and, in average, two (66.7%) are operational. Out of the two available abulances in Kibirizi, normally 1.5 (75%) are ready to use. In Nyamata five ambulances should be available at all times, but in reality, 4.4 (88%) are ready.

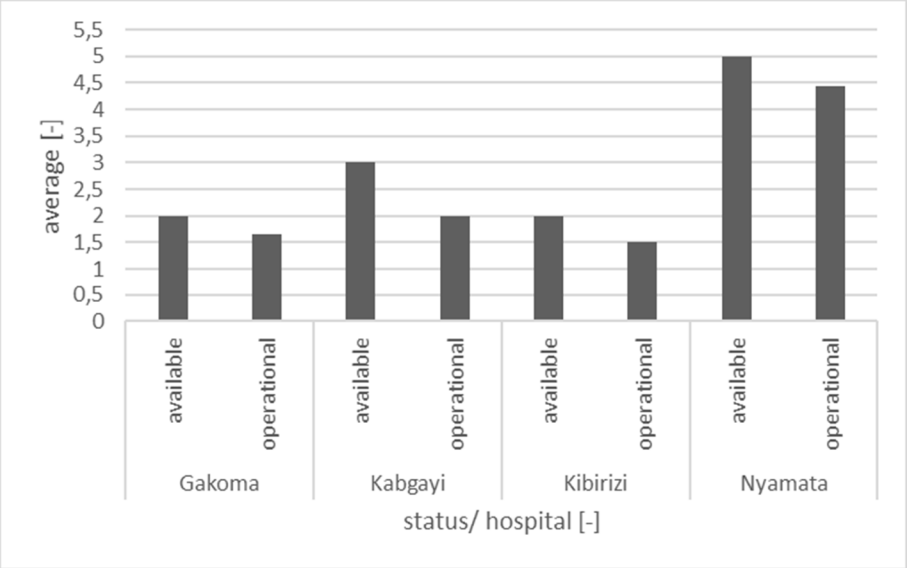

Figure 29: Available and operational ambulances

Ambulance staffing

As shown in Figure 30 (n=15), the hospital management states that the majority of the ambulances is not staffed with a doctor or non-physician anaesthetist. Nine (60 %) state that the ambulances are operated by a driver and a nurse, four (26.7 %) others state that their ambulances are staffed with a driver and a nurse and/ or midwife. Only two (13.3 %) are able to send a doctor or non-physician anaesthetist with the driver and the nurse/ midwife.

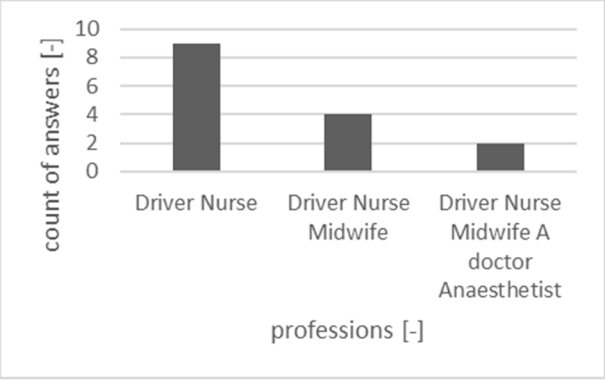

Figure 30: ambulance staffing

Lack of professions in the ambulance service

The majority of the management staff (ten, 66.7%), does not have enough staff to fully operate the service, as shown in Figure 31 (n=15). Five (33.3%) have a sufficient number of staffers.
While three (30%) of those who do not have enough staff (n=10), are lacking drivers and nurses, three (30%) are only lacking nurses and four (40%) are lacking drivers,

nurses/ midwives and doctors. What all answers (100%) have in common is the lack in number of nurses.

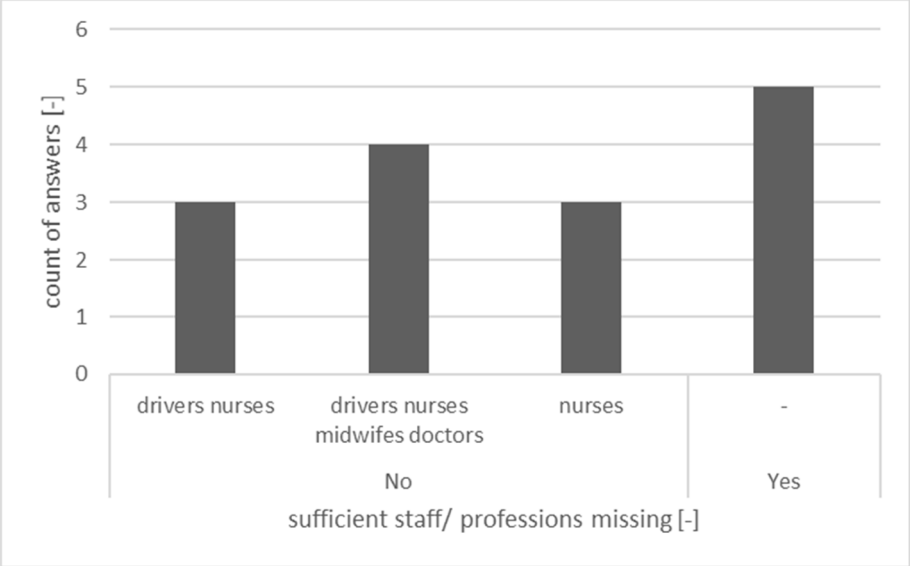

Figure 31: Availability of sufficient number of staff for ambulances

Knowledge about Emergency Medical Technicians

The management staff was questioned about their knowledge about the EMT profession. As shown in Figure 32 (n=15), the majority (eight out of fifteen, 53.3%) is not aware of the profession, the other seven (46.7%) do know about the profession.
Those who stated that they know about the EMT profession, were asked to specify their knowledge (n=7). Three (42.9%) did not specify their knowledge, just repeated their answer “Yes”. For two (28.6%), an EMT is a driver with additional competencies, one (14.3%) does not specify them as drivers, but as “staff which uses ambulances and is allowed to render some emergency interventions (sic!)”. One (14.3%) does know that the Rwanda Red Cross has people trained as EMT.

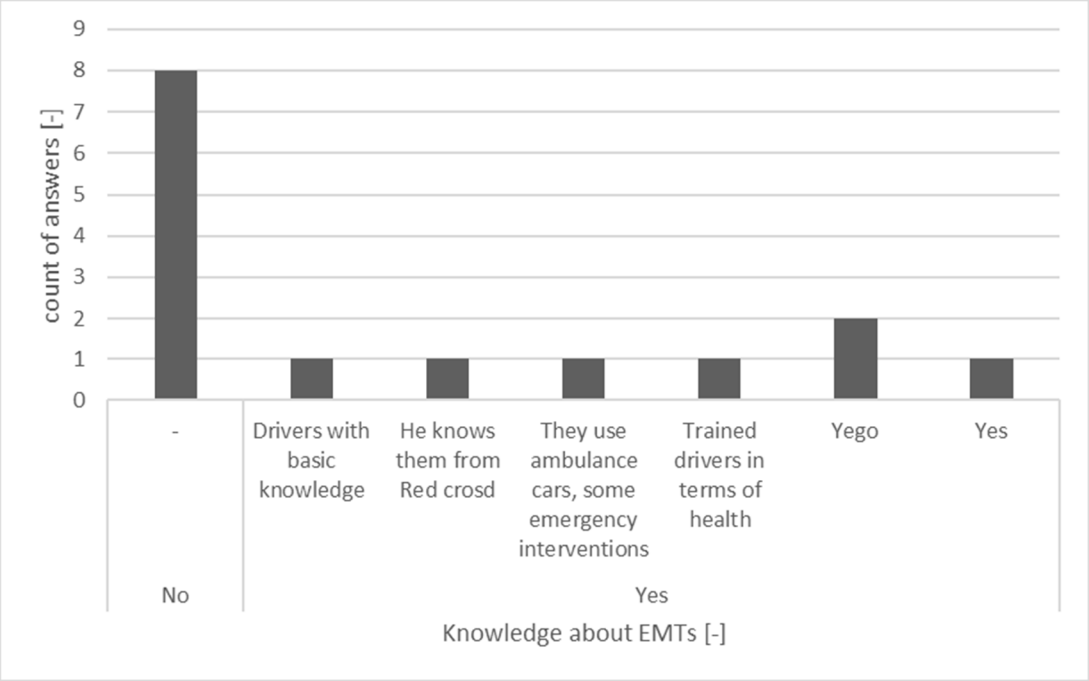

Figure 32: Knowledge about EMT profession

Supply chain responsibility

As shown in Annexe E – Supply chain responsibility, and as stated by the nurses/ midwives as well, a single responsible position could not be determined.

Cleaning and disinfection of ambulances

As shown in Annexe F – Ambulance cleaning and disinfection, the responsibility and the frequency of cleaning and disinfection vary widely. The statements of the hospital management are in line with those of the nurses/ midwives.

Use of patient care report and guidelines

As shown in Figure 33 (n=15), the majority of participants (eight, 53.3 %) are not using a standard patient care report form, the minority (seven, 46.7 %) is using one.

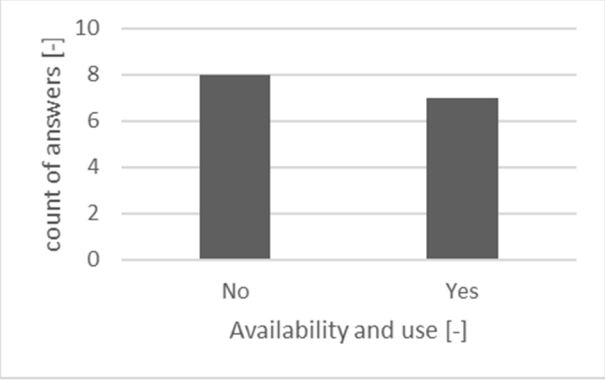

Figure 33: Use of standard patient care report

Guidelines are a symbol for a standardised EMS in the world, in Rwanda, as shown in Figure 34 (n=15), the majority of participants (11, 73.3 %) do not use guidelines. Out of the four (26.7 %), which are using guidelines, only one specified the guidelines used as “Burn protocol, Malaria, eclampsia, and pre-eclampsia, cold prolapse and Hypertension guidelines (sic!)”. The other three did only state, they are using guidelines (“Yes”, “Yego”) but did not give further details.

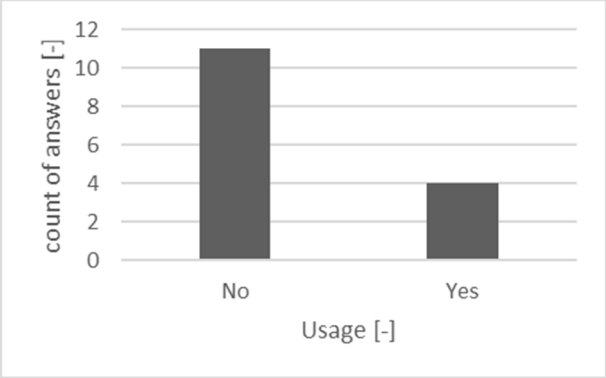

Figure 34: Use of guidelines in the ambulance service

Nature of deployments

The most common reasons, stated by the management staff, to deploy ambulances are shown in Figure 35 (n=15). While maternity cases are listed from twelve participants (80%), internal medicine cases and paediatric cases are only listed seven times (46.7%). Trauma/ surgical cases are mentioned eight times (53.3%).

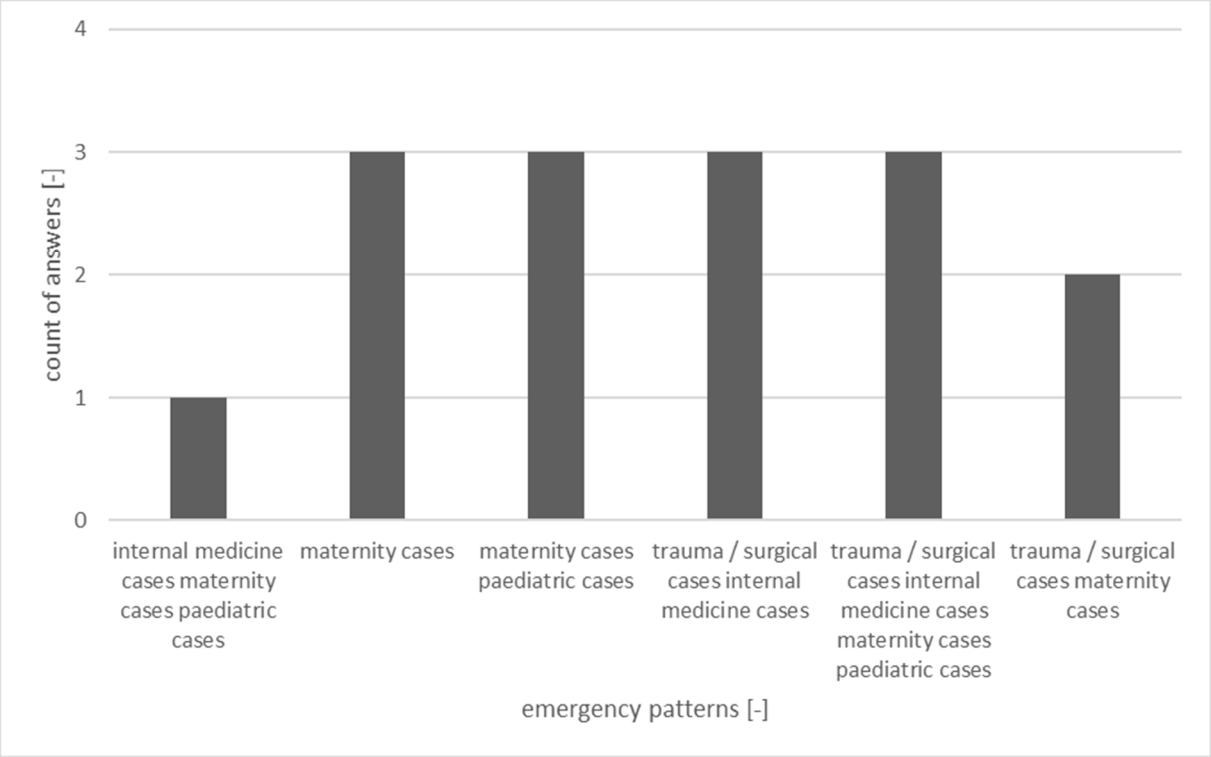

Figure 35: Emergency patterns to which ambulances respond

Challenges in the current ambulance service

Four questions were asked to the fifteen participants about challenges they have experienced during the work in pre-hospital care service.
The first question was about the staffers' skills, three out of the fifteen did not answer specifically to this question and were therefore sorted out (n=12). As shown in Figure 36, five (41.7%) have met no challenges so far, the others mentioned different trainings,

- Lack of training in First Aid and BLS (1, 8.3%)
- Managing trauma cases, BLS (1, 8.3%)
- No qualified nurse for a new-born resuscitation (1, 8.3%)
- Staff skills (1, 8.3%)
- Training of drivers (1, 8.3%)
- Training, No specialists available (1, 8.3%)
- Staff is not able to handle all emergency cases (1. 8.3%)

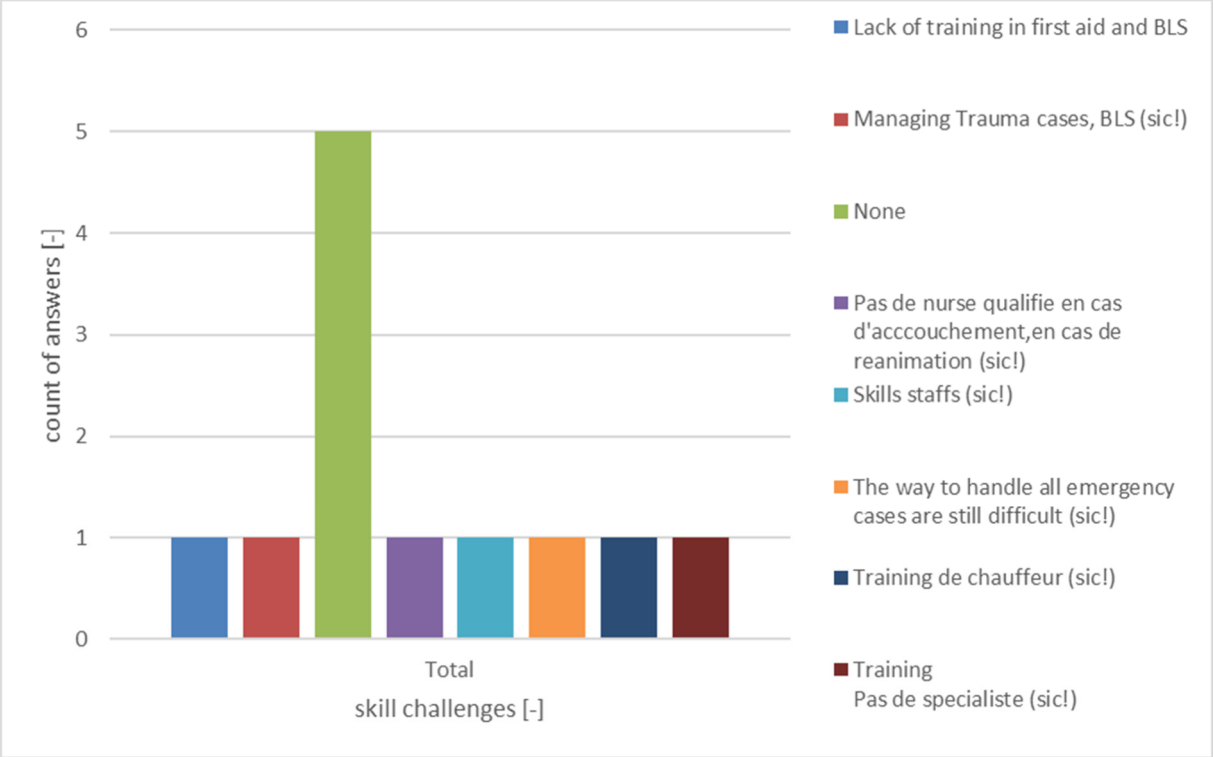

Figure 36: lack of skills of ambulance staff

The second question of this subchapter aimed to understand the challenges with equipment. 13 of the 15 received answers could be used for Figure 37 (n=13). Four participants (30.8%) have not met any challenges according to ambulance equipment. All other participants (10, 69.2%) stated either a lack of equipment or the total absence of equipment. The range of answers included ambulances as such, as well as very specific equipment. Next to a general shortage of equipment (6, 46.2%), the two most common things are ambulances (3, 23.1%) and resuscitation equipment (2, 15.4%).

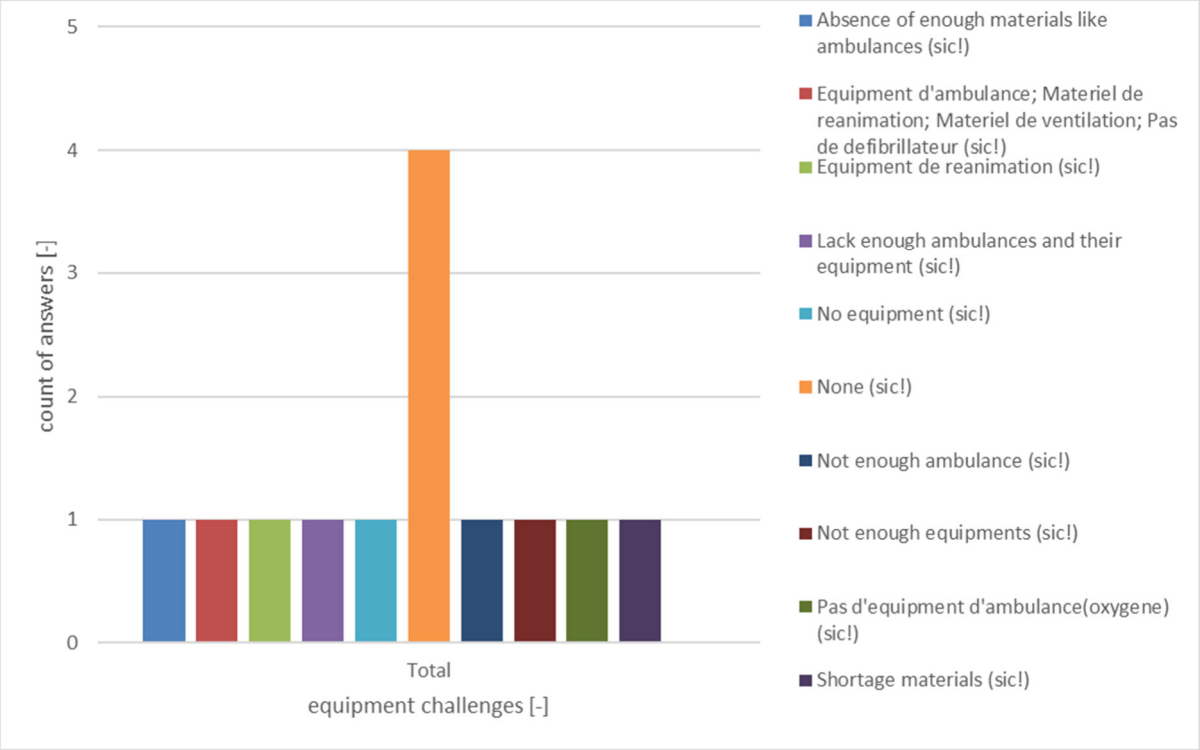

Figure 37: lack of equipment in the ambulance service

The third question was about the challenges with the work conditions in the ambulance service, one participant did not answer this question. As shown in Figure 38 (n=14), four of the participants (28.6%) stated no challenges. The other answers differ widely, the lack of staffers was mentioned three times, (21.4 %), bad road conditions was mentioned two times (14.3%). Mentioned once (8.3 %) were:

- Staff is overworked.
- Emergency room is too small (sic!).
- Lack of rapidity and knowledge how to stabilise a patient (sic!).
- Bad work conditions
- No motivation (sic!)
- Drivers are not satisfied with their salary.

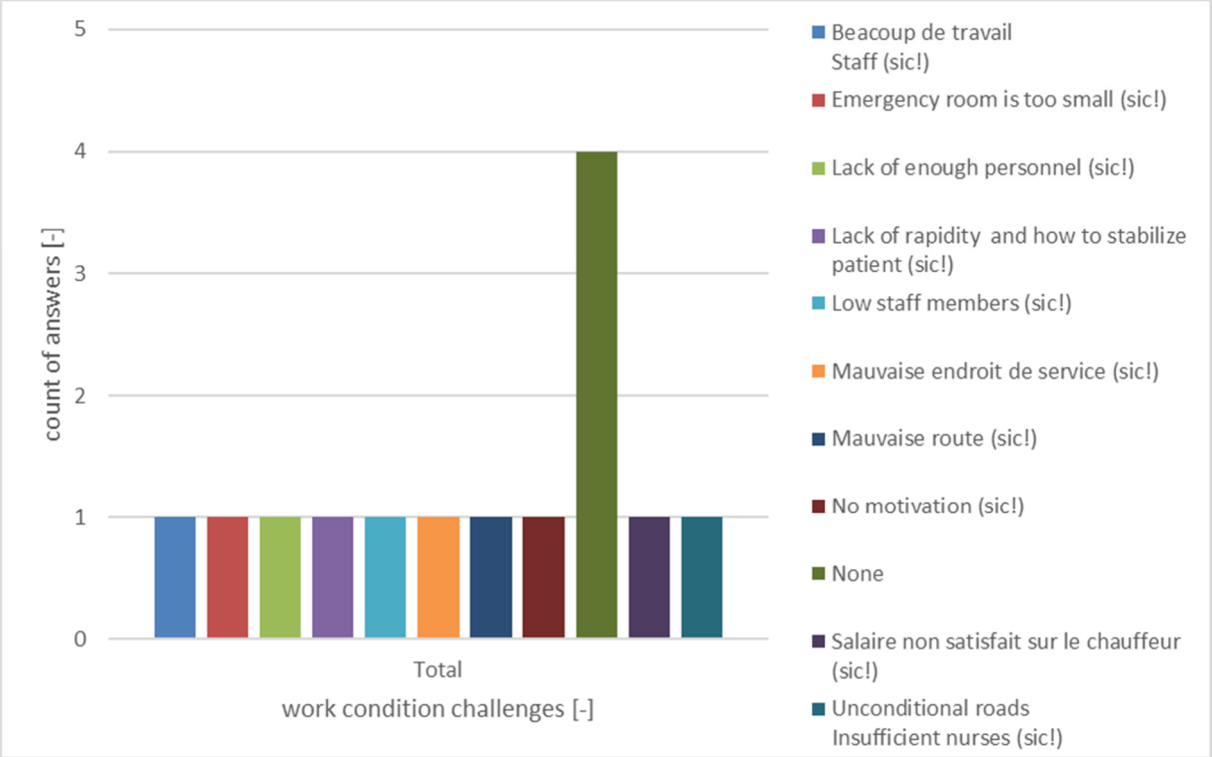

Figure 38: work condition challenges in the EMS

As shown in Figure 39, the last question of this subchapter aimed to collect other challenges, does not connected to staff, equipment, and work conditions. This question was answered by eleven participants (n=11). Six (54.5%) stated there are no other challenges. One (9.1 %) did once again mention “not enough materials” and one (9.1 %) mentioned again the “staff” as a challenge. Furthermore, the following were stated once each (9.1 %):

- No motivation, no break time, workload which is very high, more population (sic!).
- No extra money while deployed (sic!).
- Shortage of health care provider, Retardation of insurance to pay which lead to poor supply of medicine and other materials to use (sic!).

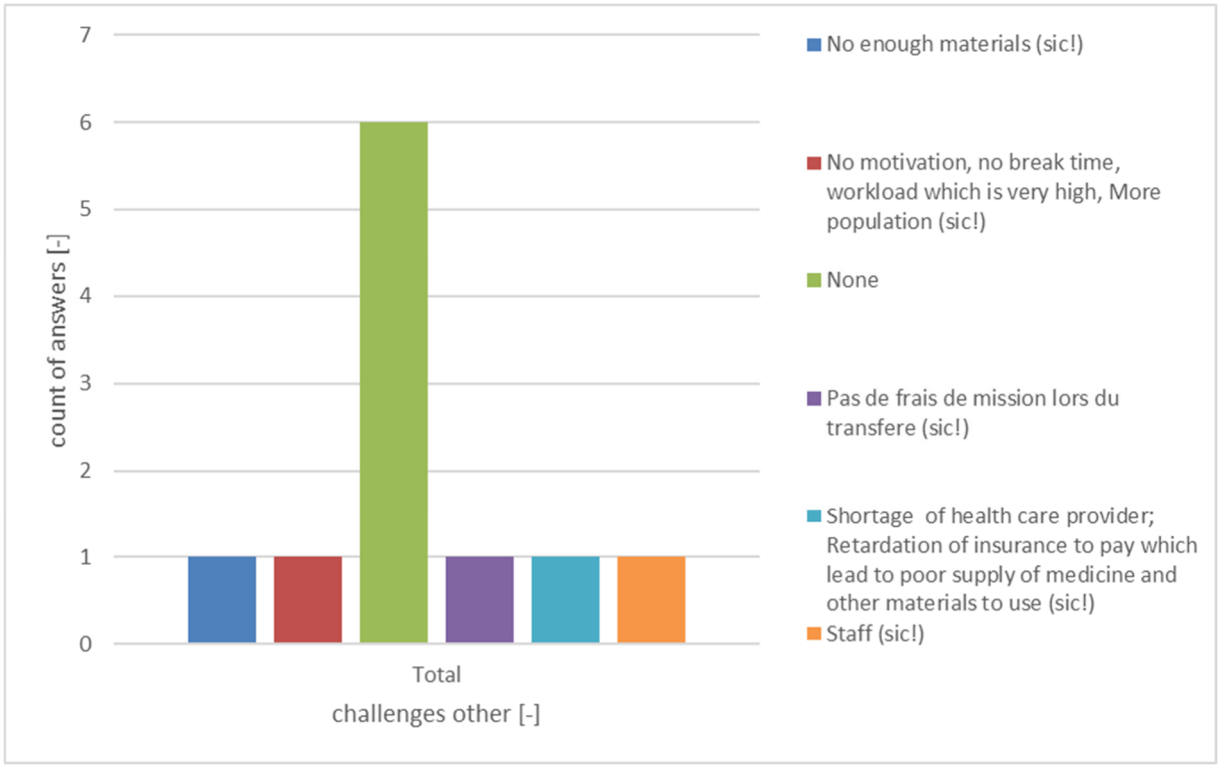

Figure 39: other challenges in the EMS

Needs for further development

As shown in Figure 40 (n=15), all participants (fifteen, 100%) of the hospital management see at least one need in the ambulance service. Three (20 %) did not specify these needs, only stating “yes” again. Eleven (73.3 %) stated a need for further training, eight (53.3 %) stated a need for more and/ or different equipment and two (13.3 %) stated the need of more ambulances.

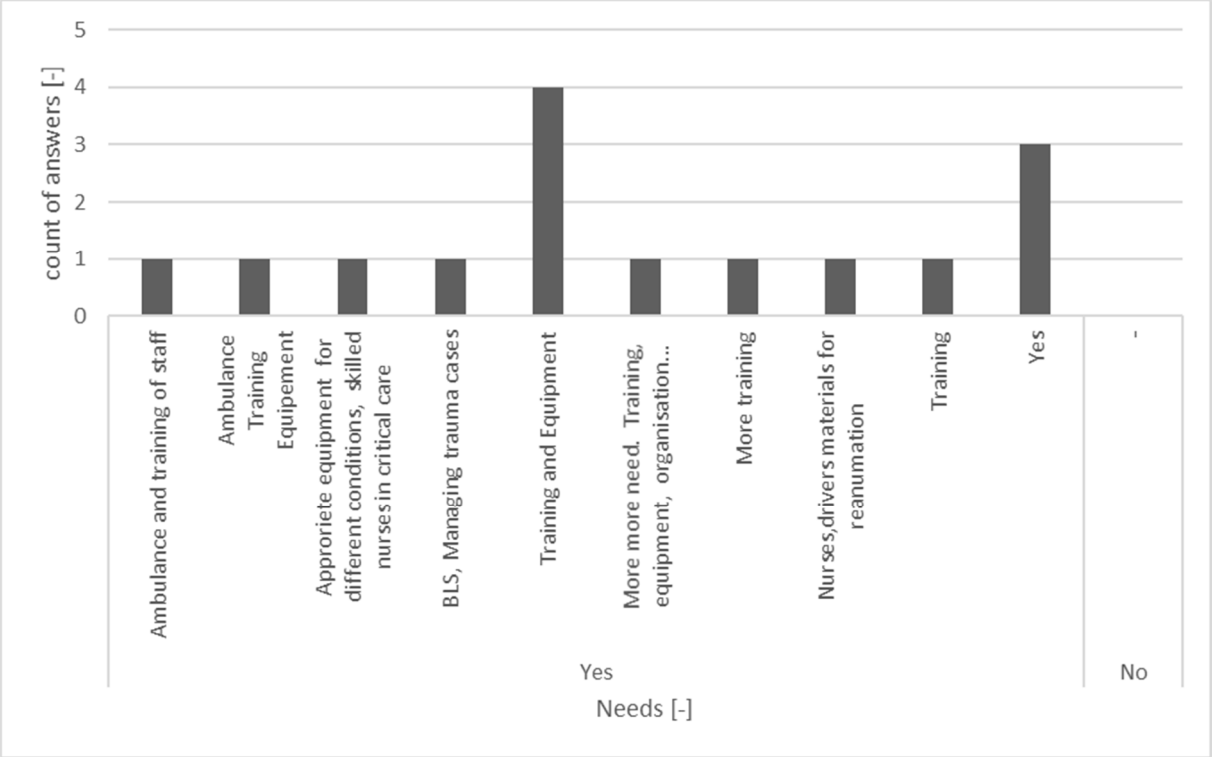

Figure 40: Needs for further development of the ambulance service

Costs and Payment/ Insurance

As shown in Figure 41 (n=15), in the majority of cases (ten, 75%), the insurance does not cover the entire costs of the ambulance transport. The patients need to pay a retention between ten percent (eight, 53.3 %), 25 percent (one, 6.7 %) and 85 percent (one, 6.7 %). The other participants, five (25 %) stated that the insurance will cover all costs.

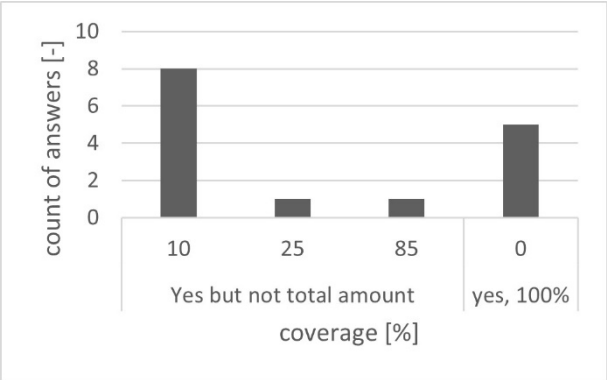

Figure 41: Cost coverage of insurances

Out of those ten answers, stated that patients have to cover a part of the cost by themselves, four cases (40 %) are covered by the admitting hospital, four (40%) have to cover the costs by themselves and in two cases (20 %) there was no specific answer received, as shown in Figure 42 (n=10).

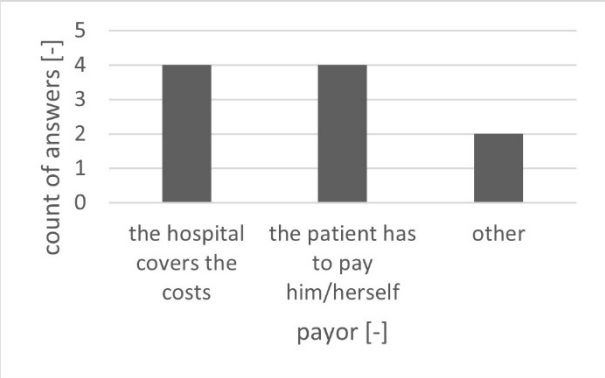

Figure 42: Retention payor

Location and accessibility of the emergency room

Another factor, which is important during the handover of the patient in the hospital, is the location of the emergency room. It should be located close to the entrance and being easily accessible for the ambulance crew. As shown in Figure 43 (n=15), in 14 cases (93.3 %), this is the case and only in one case (6.7 %) it is far away from the entrance/ parking lot.

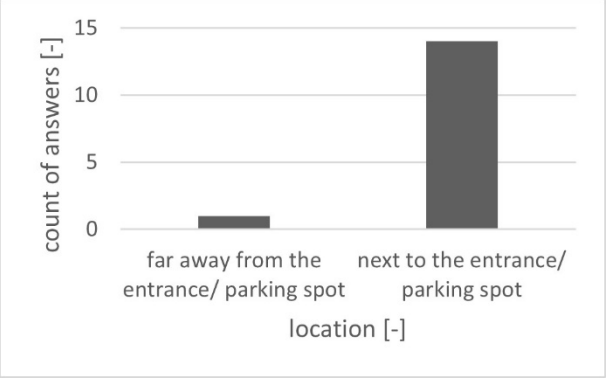

Figure 43: Location of the emergency room

Even the emergency room is located close to the entrance/ parking spot in 14 of 15 cases, the accessibility with a stretcher is not as good. As shown in Figure 44 (n=15), it is easily accessible in twelve (80 %) of the cases, some obstacles for the stretcher occur in one case (6.7 %) and in two cases (13.3 %) it is not accessible with a stretcher.

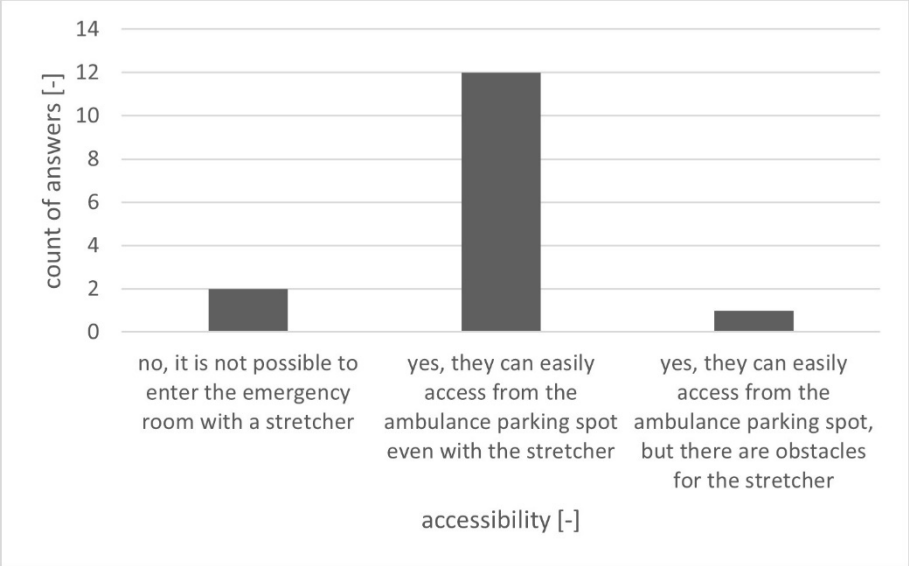

Figure 44: Accessibility of the emergency room

7.1.3. Ambulance driver

In addition to the ambulance nurses/ midwives and management staff, the ambulance drivers were interviewed. 26 drivers were approached, and all did participate in the questionnaire (n=26). The drivers are working in district hospitals and health centres.

Ambulance staffing

As shown in Figure 45 (n=26), in twelve cases (46.2 %) the ambulances are only staffed with a driver, meaning that no medical literate staff is onboard during a deployment. In six cases (23.1 %) a driver and a nurse are deployed and in eight cases (30.1 %) a driver and a nurse or midwife are operating the ambulance. In no case, an additional doctor or non-physician anaesthetist was stated.

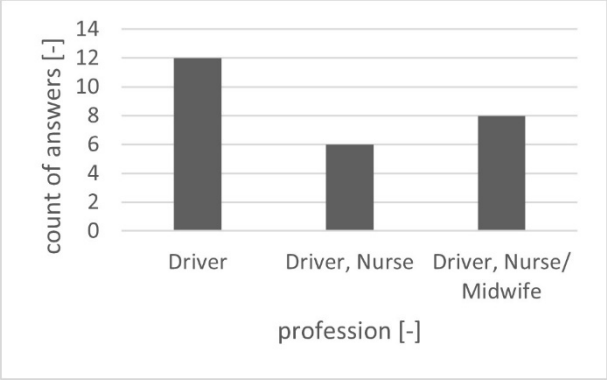

Figure 45: ambulance staffing

The involvement of the drivers in the patient rescue and treatment was questioned. As shown in Figure 46 (n=26), in the majority of cases (17, 65.4 %) they are not involved, but in nine cases (34.6 %) they are involved in the treatment.
Those drivers who stated that they are involved in the rescue and treatment of patients (n=9), were questioned to specify this involvement. Three (33.3 %) did only state “Ambulance”, which does not give any indication of their level of involvement. The other six (66.7 %) are involved in different ways, the following statements were given once each (11.1 %):

- BLS (sic!)
- In case of giving ventilation with ambu bag (sic!)
- Position, preparation of good environment, transport (sic!)
- Serving equipment to the nurse (sic!)
- Training on first aid (sic!)
- Transport of the patient

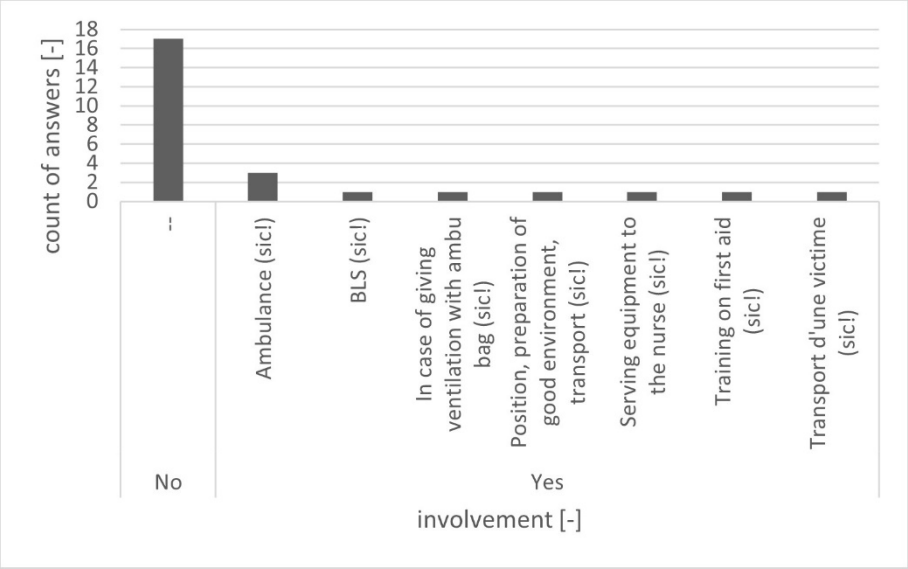

Figure 46: Involvement of drivers

The next question was about the training the drivers received for their job. As shown in Figure 47 (n=26), 14 drivers did receive a driving training (53.8 %), eleven (42.3 %) did receive a First Aid Training and 18 (69.2 %) did receive at least one “other” training. No one stated that s/he has not received any training. However, those ten (38.5 %), who stated do have received only a “other” training, did not specify the type of training received. Those who have received multiple trainings, did specify the “other” trainings as follows:

- Basic Life Support (BLS) [4 mentions]
- Ambulance Training [1]
- Cardio-pulmonary resuscitation (CPR) [1]

- Trauma training [1]
- SAMU training [1]
- Respiratory support [1]
- Additional driving training [1]

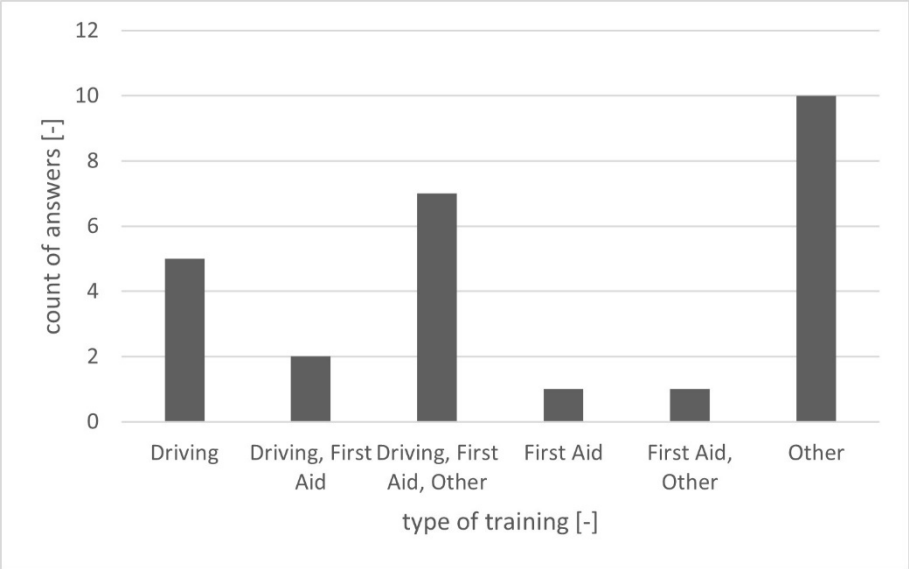

Figure 47: Training received by drivers

Challenges in the current ambulance service

The following section of questions aimed to understand the challenges, drivers have to deal with at their workplace.
The first question was about the skills, as shown in Figure 48 (n=26), the minority (twelve, 46.2 %) does not see any problems/ challenges with their skills. The majority (14, 53.8 %) does see challenges. All of them relate the challenges to their level of training or their skills acquired. The most common stated lack was in three cases (11.5 %) each, the skills on delivery and no respective to less training.

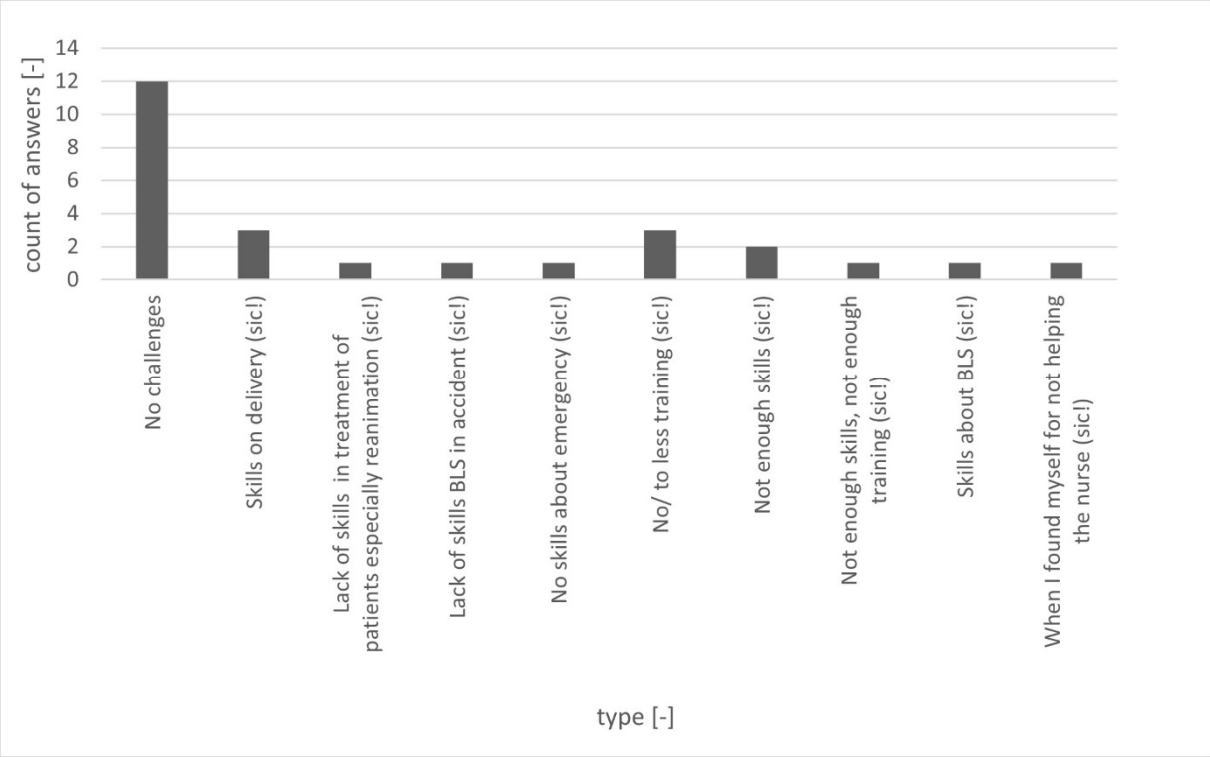

Figure 48: Challenges about drivers' skills

Challenges with the equipment were questioned next. As shown in Figure 49 (n=26), only a minority of seven (26.9 %) has stated, that there are no problems with the equipment. The majority of 19 (73.1 %) stated different problems. The three most common stated problems are:

- Drivers have to use equipment they are not trained for (five, 19.2 %)
- No materials in the ambulance (three, 11.5 %)
- Insufficient materials (three, 11.5 %)

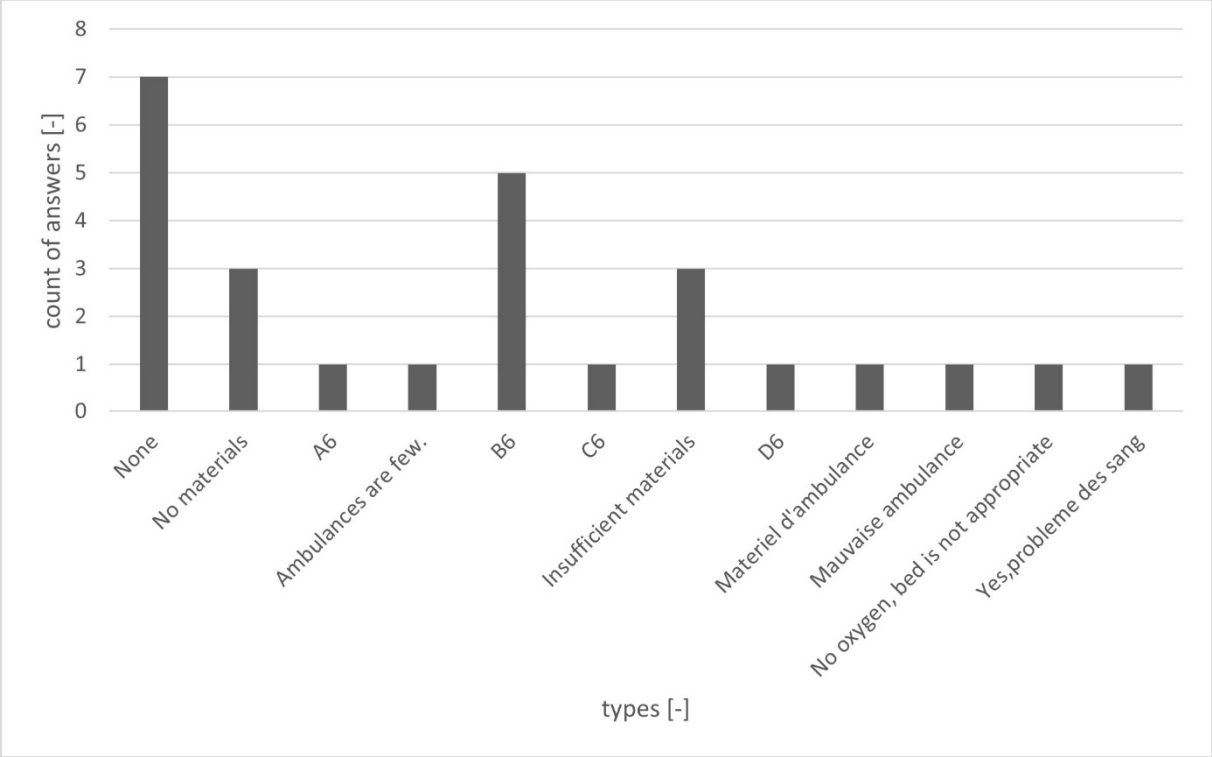

Figure 49: Challenges with the equipment, A6: Ambulances are few and work 24hrs a day. This makes the worn out easily in short period of time (sic!)., B6: Driver has to use equipment, but is not trained (sic!), C6: I used to hear providers complain that there is no appropriate and enough materials (sic!), D6: It seems like usual car, no oxygen supplies even if are not available in the ambulance I should have training about it (sic!)

The last question on challenges was about the work conditions. As shown in Figure 50 (n=26), the drivers stated many different challenges. The most common stated is bad roads (15, 57.7%). No challenges were stated by two participants (7.7%). As 92.3% of drivers state challenges, one can see that a further development of the work conditions is needed.

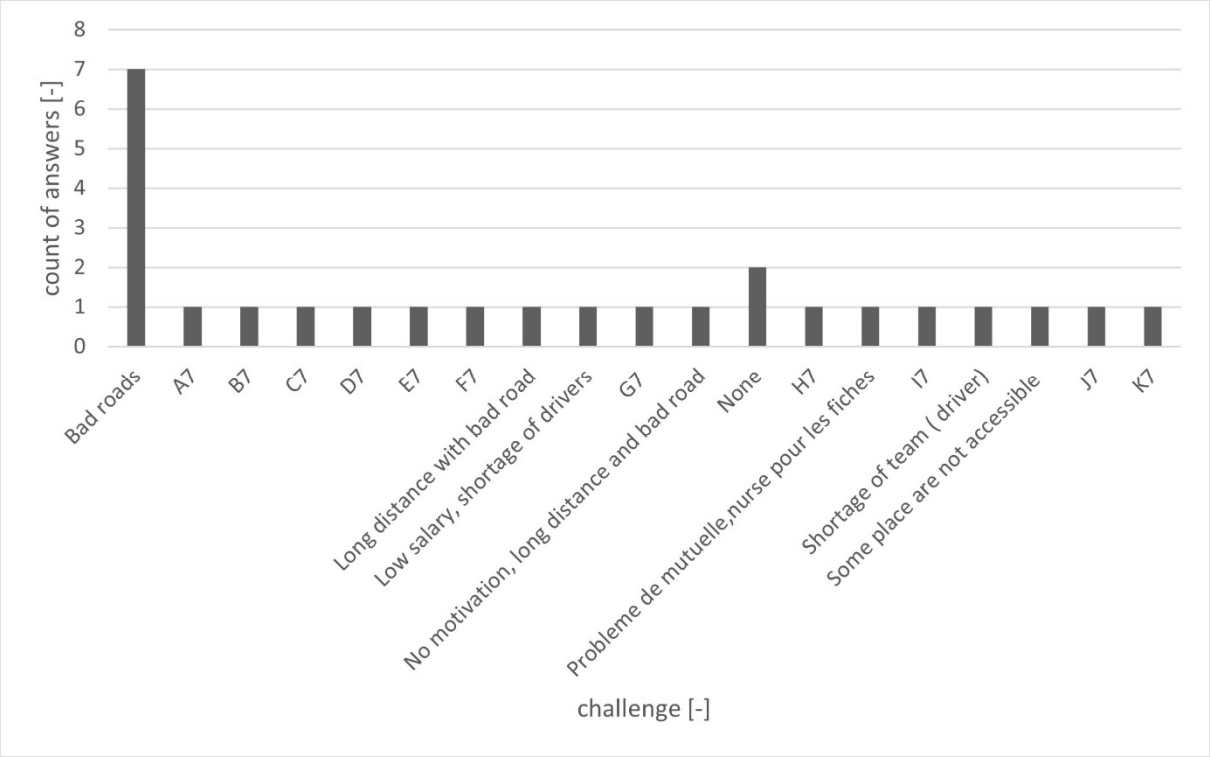

Figure 50: Challenges with the work conditions, A7: Heavy workload no leave (sic!), B7: Bad roads, and raining period, old ambulance (sic!), C7: Heavy workload, working day and night. Low salary and we are working with vocation (sic!), D7: I can be called more that 3times at the same time for emergencies (sic!), E7: Lack of light on the road during the night and bad roads (sic!)., F7: Long distance from hospital to health centre, bad road (sic!), G7: "-Nissan patrol Ambulances are not strong enough to handle rough roads (sic!). H7: Poor roads, Ambulance breakdown and Maintenance challenges during transportation, A lot of work due to few number of ambulance drivers e.g 2 drivers working 24hrs a day on 1 ambulance in different health centres (sic!), I7: Salary that is low than other sites but they are working to solve it (sic!), J7: Unconductive roads, Not enough drives (sic!), K7: We are OK except being called to pass more than 1health without considering condition of patients (sic!)

Pathfinding

As further elaborated in Annexe C – Pathfinding and communication the navigation to the patients' home or location is still done with a verbal description prior the deployment or via phone assistance.

7.1.4. Population

2,725 people were approached for the questionnaire, eleven (0.4 %) did not consent to take part in the interviews (n=2,714). The aim of this questionnaire was to create a basic understanding of the relation between the public and the ambulance service in Rwanda. The patient is the customer of the service and should feel confident to use the service.

First contact in case of illness

To gain a basic understanding of the importance of different stakeholders of the Rwanda Health System for the population, they were questioned to state whom they call first in case someone in the family feels sick. As shown in Figure 56 (n=2714), the most common contacted people are family members (982, 36.2 %), the second most common are health centres (800, 29.5 %) and the third are the community health workers (CHW) (763, 28.1 %). Only one participant (0.04 %) did mention SAMU, which is the national ambulance service of Rwanda, which gives an indication, that the importance of the ambulance service to the population is exceptionally low.

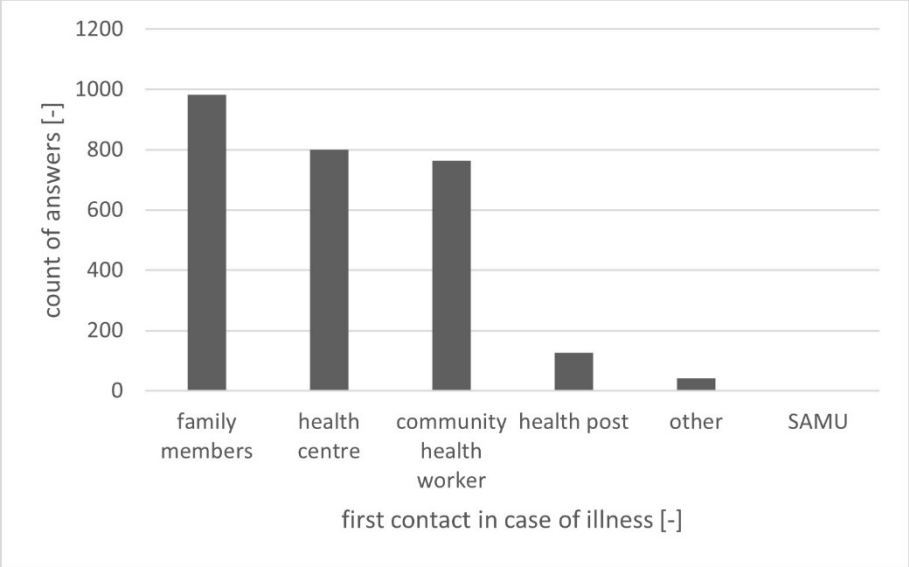

Figure 51: First contact of people in case of illness

As shown in Figure 52 (n=42), all participants who stated “other” as first contact in case of illness did specify this answer. The most common first contact in this group are the neighbours (15, 35.7 %), the second common is the motorcycle taxi (11, 26.2 %). All other answers were given only once (2.4 %) or twice (4.8 %).

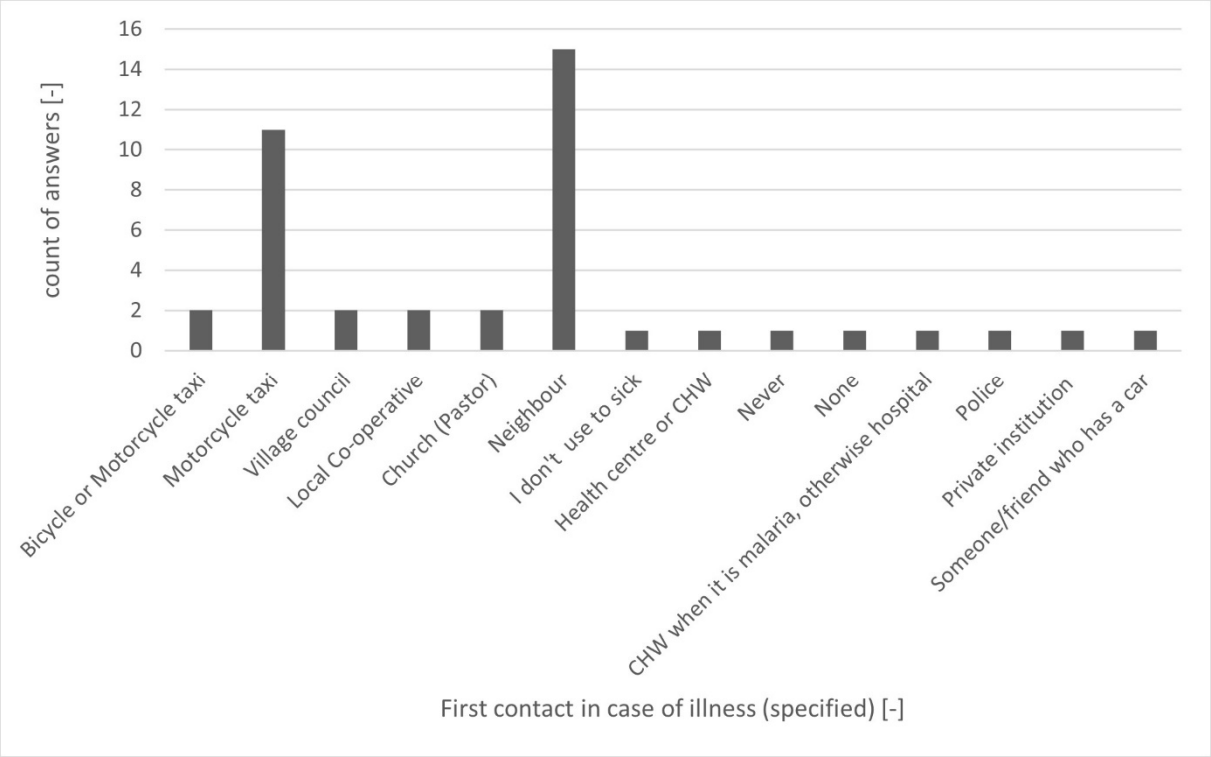

Figure 52: first contact in case of illness, other specified

Knowledge about emergency phone numbers

Do understand how widespread the knowledge of the correct emergency phone numbers in Rwanda is, the population was questioned to name the phone numbers of four different organisations, the fire brigade, the police, the traffic police, and the ambulance service. As a resort, they could also state “I they don’t know”.
As shown in Figure 53 (n= 2714), the vast majority of people doesn’t know any emergency phone number. More specific in case of the fire brigade, 2,457 (90.5 %) don’t know the number. In addition, 225 (8.3 %) named an incorrect number and only 32 (1.2 %) named the correct number. Regarding the police, 2,176 (80.2 %) did not know the number, 260 (9.6 %) stated an incorrect and only 278 (10.2 %) stated the correct one. Regarding the traffic police, 2,424 (89.3 %) did not know the number, 220 (8.1 %) stated an incorrect and 70 (2.6 %) stated the correct number. Regarding the ambulance service, 2,443 (90 %) of the participants stated that they do not know the number, 202 (7.4 %) stated an incorrect and only 69 (2.6 %) stated the correct number.

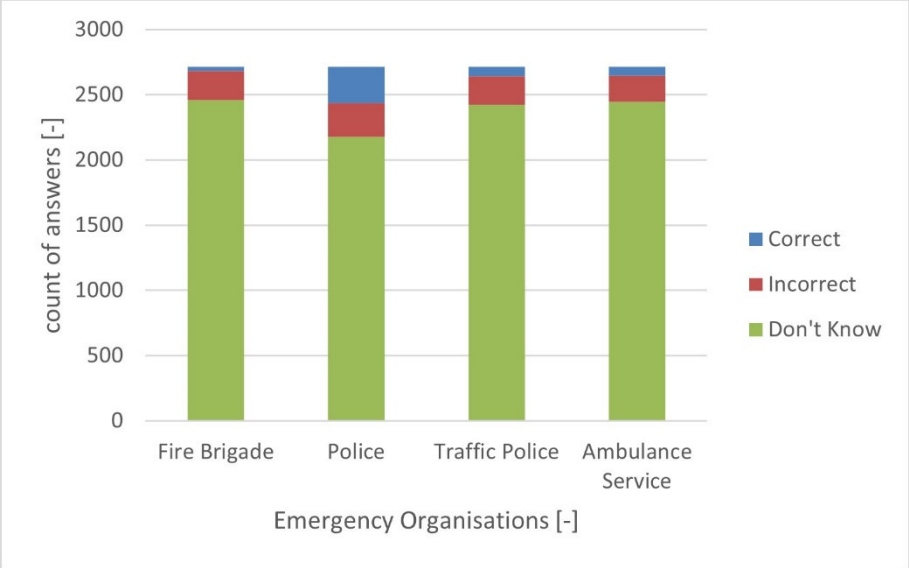

Figure 53: Level of knowledge about emergency phone numbers

Reasons to call an ambulance

The population was questioned, if they would call an ambulance in case of eleven specific diseases/ health problems. Next to these options, they could answer with “other” or that they would never call an ambulance. As shown in Figure 54 (n=2714), the three most common reasons to call an ambulance are delivery (1,618, 59.6 %), labour (1,448, 53.4 %) and road accident (1,424, 52.5 %). These are as well the only three cases where the majority of participants would call for ambulance. In all other cases, the majority would not call the ambulance service. The three reasons with the lowest willingness to call an ambulance are disasters (91, 3.4 %), a person in cardiac or pulmonary arrest (27, 0.99 %) and (Severe) Gender Based Violence ((S)GBV) (26, 0.96 %).
404 people (14.9 %) would never call for an ambulance, the reasons for this decision are elaborated in Figure 55.

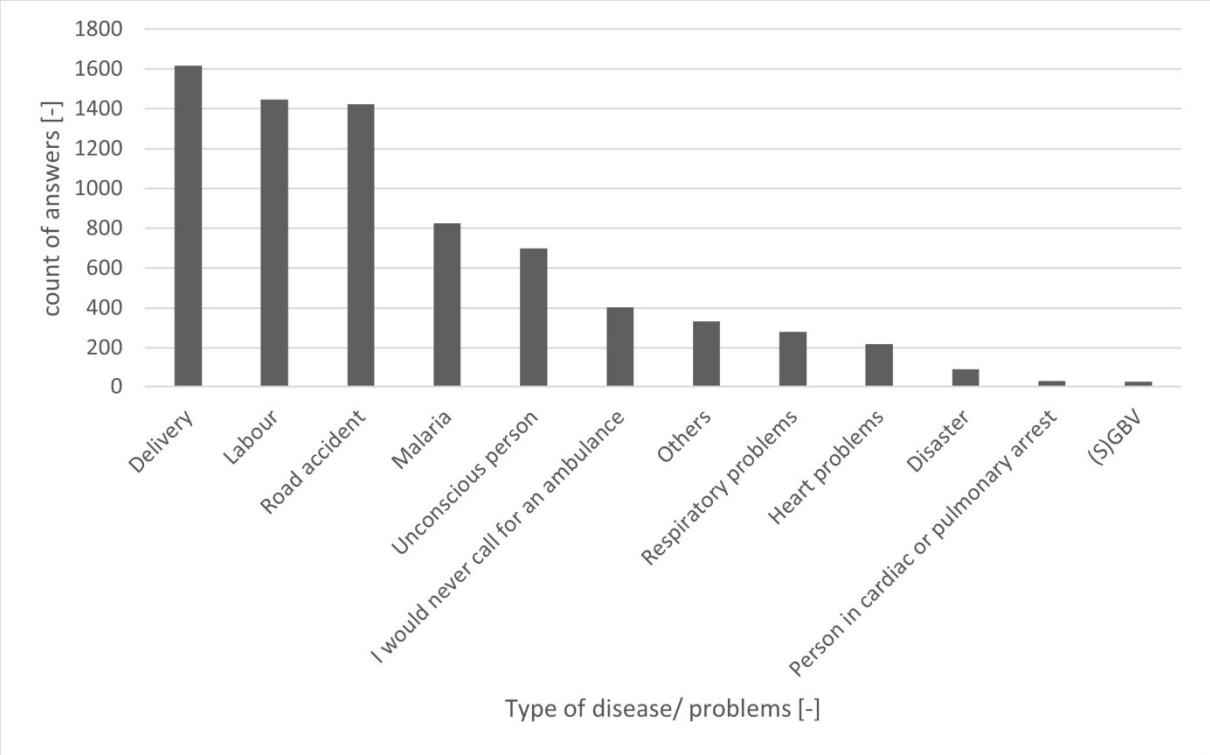

Figure 54: Reasons to call for an ambulance, (S)GBV... (Severe) Gender Based Violence

Out of the 404 people who stated that they would never call an ambulance, 292 (72.3 %) elaborated further. As Figure 55 (n=292) shows, there are two highlighted reasons not to call an ambulance. The most common reason is, that the person doesn't know the number of the ambulance service (117, 40.1 %), 23 people (7.9 %) stated that it is too expensive for them and 152 (52 %) stated "other" as reason. This other reasons are further elaborated in Figure 56

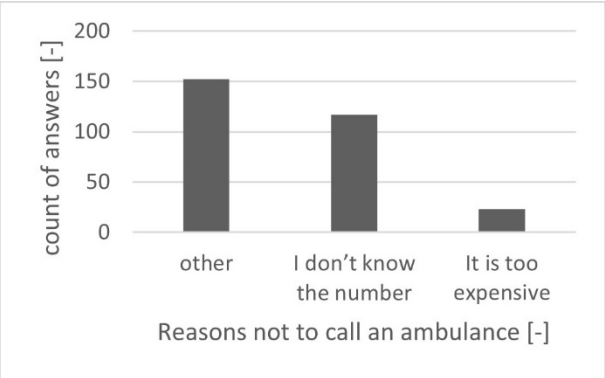

Figure 55: reasons not to call an ambulance

148 (97.4 %) out of 152 people who stated "other" as reason not to call an ambulance did specify this answer. As shown in Figure 56 (n=148), the three most common stated reasons are that they think that the population is not allowed to call direct (64, 43.2 %), that the health centre is the one who calls the ambulance (17, 11.2 %) and that the person has to go to the health centre first (16, 10.5 %).

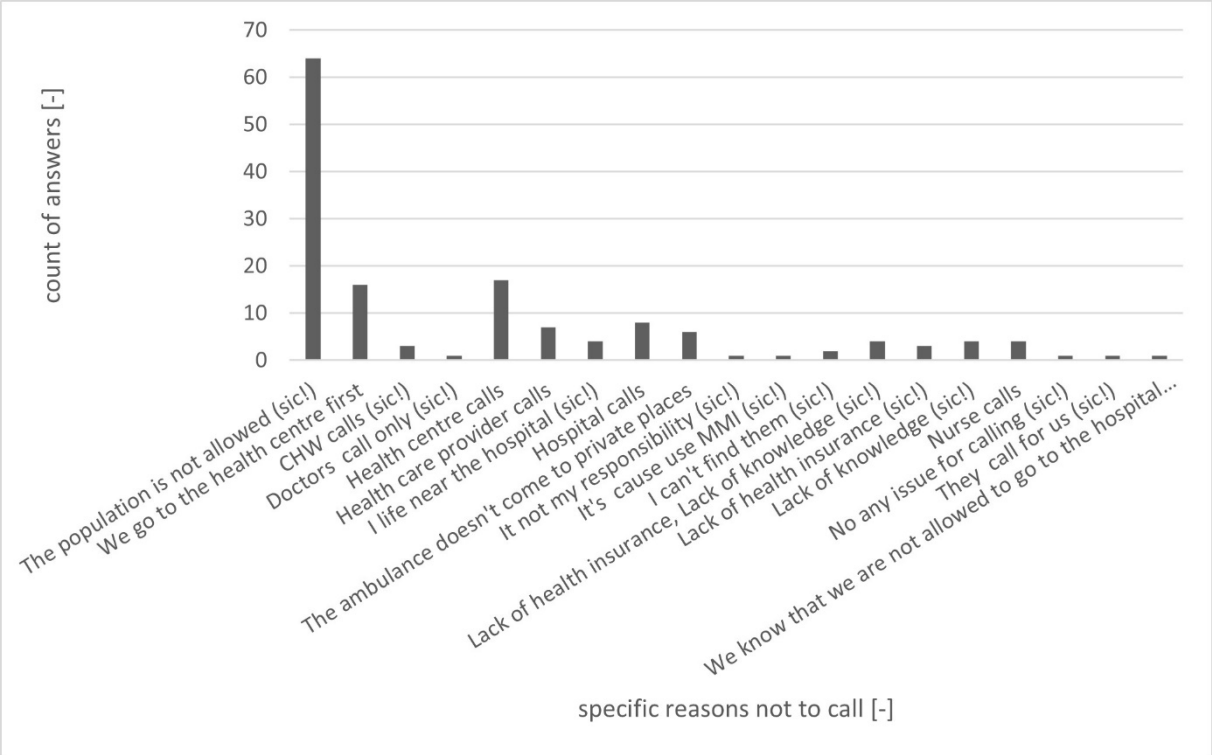

Figure 56: specific reason not to call for an ambulance

As shown in Figure 57 (n=2714), the majority of people, namely 2,592 respective 95.5 % will use other means of transport instead of calling an ambulance. Only 122 respective 4.5 % will choose the ambulance over all other means of transport.

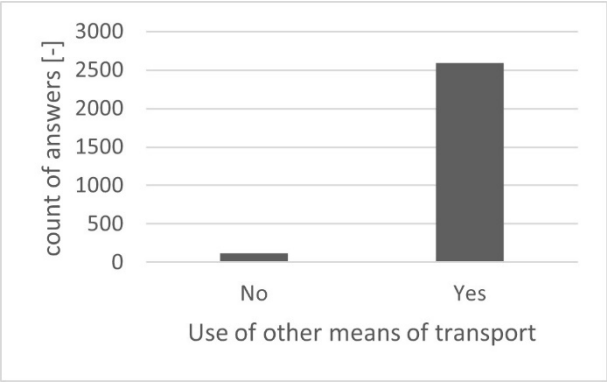

Figure 57: Use of other means of transport

Those 2,592 people who prefer other means of transport were questioned to specify the means. The most common answer is “moto taxi” (motorcycle taxi) with 1,630 (62.9 %) of people who would choose this option if available. The second and third most common means are walking (foot) with 1,390 (53.6 %) and the bicycle with 703 (27.1 %) of participants who would choose this way of transport, if available.

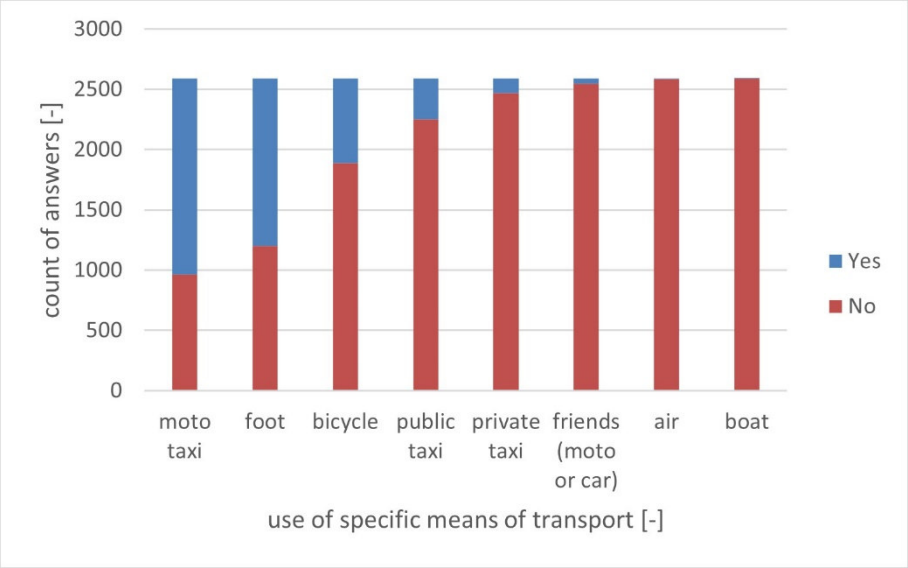

Figure 58: other means of transport specified

Experience with the ambulance system

To create a basic knowledge of the ambulance systems' quality, the population was questioned if they had already contact with the system. As shown in Figure 59 (n=2,714), three possibilities of contact were sampled. In total 1,008 (37.1 %) of the participants did not have any contact with the ambulance system yet. 184 (6.8 %) were present when an ambulance picked up a relative or friend, 451 (16.6 %) did accompany a relative or friend during a transport and 1,071 (39.5 %) were transported in person.

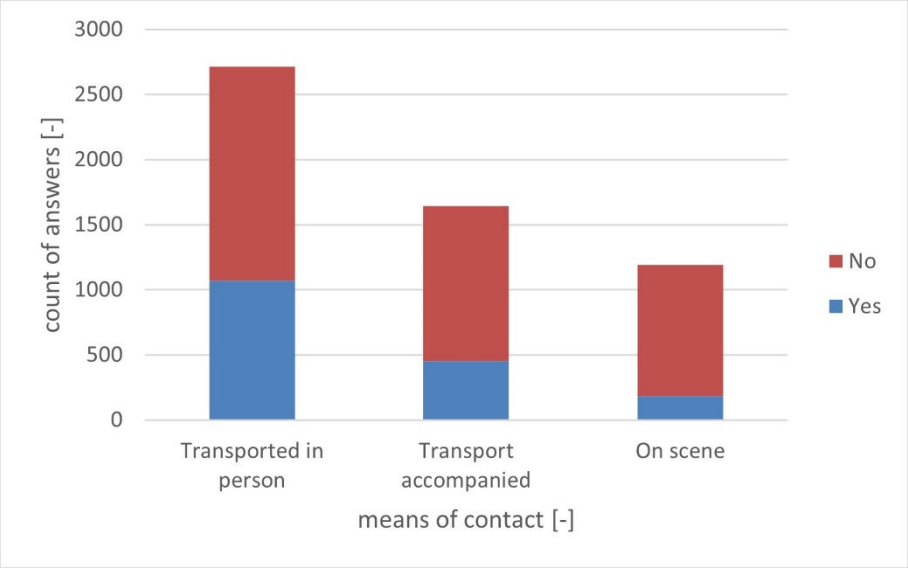

Figure 59: Type of contact with the ambulance system

One important factor for the quality of an ambulance service is the waiting time from the call until the ambulance arrives at the scene (O'Keeffe *et al.*, 2011). This value is often used as a benchmark for systems in western countries.

As shown in Figure 60 (n=1,706), the waiting time differs starting at zero to 15 minutes to more than two hours.
Overall, 501 (29.4 %) waited zero to 15 minutes, 437 (25.6 %) 16 to 30 minutes, 388 (22.7 %) 31 minutes to one hour, 206 (12.1 %) one to two hours and 174 (10.2 %) more than two hours.

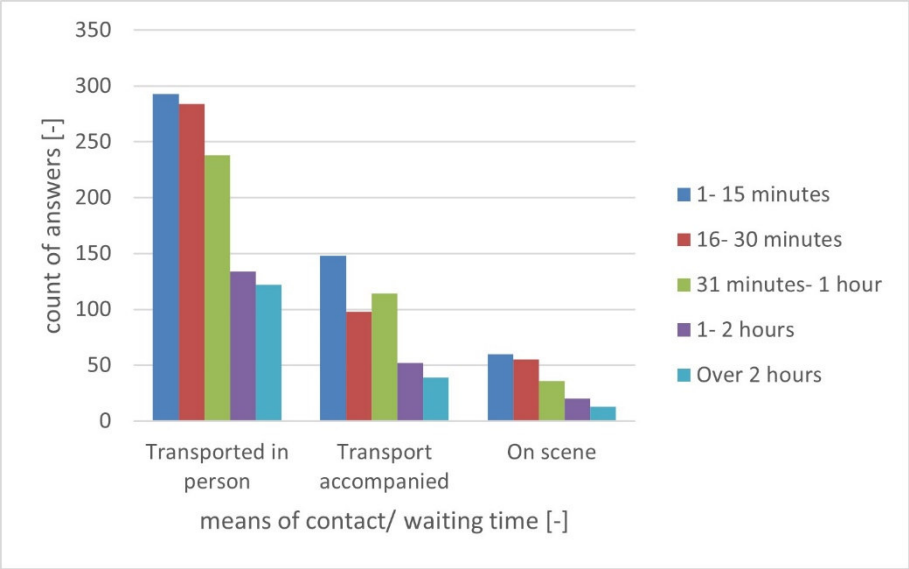

Figure 60: Waiting time for ambulances

As shown in Figure 61 (n=1,706), the satisfaction with the received service by the ambulances is remarkably high. Overall, 1,349 (79.1 %) of the questioned population are satisfied and 357 (20.9 %) are not satisfied.
The result in the group of bystanders stand out, as in this group (n=184) only 29 (15.8 %) were satisfied and 155 (84.2 %) were not satisfied.

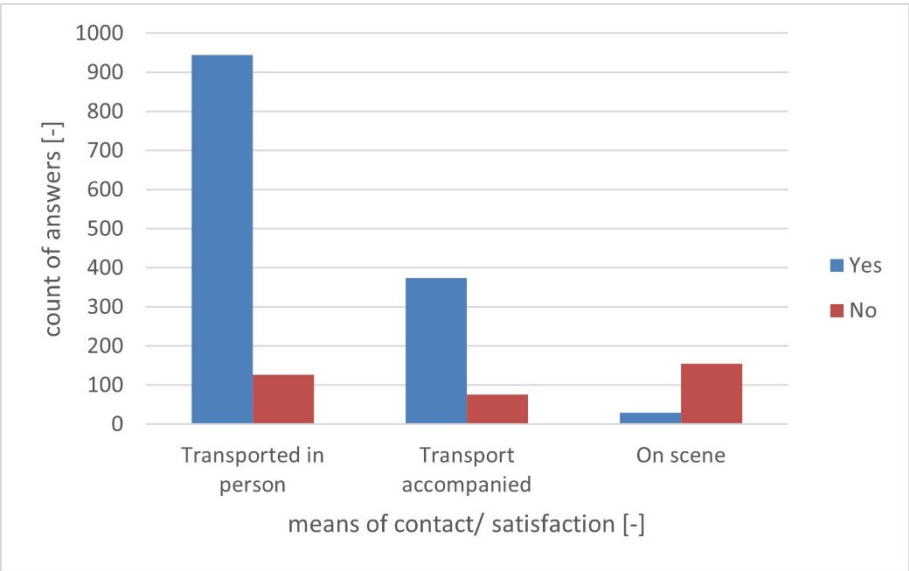

Figure 61: Satisfaction with the rendered service by ambulances

Those who were transported as patient or accompanied a transport (n=1,522), were asked how they felt treated as person. As shown in Figure 62, a vast majority of 1,449 (95.2 %) felt either very well or well treated, 68 (4.5 %) felt bad treated and only five (0.3 %) felt very bad treated.

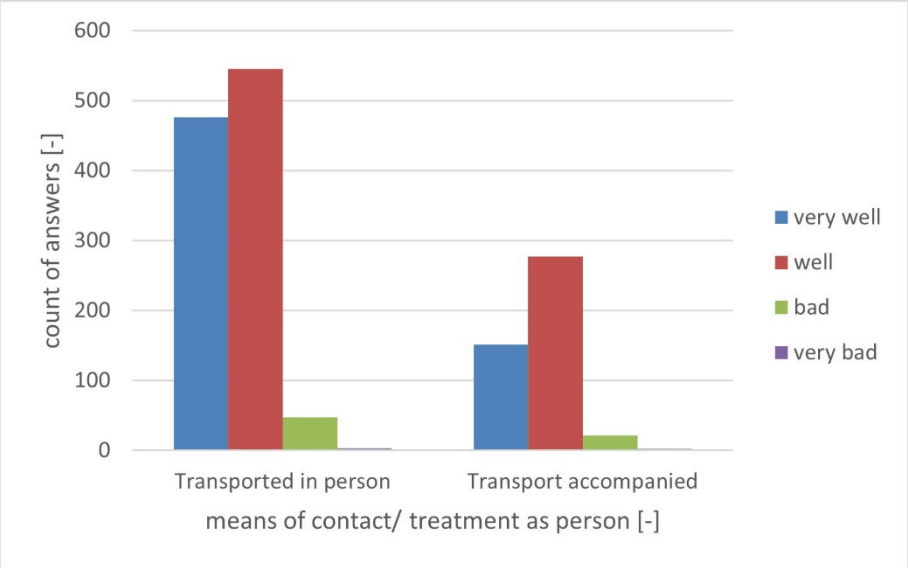

Figure 62: Treatment as person by ambulance staff

The findings regarding the information received about the own situation or the situation of the relative/ friend looks different. As shown in Figure 63 (n=1,552), 473 (31.1 %) felt well informed all the time, 399 (26.2 %) were informed once about their situation, but 650 (42.7 %) participants stated that they were never informed about the findings and the treatment by the ambulance staff.

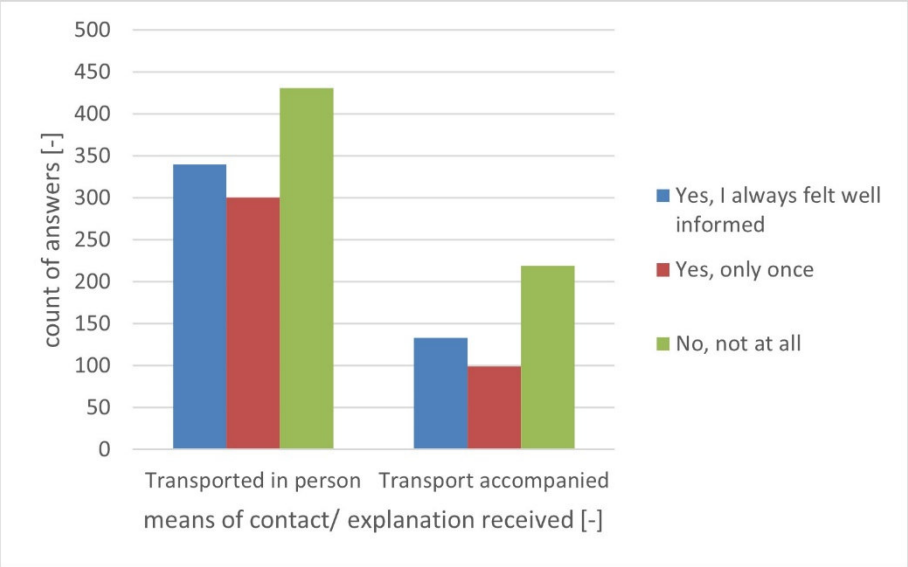

Figure 63: Explanation of the situation of the patient

As shown in Figure 64 (n=1,071), those who have been transported in person were questioned, if the ambulance did go directly to the admitting health facility or if they made stops on the way. An absolute majority of 1,044 (97.5 %) was transported without any stops on the way, only in minor cases (20, 1.9 %) the ambulance stopped once and in 7 (0.6 %) multi stops were made.

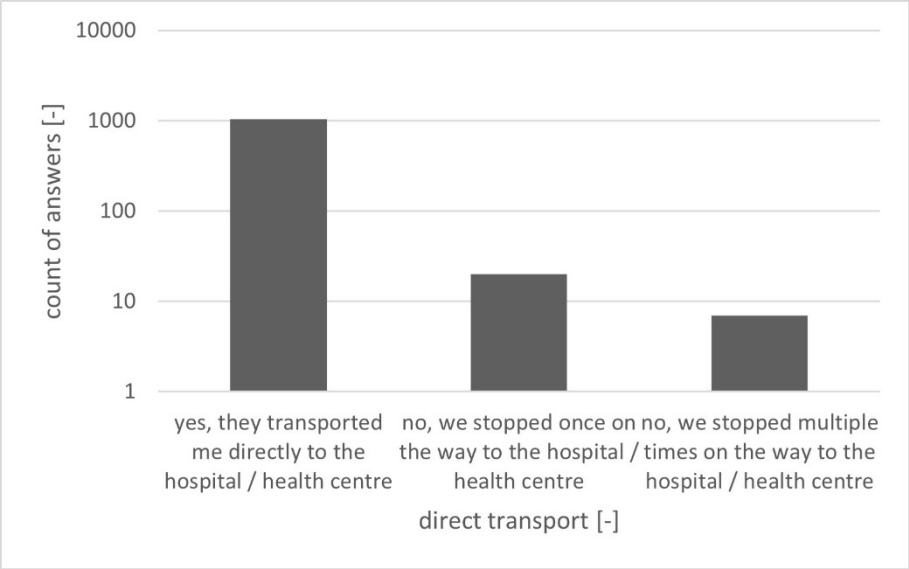

Figure 64: Transport to the admitting health facility

Ambulance staffing

As shown in Figure 65 (n= 1,706), the number of staffers operating an ambulance can be quite different. While in the vast majority of cases (1,299, 76.2 %), one driver and one other person (nurse or midwife) reaches the scene, in 345 (20.2 %) cases a third person is on board. In very rare cases (14, 0.8 %) only the driver is operating the ambulance and in 48 (2.8 %) the participants stated “other” about the staffing.

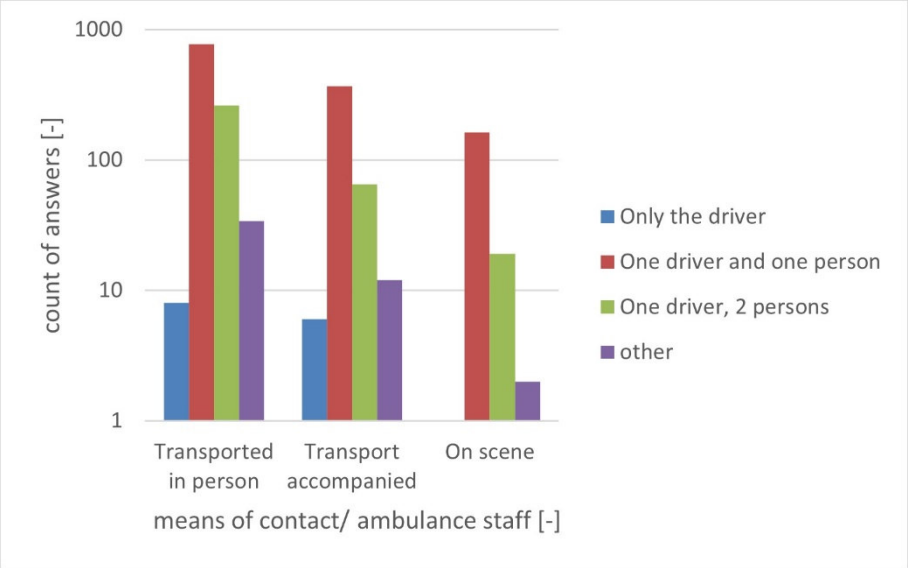

Figure 65: ambulance staffing

During the transport, one person should always be with the patient. Otherwise, it is not possible to react on a change of the situation of the patient. As shown in Figure 66 (n=1,522), this is only the case in 631 (41.5 %) of the answers. In the majority of cases (891, 58.5 %), all staff members sat in the front cabin during the transport of the patient.

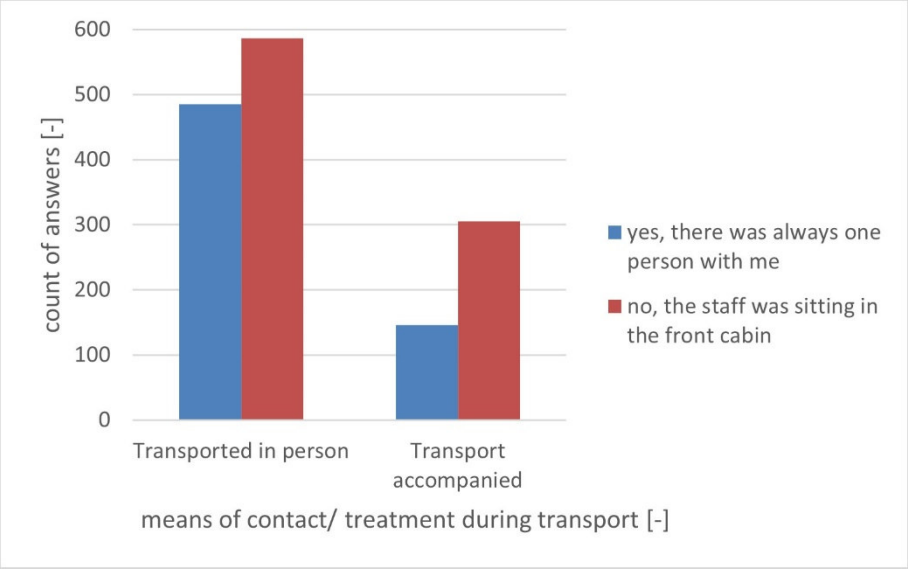

Figure 66: Caretaking and treatment during the transport

Cost and payment/ insurance

As shown in Figure 67 (n=1071), the insurance covered the total amount of the transport only in 234 (21.8 %) cases, the majority of cases, namely 791, respective 73.9% paid a retention. In 46 (4.3 %) cases, the insurance did not cover any costs and the patient had to pay the full amount him/herself.

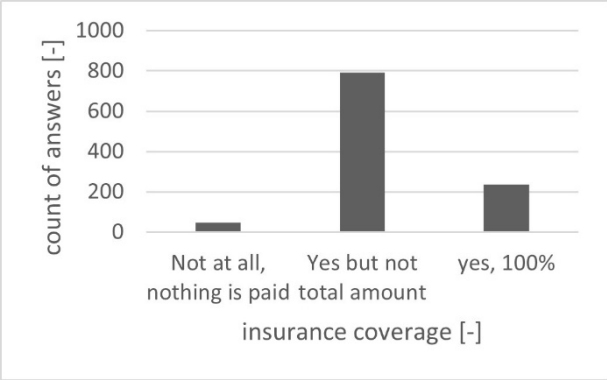

Figure 67: Insurance coerage

Those who paid retention (n=791), were asked how much percentage they had to cover by themselves. As shown in Figure 68, the retention varies. However, the vast majority (639, 80.8 %) contributed ten percent of the total costs. On the opposite 44 (5.6 %) had to contribute 90 % by themselves.

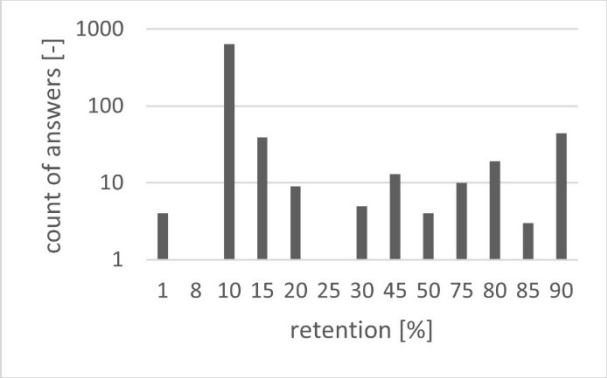

Figure 68: Percentage of retention

7.2. Midterm survey

As the time between the baseline and the midterm survey was less than one year, the midterm survey was conducted with reduced questions, as presented in Annexe H – Midterm questionnaires, and with a reduced number of participants. The end line survey which is planned for June 2021 will than cover all questions and more participants again.

The two hospitals, where the Rwanda Red Cross Society established their ambulance service were chosen to participate in the midterm survey. This way, a possible impact of the new service might be already measurable.

The demographic data was collected only from the population, hence not from the staff. As shown in Annexe B – Midterm demographic data, only three of the approached people (0.2%) did not consent to participate in the study. Which indicates a high level of interest in such studies.

Around two third of the participants (1,179, 67.6%) are 21 to 40 years of age. The smallest groups are those participants 60 years plus (109, 6.3%) and the youngest group, below the age of 20 (62, 3.6%).
Females are represented with 88% (1.529) and males with 12% (214).

The interviews were conducted with different groups of people, as shown in Table 5. The same groups were chosen as in the baseline survey. Thus, to enable the comparison of different opinion on the same questions.

Table 5: Midterm participants' overview

Interviewee	count
Ambulance staff (nurses/ midwives)	21
nurses	13
Midwives	6
Head nurse of service	2
Hospital management staff	4
Clinical director	2
Fleet manager	2
Ambulance driver	11
Population	1,743
Total	1,779

7.2.1. Nurses and midwives

As shown in Figure 69 (n=19), all interviewed nurses and midwives of Nyamata hospital (n=6) have not received any training for the work in the ambulance service. In Kibirizi hospital (n=13), six (46.2 %) have not received any training, while three (23.1 %) have received a First Aid Training and an additional unspecified training and two (15.3 %) have received a PHTLS training. One (7.7 %) has received a BLS training and one (7.7%) has received only a First Aid Training.
Overall, twelve out of 19 (63.2 %) have not received any additional training.

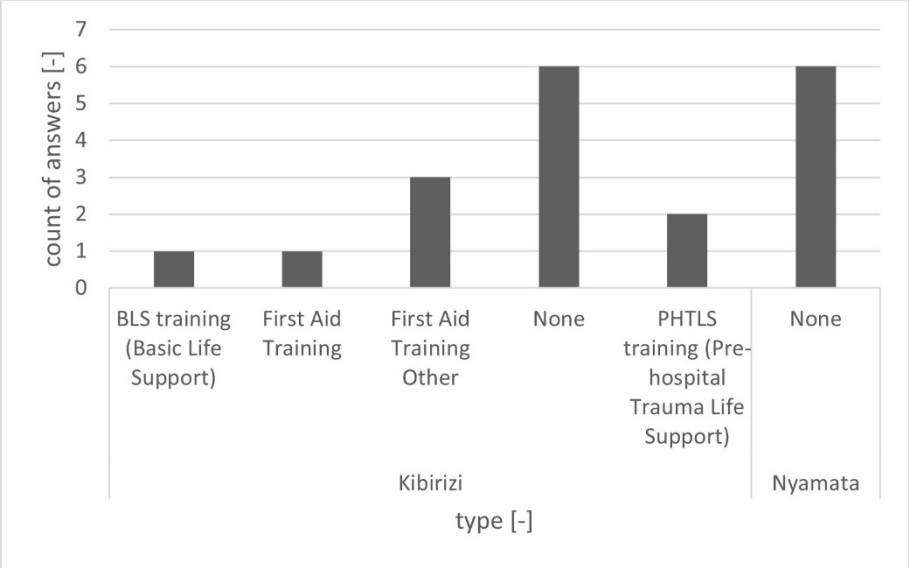

Figure 69: training received by nurses and midwives

Ambulance equipment

Only the two head nurses of the emergency department were questioned about the available equipment in their ambulances.
As shown in Figure 70 (n=2), most polled equipment, to respond to internal medicine and neurological cases, is available in both hospitals, but an Automated External Defibrillator (AED) is not available at all.

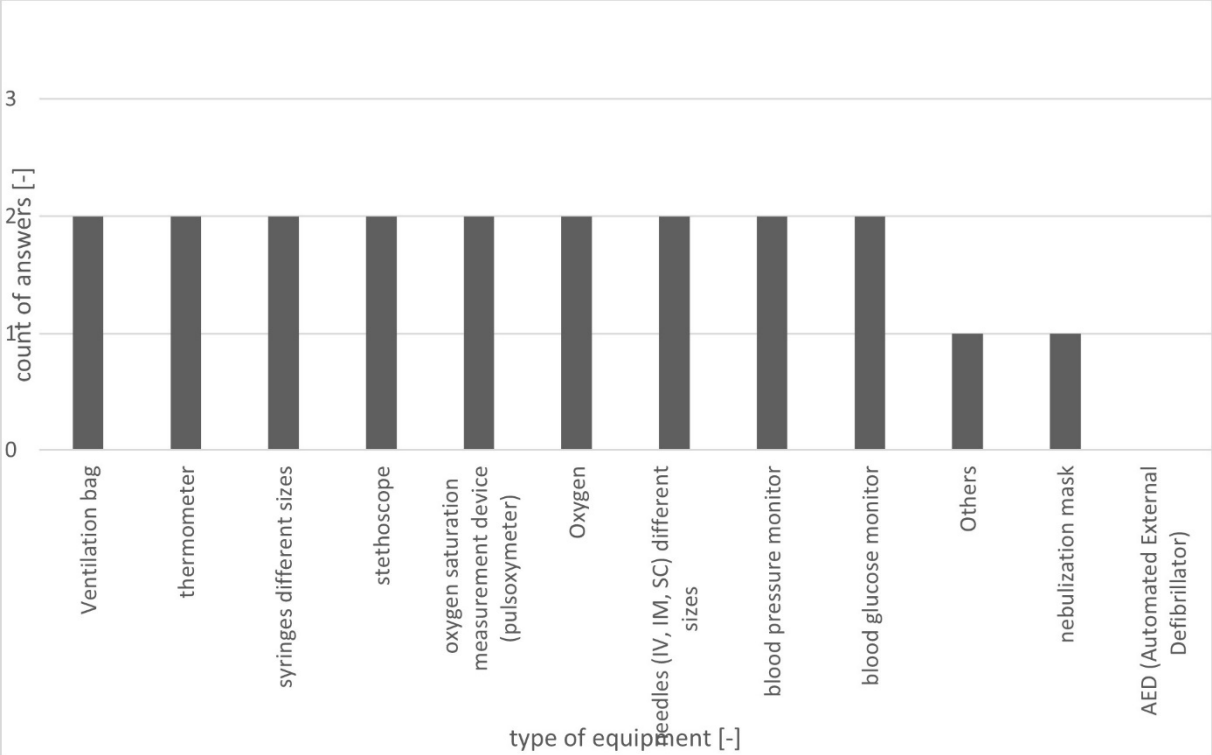

Figure 70: available equipment to respond to internal medicine and neurological cases

As shown in Figure 71 (n=2), as well most of the equipment, to respond to trauma cases, is available in both hospitals. A vacuum mattress and a leg splint are only available at one site (50%).

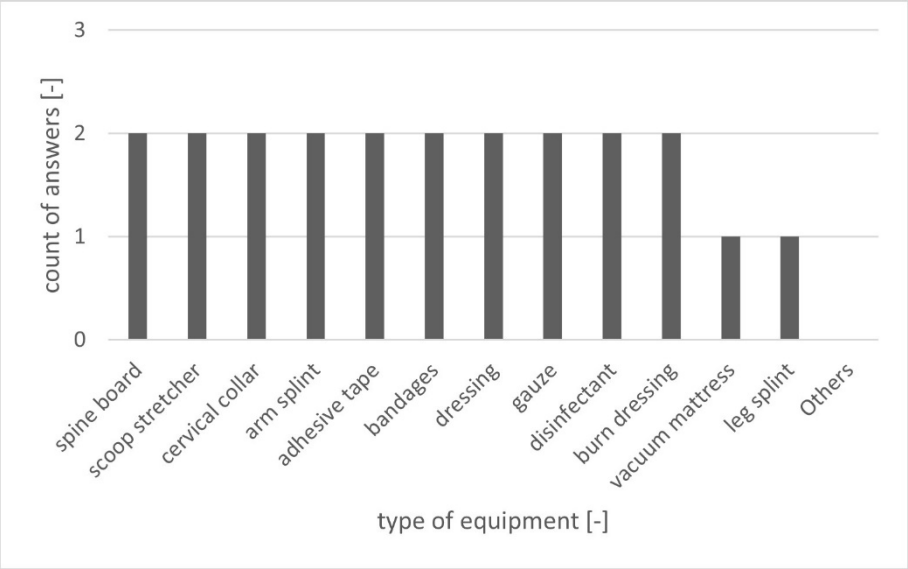

Figure 71: available equipment to respond to trauma cases

As shown in Figure 72 (n=2), all polled equipment, to respond to maternity/ delivery cases, is available in both hospitals. One hospital even carries additional equipment in the ambulance.

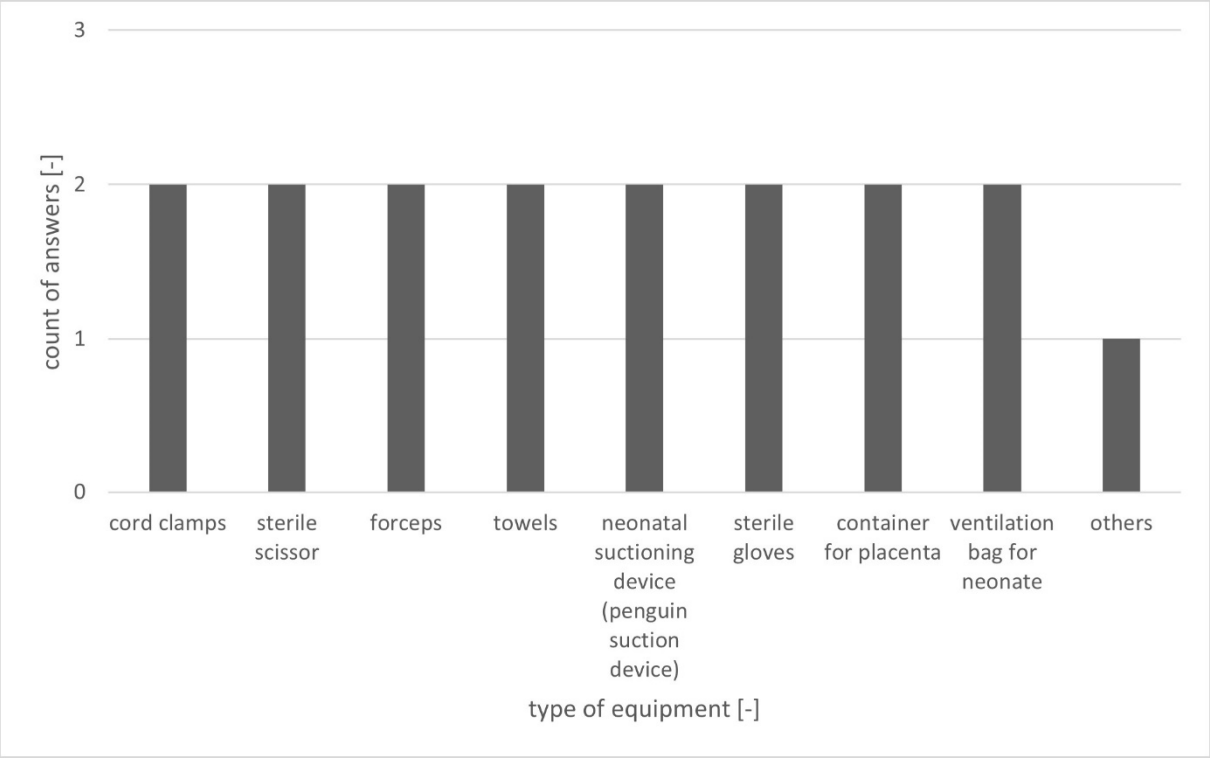

Figure 72: available equipment to respond to maternity/ delivery cases

While the baseline survey was conducted before the Covid-19 pandemic started, the midterm survey was conducted during the pandemic.
As shown in Figure 73 (n=2), both hospitals carry face masks and gloves in the ambulances. Only one of them is equipped with hats, helmets, shoe cover and other personal protective equipment. Both lack goggles, aprons and overalls.

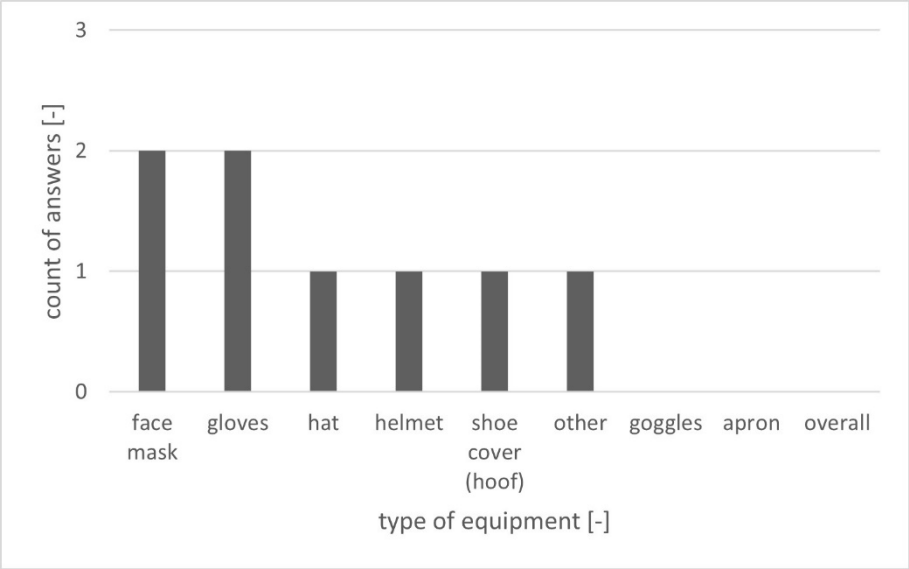

Figure 73: available PPE

As shown in Figure 74 (n=2), only alcohol is available at both sites to carry out personal hygiene measures. Water, soap, hand sanitizer, antiseptic and even other equipment is only available at one site (50%).

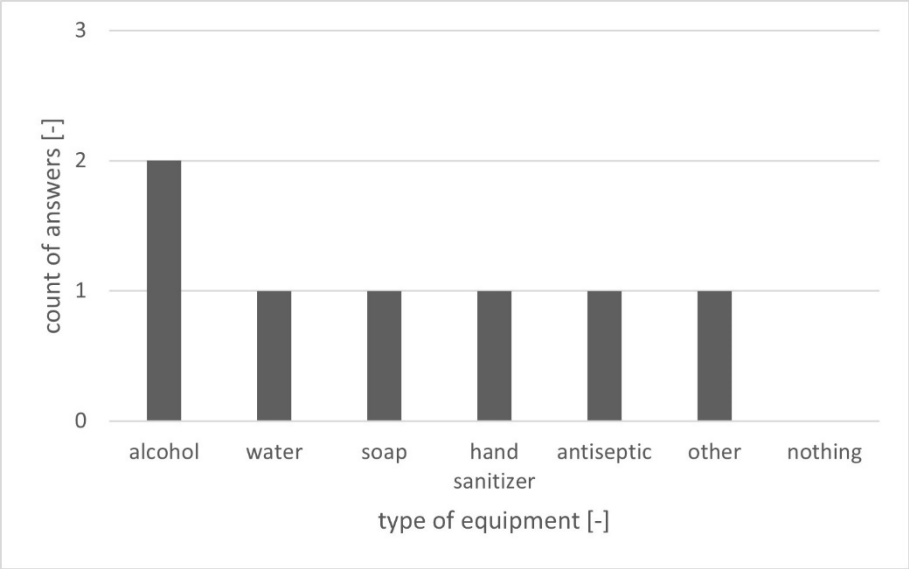

Figure 74: available equipment for personal hygiene

As shown in Figure 75 (n=2), both cases have experienced problems with the ambulance equipment. While both participants (100%) found out that equipment was

missing, one (50%) had additional challenges with equipment which was out of stock and even other.

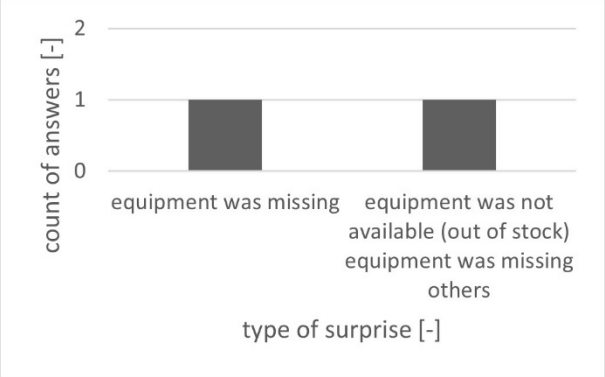

Figure 75: surprises experience with ambulance equipment

Supply chain responsibility

As shown in Annexe E – Supply chain responsibility, according to the clinical directors, the supply chains' responsibility is with the head nurse of the emergency department. This answer differs from the answer of the baseline, where no single position of responsibility could be determined.

Ambulance cleaning and disinfection

As shown in Annexe F – Ambulance cleaning and disinfection, even though only two participants were questioned about the ambulance cleaning and disinfection, the answers vary. The responsibility is either with the nurse/ midwife or with the hospital cleaner. The frequency is either "after every patient" or "once a day".
No difference to the variety of answers in the baseline was found.

Documentation

As shown in Figure 76 (n=21), the majority (twelve, 57.1%) of the ambulance staff does not use a standard patient care report yet.

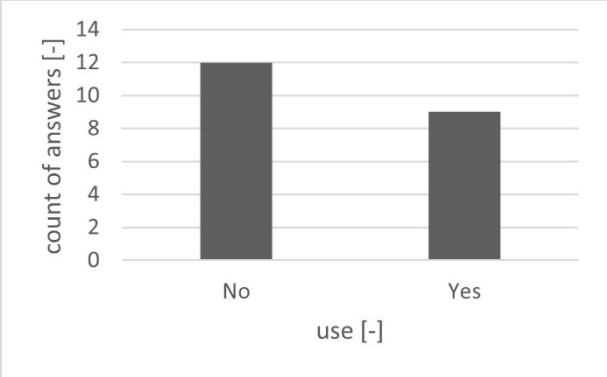

Figure 76: Use of standard patient care report

Communication

As shown in Figure 77 (n=21), most of the participants (18, 85.7%) communicate the diagnose of the patient to the admitting hospital. Additional common communicated information is vital parameter (16, 76.2%%), treatment received (15, 71.4%), symptoms onset (12, 57.1%) and additional, not specified information (13, 61.9%). The two least often communicated parameters are ETA (five, 23.8%) and number of the client (one, 4.8%).

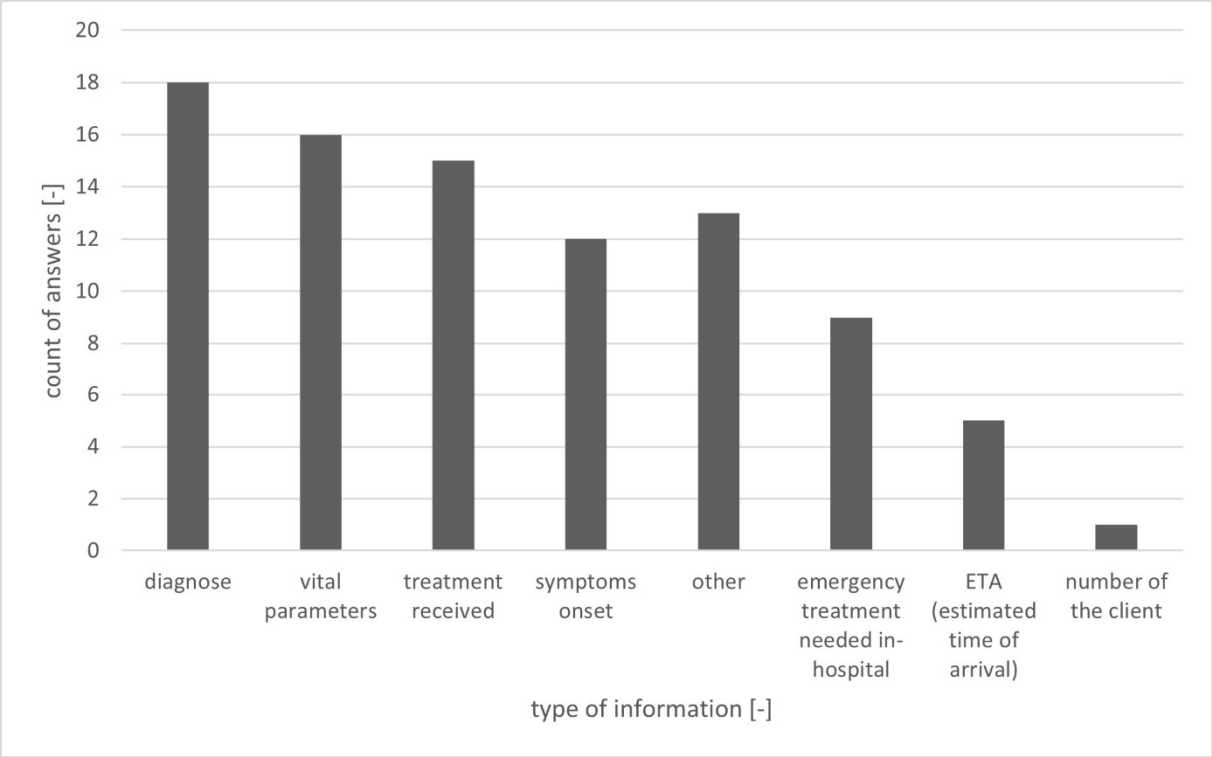

Figure 77: communication of patient information to the admitting hospital

As shown in Figure 78 (n=21), after communicating the first status of the patient to the admitting hospital, only seven respective 33.3% of the ambulance staff keep up the communication with the hospital during the transport. The other 14 respective 66.7%

do not inform the hospital of any change in condition during the transport before arriving there.

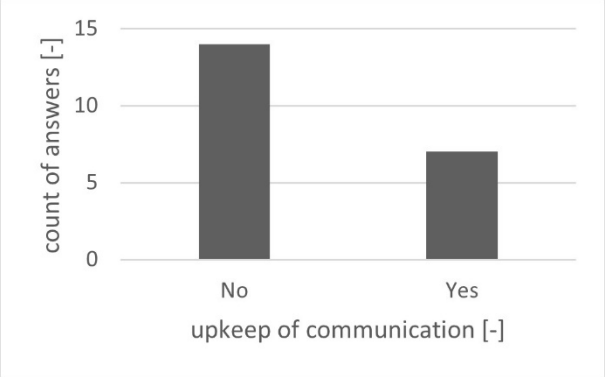

Figure 78: Communication with the hospital during transport

As shown in Figure 79 (n=21), even less staff (five, 23.8%) keeps up the communication with the patient during transport, than with the hospital. Sixteen (76.2%) do not communicate with the patient during the transport.

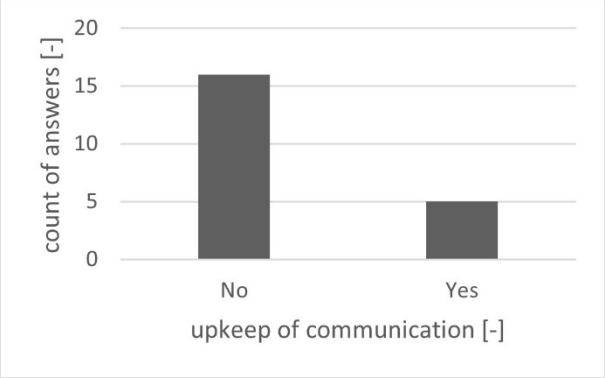

Figure 79: communication with the patient during transport

Use of guidelines

As shown in Figure 80 (n=21), the use of guidelines in the pre-hospital service is rare. Only three (14.3%) stated that they are using guidelines for their work.

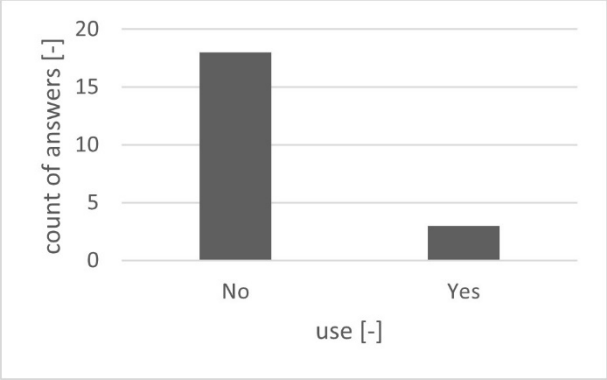

Figure 80: Use of guidelines

As shown in Figure 81 (n=21), all participants see a need for the further development of the EMS in Rwanda. 18 (85.7%) see the need of additional training, 17 (81%) the need of more/ better equipment and 15 (71.4%) see a lack of staff.

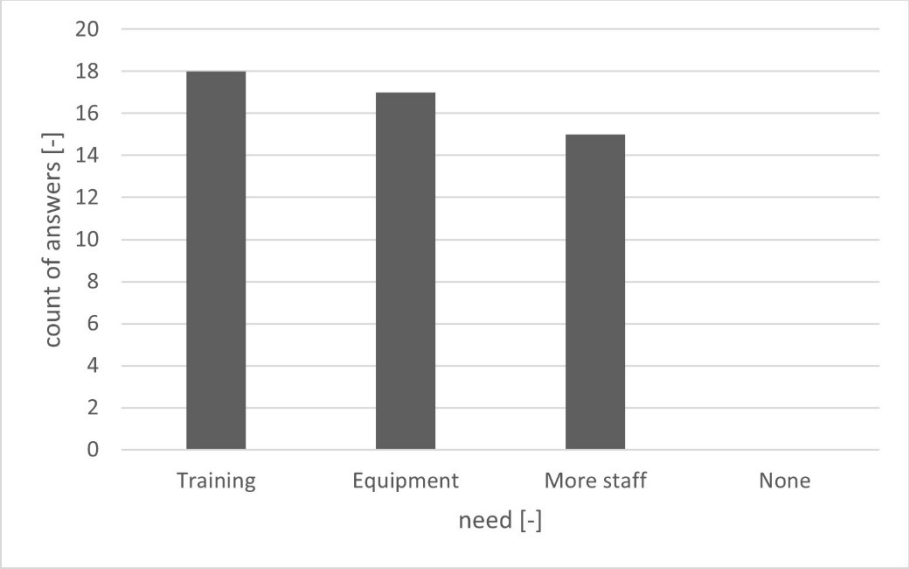

Figure 81: specific need(s) for further development of the system

7.2.2. Hospital management

As shown in Figure 82 (n=2), both participants see a need of further development of the system, especially in the area of training.

Figure 82: specific need for further development of the system

As shown in Figure 83 (n=2), the fleet managers were asked about the number of ambulances under their responsibility and the number of operational ambulances. While in Kibirizi only 50% (three out of six) ambulances are operational, the situation in Nyamat looks better. There 70% (seven out of ten) are operational.

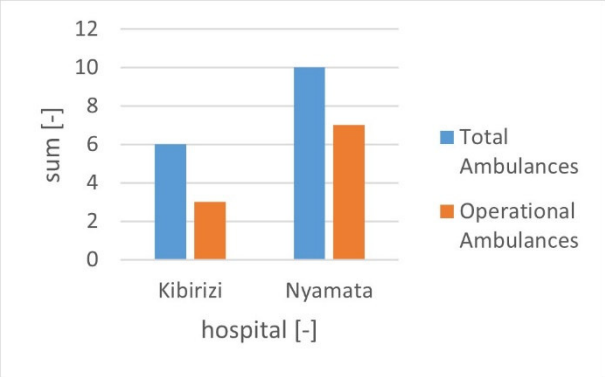

Figure 83: total and operational ambulances

As shown in Figure 84 (n=2), according to the clinical directors, in one case (50%), the ambulances are staffed with an EMT, a nurse/ midwife and a medical doctor. In the other case (50%), the ambulances are staffed with a driver and a nurse/ midwife. As in the baseline, one can see a clear difference in the statements of the management level and the operational staff.

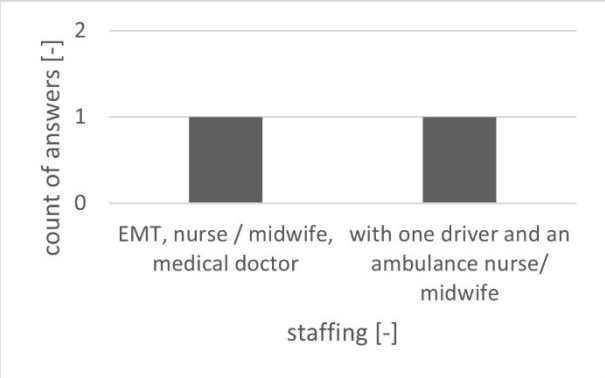

Figure 84: ambulance staffing

As shown in Figure 85 (n=2), one (50%) is lacking staff for the ambulances, s/he specified this lack with drivers and nurses. The other participant stated that there is no need for additional staff. This point of view differs from the point of view of the operational staffers.

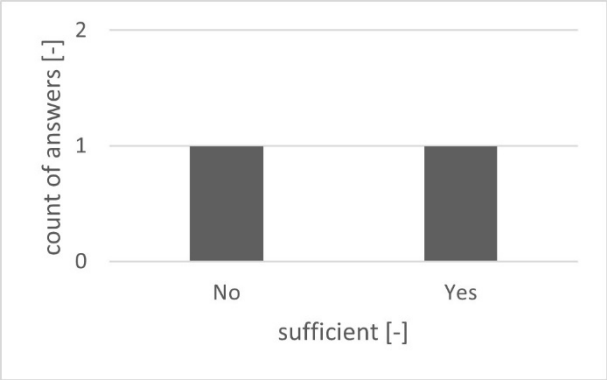

Figure 85: lack of ambulance staff

As shown in Figure 86 (n=2), both clinical directors (100%) are aware of the profession of EMT/ ECA. As they are the heads of the hospitals, where the RRCS established the pilot phase of the EMT project, this was expected.

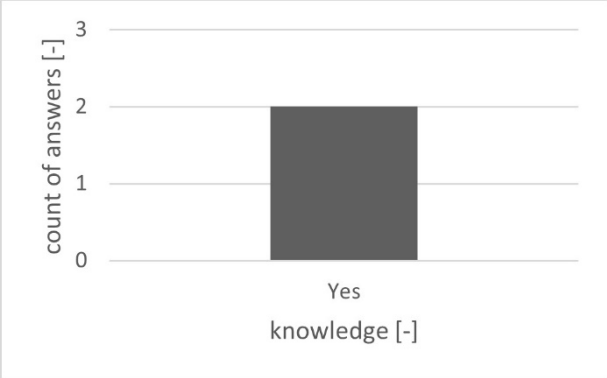

Figure 86: Knowledge about the EMT profession

As shown in Figure 87 (n=2), in both cases (100%) a standard patient care report is used. As with other findings, the statements of the management staffers according the use of patient care reports, differs clearly to the statements of the operational staffers.

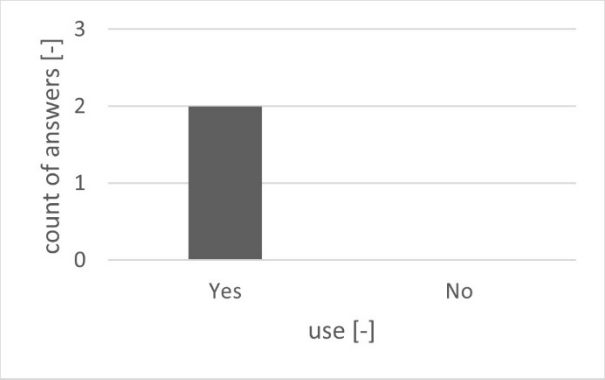

Figure 87: use of standard patient care report

As shown in Figure 88 (n=2), as well as with the patient care reports, guidelines are used in both cases (100%), according to the management staff. Once more, this point of view differs clearly to the point of view of the operational staffers.

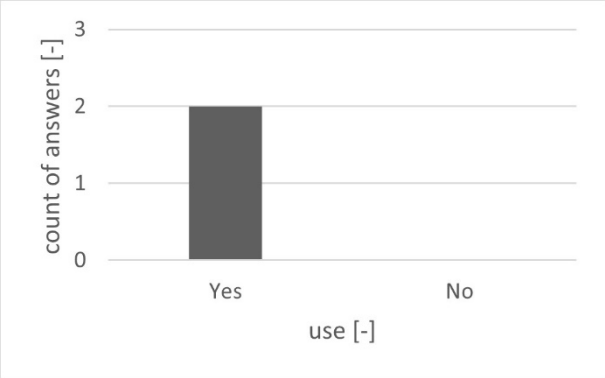

Figure 88: use of guidelines in the ambulance service

As shown in Figure 89 (n=2), the ambulances of both hospitals (100%) respond to maternity and paediatric cases. While only in one case (50%), they also respond to trauma and internal medicine cases.

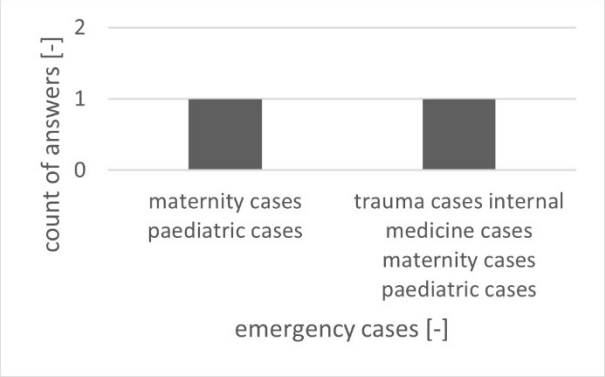

Figure 89: reasons for deployment

As shown in Figure 90 (n=2), in both cases (100%), the access to the emergency room is available with a stretcher. One can see, that the statements are similar to those in the baseline survey.

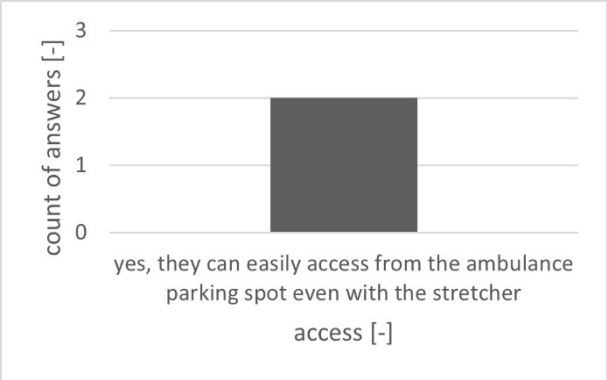

Figure 90: access to the emergency room

7.2.3. Ambulance driver

Training received

As shown in Figure 91 (n=11), five participants (45.5 %) have received the EMT/ECA training already, five (45.5 %) have received a First Aid training and only one (9%) has received a training not specified.

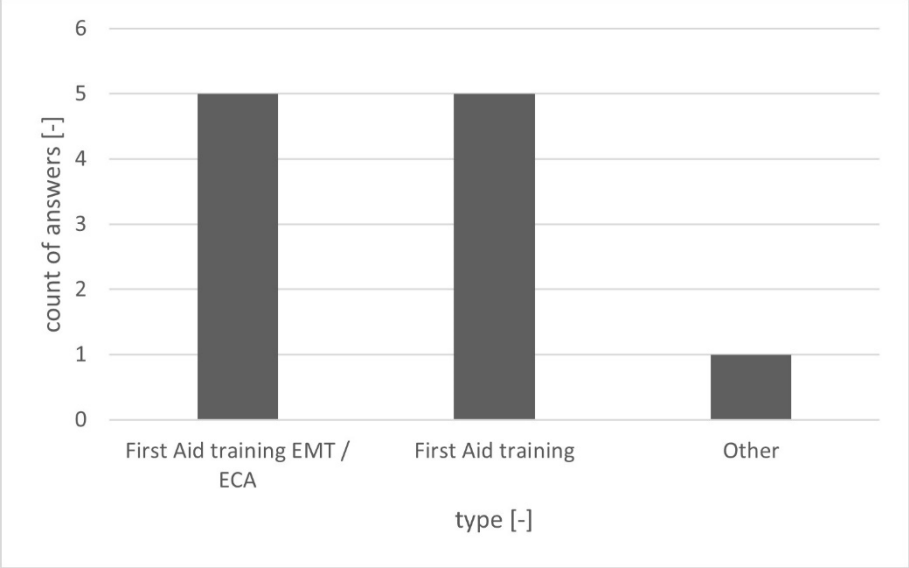

Figure 91: Training received by ambulance drivers

7.2.4. Population

Experience with the ambulance system

As shown in Figure 92 (n=1,743), 1,698 (97.4%) of the participants had already contact with the ambulance service in Rwanda. Only 45 (2.6%) have neither been transported by themselves, nor accompanied a transport, nor been present at the scene of an ambulance pick up.

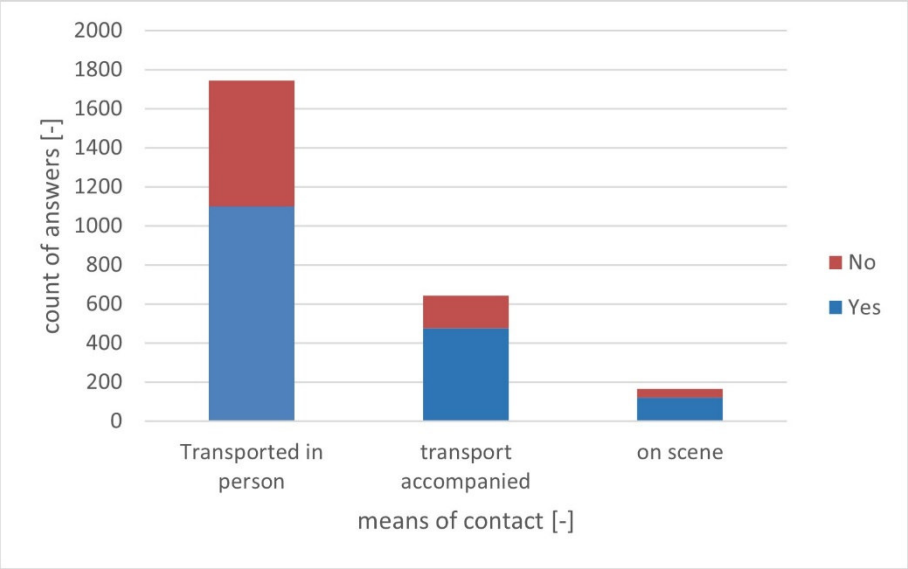

Figure 92: type of contact with the ambulance system

As shown in Figure 93 (n=1,698), the waiting time for an ambulance differs widely. The most common time frame waiting is 16- 30 minutes (540, 31.8%). The second most often mentioned (436, 25.7%) is 31 minutes to one hour, the third most often (420, 24.7%) zero to 15 minutes. The longest waiting periods are also the less often stated ones, the period of one to two hours was stated 156 times (9.2%) and a waiting time of more than two hours, 146 times (8.6%).

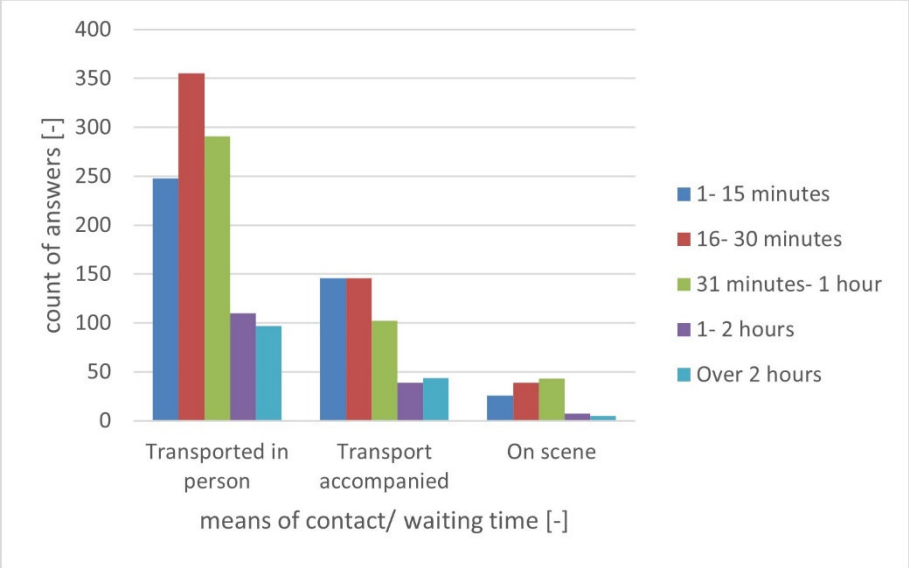

Figure 93: waiting time for an ambulance

As shown in Figure 94 (n=1,578), the vast majority of participants (1,411, 89.4%) is satisfied with the service they received. Only a minority of 167 people (10.6%) was not satisfied with service.

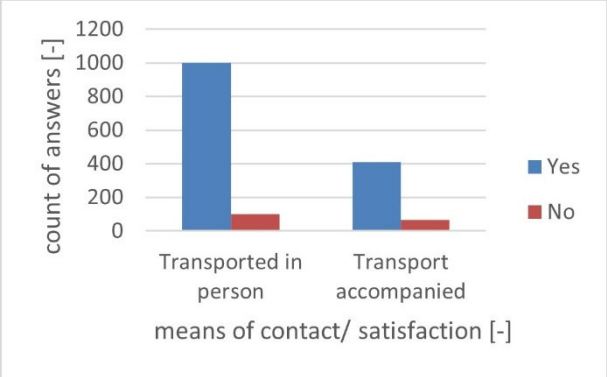

Figure 94: Satisfaction with ambulance service

As shown in Figure 95 (n=1,578), the vast majority of participants (1,516, 96.1%) felt either very well or well treated as a person. Only in rare cases (58, 3.7%) they felt bad treated and in a few exceptional cases (4, 0.2%) the participants felt very bad treated.

Figure 95: Treatment as person by the ambulance service

As shown in Figure 96 (n=1,578), most of the treated people and also those who accompanied a transport (972, 61.6%) felt well informed at all times. An additional 303 (19.2%) were informed once, but still 303 (19.2%) did not receive any information about the findings and treatment.

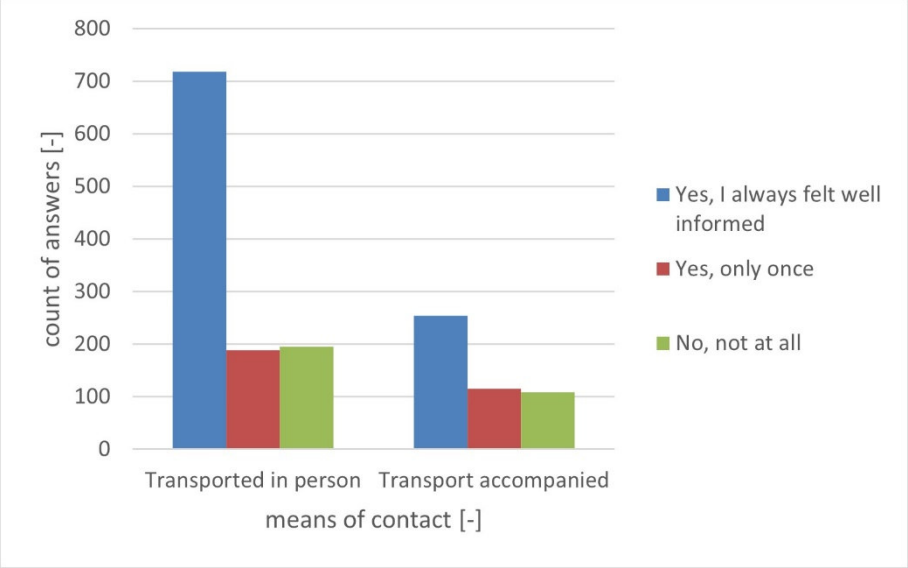

Figure 96: Explanation of findings and treatment

As shown in Figure 97 (n=1,101), almost all (1,059, 96.2%) transports directly approached the admitting hospital. In a few cases (39, 3.5%) the ambulance did stop once on the way to the health facility and in three cases (0.3%) they stopped more than once.

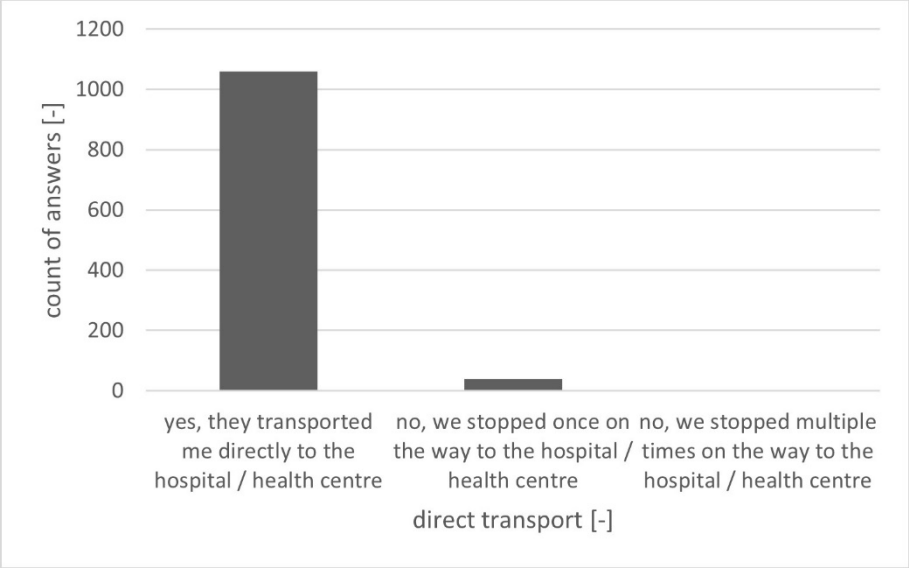

Figure 97: Direct transport to the health facility

Ambulance staffing

As shown in Figure 98 (n=1,698), the most common answer (1,644, 96.8%) stated according to ambulance staffing is “a driver and a nurse/midwife”. In 31 cases (1.8%), only the driver operated the ambulance. In 22 cases (1.3%) a driver and two additional persons arrived with the ambulance and in only one case (0.1%) another constellation operated the ambulance.

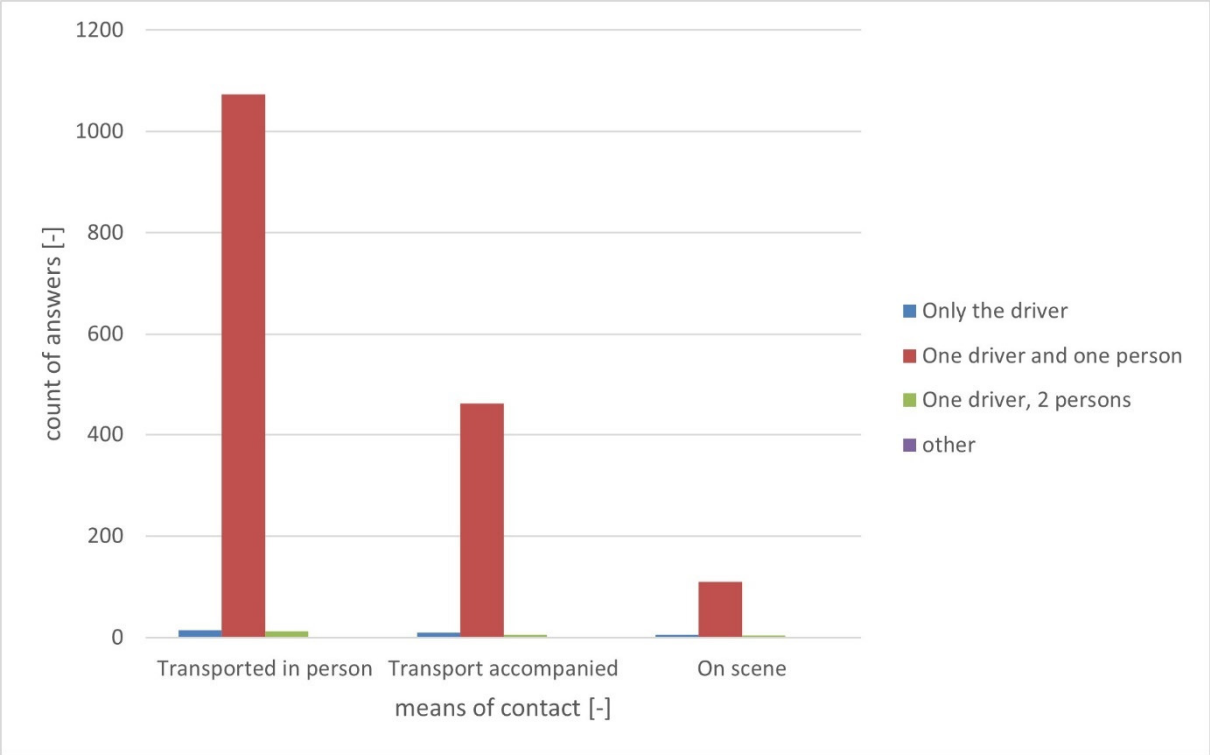

Figure 98: ambulance staffing

As shown in Figure 99 (n=1,578), in the majority of cases (1,001, 63.4%), the ambulance crew was sitting in the front cabin during the transport of the patient. In 577 cases (36.6%) one staff accompanied the patient during the whole transport period.

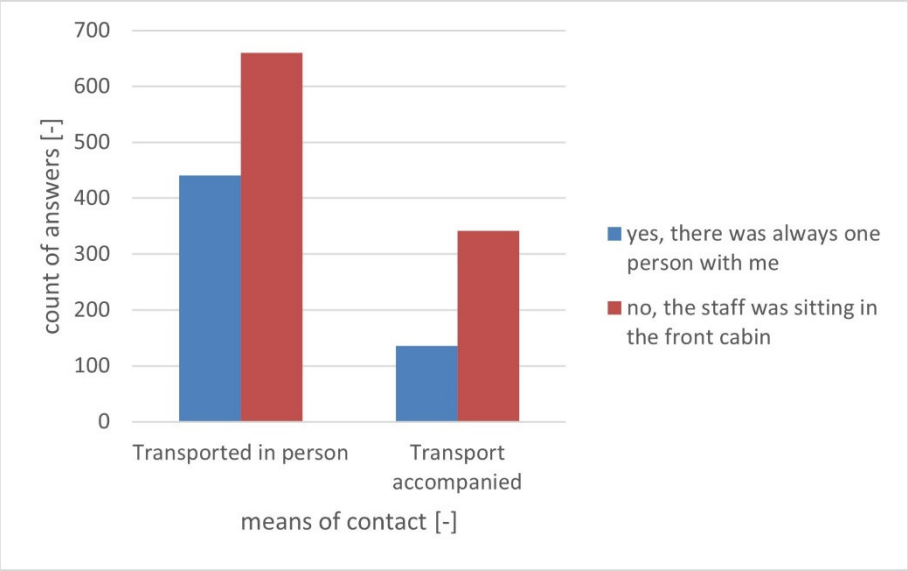

Figure 99: caretaking during transport

8. Conclusion

8.1. Interpretation of literature result

Comparing the two research questions “Is a standardised EMS needed in a health system” and “Will a standardised EMS reduce the patients’ mortality rate?”, with the literature, one finds, that the literature (e.g. Kobusingye *et al.*, 2005, Mould-Millman *et al.*, 2017) clearly states, that Emergency Medical Services are an important factor for a successful holistic medical treatment of people. Studies show that the mortality rate can be decreased by providing care with trained responders on scene. However, due to various myths, even governments, do not establish EMS in their countries. Therefore, compared to high-income countries, the population of low- and middle-income countries has a significantly worse care provided by EMS.

According to Obermeyer *et al.*, 2015, a standardised EMS and especially (international) standardised trainings prove to be efficient in all kinds of settings. Due to the lack of equipment, these trainings are often not offered in low- and middle- income countries. Hence it is key to establish national regulations and standards to develop the respective EMS further.

In the literature focusing on Rwanda (e.g. Wen and Char, 2011, Kabeza *et al.*, 2013) the findings clearly state, that a well organised EMS is able to firstly, reduce the mortality rate and secondly, improve the entire health system of a country. By means of quick and professional transport of injured or ill people, their chance of survival is significantly increased. EMS need a sufficient number of staff, standardised training, and

a legal framework. In addition, there is a need for a well-trained and organised management level.
As shown in the study from Hauswald and Yeoh, 1997, prehospital therapies could be identified, which reduce the mortality rate of patients. These therapies have to be trained and used.

According to Flaherty *et al.*, 2020 and Sobuwa and Christopher, 2019, a legal framework and the standardisation of training, plays a key role in the efficiency of an EMS. Ghana and South Africa can therefore be seen as role models for Africa. Both countries have established a legal framework and an educational path, including standardised curricula, for pre-hospital services. This has enabled them to enhance their systems' quality and contributed to the patient safety, which proves the hypothesis "By implementing a standardised Emergency Medical Technician training, the quality of patient care will increase", correct.

Comparing the research question "Is there an interest on the labour market in the new profession "Emergency Medical Technician"", with the presented literature, one finds that both countries (Ghana and South Africa), have created the possibility to work in EMS with or without university education. The legally recognised and certified training beyond the university educational path, is a key factor to attract enough staff to overcome the shortages in the system (cf. Flaherty *et al.*, 2020, Sobuwa and Christopher, 2019).

8.2. Interpretation of project data

An organised Emergency Medical System is a basic requirement for a modern and appropriate system, which is able to reduce patients' mortality rate (cf. Kobusingye *et al.*, 2005). At the moment the organisational level is not very well perceived by the participants of the baseline survey. In the baseline, 84.2% of nurses/midwives and 33.3% of the management staff state, there is no organised system yet. This makes an overall of 69.8% who are not convinced that the EMS in Rwanda is organised. The nurses/midwives provide a clear answer to the question what they are missing in the system. On the one hand, they call for enough trained staff and on the other hand sufficient equipment. Both challenges can be overcome by establishing a well organised EMT profession. One management staffer already gave the RRCS EMS credit, by mentioning them as an example of an organised system. This at a time, when s/he had only received information about it during meetings and presentations.

The response time is a crucial factor in Emergency Medical Services. The longer a patient has to wait after calling for an ambulance, the higher the risk, that their health condition further decreases. By comparing the results of the baseline and the midterm survey, on the one hand, one can see that the most common waiting time increased from zero to 15 minutes to 16- 30 minutes. On the other hand, the percentage of participants waiting for one to two hours and more than two hours was reduced. The research question, concerning the reduction of the response time cannot be answered

at this point. Firstly, the EMT/ECA profession is not yet legally recognised in Rwanda, meaning that the EMTs/ECAs still have to have a nurse/midwife on board. And secondly, the most frequently mentioned waiting timespan increased from the baseline to the midterm survey, however the cases of extraordinary long waiting times decreased.

The overall satisfaction with the received service rose from 79.1% to 84.2%, which indicates that the rendered service was improved. Furthermore, the people who felt well treated as a person increased slightly from 95.2% to 96.1 %. The information patients received about their situation, increased clearly. Whereas in the baseline study 31.1% stated they felt well informed, the number increased to 61.6% in the midterm review. The percentage of those who were informed at least once, decreased from 26.2% to 19.2%. Additionally, the percentage of people who were never informed about their situation decreased from 42.7% to 19.2%. As already almost all transports directly approached the hospital without any stops on the way, in the baseline survey (97.5%), this number remained high in the midterm survey (96.2%). The percentage of transports which stop once (1.9% vs. 3.5%) and those which stop multiple times (0.6% vs. 0.3%) also remained at the same level. The number of staff members, operating an ambulance, seems to be more constant. While in the baseline 76.2% of the ambulances were operated by one driver and one nurse/midwife, this percentage increased to 96.8% in the midterm review.
The overall satisfaction with the ambulance service was increased, however already started on a high level. The quality of some factors, e.g. care during transport and waiting time, decreased. As mentioned in the paragraph before, it is difficult to determine the influence of the EMT/ECA profession based on these numbers, as the profession is not legally recognised yet.

The staff shortage in the ambulance system is evident in the results of the questionnaire as well as in the documents of authorities (e.g. Rwanda Ministry of Health, 2015). In the baseline survey, 95% of the interviewed nurses/midwives stated that there is a lack of staff. In the management group, 66.7% experience a staff shortage. Overall, 79.2% of the participants state that there is a lack of staff. Nurses/midwives and hospital management named the professions nurse/midwife and driver as their highest need. In the midterm survey, only the hospital management represented by two participants was asked this question. One of the clinical directors does not see a shortage in staff, the other one however, still sees a shortage of drivers and nurses/midwives.
In addition to the staff shortage, the lack of specialised training for working in a pre-hospital environment is evident. While, in the baseline, none of the nurses and midwives received a training covering all aspects of pre-hospital emergencies and 39.5% received no training at all, only 7.9% received a PHTLS training, to better deal with trauma emergencies. The drivers' data shows a similar situation. While 53.8% of the drivers received a driving training, only 11.5% specified a medical training other than a First Aid or equivalent training. In the midterm survey the situation of nurses/midwives has not changed at all. While 63.2% of the participants received no training at all, only 7.7% received a PHTLS training. The drivers' situation changed in the midterm review.

45.5% of the questioned drivers had already received the ECA training, providing them with sufficient knowledge to respond to all kind of pre-hospital emergencies.
Hence, the new profession of Emergency Care Assistants should be able to overcome this staff shortage, if it is rolled out. At the moment an ECA can “only” replace the driver, but once the profession is accredited by the RAHPC, s/he can also replace the nurse/midwife. By creating this non- university education, the entrance barrier for interested people is lowered clearly. The first announcement of the training by Rwanda Red Cross, attracted 1,152 applicants for 20 offered positions. After screening the applications according to the published criteria and a pre-test, 46 candidates were invited to a hearing. After the hearing 20 applicants were chosen to start the training. All of them showed up at the first day. During the training four participants quitted the training on their own accord. As it was in an early stage, four candidates from the waiting list were invited to take their place. In the end, 18 passed the exam. A 90% pass rate is more than what was expected.
Furthermore, the ECA training aims to provide a holistic skill set to respond to all kinds of emergencies. It is the first training in Rwanda covering this huge spectrum of knowledge and skills.

9. Way ahead

9.1. Emergency Medical Service

As shown in the literature (e.g. Mould-Millman *et al.*, 2017, Naidoo, 2011) and also with the data from the baseline and the midterm survey (cf. Figure 26, Figure 27, Figure 28, Figure 40, Figure 81), Emergency Medical Services in low- and middle- income countries, including Rwanda, have a long way to go until they are fully operational and comparable to high- income countries systems. Nevertheless, the systems are starting to change and develop all over Africa. This first step is always needed, to achieve developments. The dependence of the development of such systems on foreign investments (INGOs, governments) is still evident. Therefore, in the long run, the systems’ self-sustainability has to be integrated in such projects. One way to achieve sustainability is the integration of the public as part of the system. Providing information and training to the public increases the acceptance of the system and reduces the “wrong use” of the capacities. Therefore, an effective system can be developed (cf. Ali *et al.*, 2006).

Forecasting presents itself as a challenge in the development of EMSs. To accurately plan the resources (staff, equipment, ambulances), statistics of the system are needed (cf. Aringhieri *et al.*, 2017). As in high-income countries each EMS has SOPs (including the need of documentation) established, such data is easily accessible. However, in low- and middle- income countries, such Standard Operating Procedures are often missing (cf. Figure 24, Figure 76, Figure 80). Therefore, data for forecasting is not available in the needed extent and resource planning is impeded.

In Rwanda, a professional Emergency Medical Service is still in the fledgling stages. SAMU, the governmental EMS, is only fully implemented in the capital Kigali. The RRCS EMS started with two ambulances in two different hospitals and therefore only contributes to a geographically limited area. The systems on the countryside are still underdeveloped, understaffed, underequipped, and lack specialised training (cf. chapter 7).

With the efforts, on the way by international and national organisations and the government of Rwanda, this situation will radically change within the next ten years and turn for the better of the patients. However, such development is always prone to disruptions, political change, civil war, or economic crisis which can stop the efforts abruptly. Particularly in low- and middle-income countries these factors have to be considered.

9.2. Legalisation of the profession in Rwanda

The ECA profession is not yet recognised as a medical profession by the authorities (RAHPC). One milestone was reached in January 2021, when the curriculum was accredited by the Workforce Development Authority (WDA) of Rwanda. Hence, it is now officially a profession, but in order to work independently, the accreditation by the RAHPC is needed. The review process is still ongoing, and a foreseeable timeframe cannot be given. This delay has a positive and a negative side. On the positive side, the outcome of an accurate and serious review process, will provide a legal certainty and the acknowledgement of the profession. On the negative side, the extreme long timespan, from the hand in of the curriculum to the final decision by the RAHCP, leaves the already trained ECAs and the hospitals cooperating in the project with present uncertainty.
Once the profession is fully approved by the authorities, the training of additional ECAs of RRCS and other providers can continue. SAMU has already expressed interest to train their drivers as ECAs. This step shows the already existing acceptance of the new training and profession.

9.3. Curriculum development in Rwanda

The first curriculum still has to be approved, but it should not be considered final. Day by day, the system gains experience. This experience in combination with international studies and guidelines help to further develop the “new” curriculum. At the beginning, it should be reviewed on a bi-annual basis at least, later on, this interval can be extended. In addition, brainstorming and creating concepts for different professions should start immediately after the accreditation of the curriculum. As described in the presented literature (e.g. Joyce *et al.*, 2009, Kilner, 2004, Sobuwa and Christopher, 2019), different levels of pre-hospital staff are an international standard and allow to distinguish between a transport- only service and a sophisticated EMS.

The present version of the curriculum enables the training of highly- qualified staff. The included and trained interventions provide the ECAs with more competences than, for example, Austrian EMTs.

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Abstract

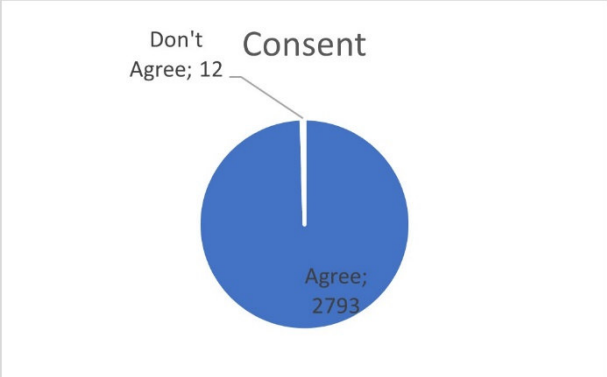
Emergency Medical Services should be available to the entire population of a country. This is the case in high- income countries, however the situation in low- and middle-income countries is different.
This thesis analyses Emergency Medical Services in low- and middle- income countries, and sheds some light on those differences. On the one hand, available literature (e.g. Kobusingye *et al.*, 2005, Mould-Millman *et al.*, 2017, Obermeyer *et al.*, 2015) was compared, and a conclusion was drawn. On the other hand, an Emergency Medical Technician project, in Rwanda, was evaluated by means of a baseline and a midterm survey. The presented literature matched the surveys' findings.
The evidence proves, that the systems in low- and middle- income countries lack a structured management, Standard Operating Procedures (SOP), specialised training and adequate equipment. In addition, the services are not available to the broad public and often centred in the capitals. However, with moderate investments the quality of EMS in low- and middle- income countries can be improved and made available to the entire population.

Kurzzusammenfassung

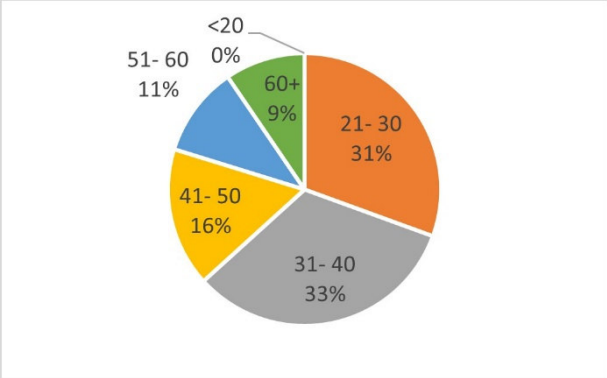
Rettungsdienste sollten, in allen Ländern, der breiten Bevölkerung zur Verfügung stehen. Was in Länder mit einem hohen Durchschnittseinkommen eine Selbstverständlichkeit ist, ist in Ländern mit niedrigem und mittlerem Einkommensniveau (noch) nicht der Fall.
Diese Masterarbeit hat zum Ziel, Rettungsdienste in Ländern mit niedrigem und mittlerem Durchschnittseinkommen zu beleuchten. Zwei verschiedene Ansätze werden dafür verwendet. Auf der einen Seite wird die verfügbare Literatur (z.B. Kobusingye *et al.*, 2005, Mould-Millman *et al.*, 2017, Obermeyer *et al.*, 2015) ausgewertet, verglichen und eine Fazit gezogen. Auf der anderen Seite stehen eine anfängliche Bestandsaufnahme und eine Halbzeitstudie eines Rettungssanitäter/innen Projektes in Ruanda zur Verfügung. Diese Studien wurden ausgewertet und verglichen. Die Ergebnisse der Studien und der verwendeten Literatur decken sich weitestgehend.
Wie die wissenschaftlichen Belege zeigen, fehlen den Rettungsdiensten, in Ländern mit niedrigem und mittlerem Durchschnittseinkommen, ein strukturiertes Management, Standard Operating Procedures, spezifizierte Trainings und eine angemessene Ausstattung. Zusätzlich sind die Dienste nicht für die gesamte Bevölkerung zugänglich und oft zentral in den Hauptstädten gelegen. Nichtsdestotrotz, mit angemessenen Investitionen können die Dienste in ihrer Qualität und ihrer Verfügbarkeit gesteigert werden.

Annexes

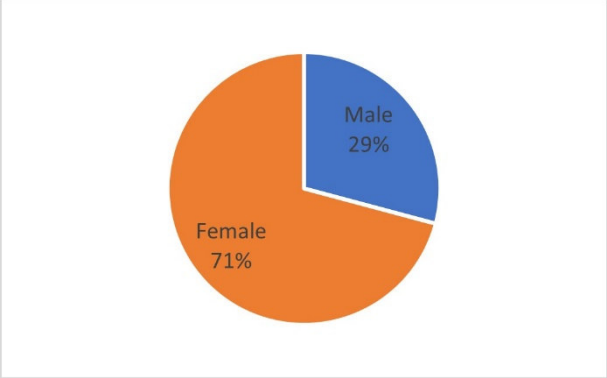
Annexe A – Baseline demographic data



consent to participate in the study

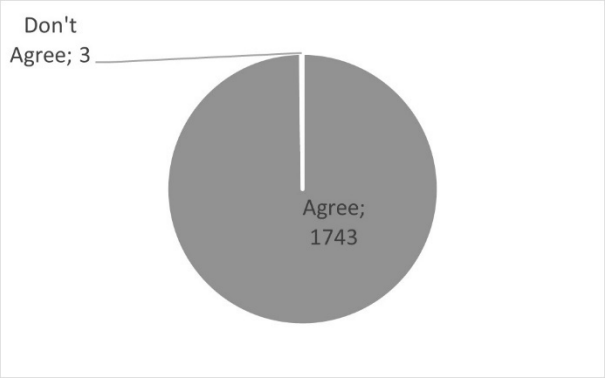


Age of the participants in five categories

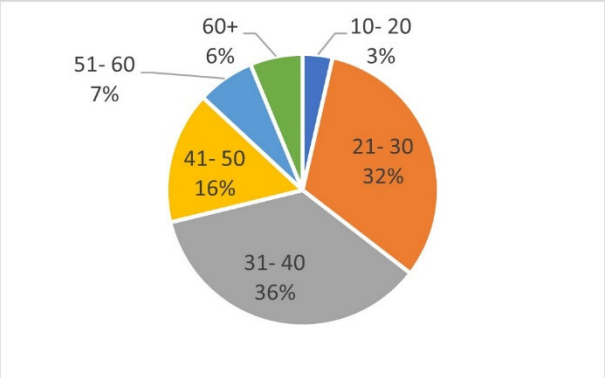


Gender distribution of the participants

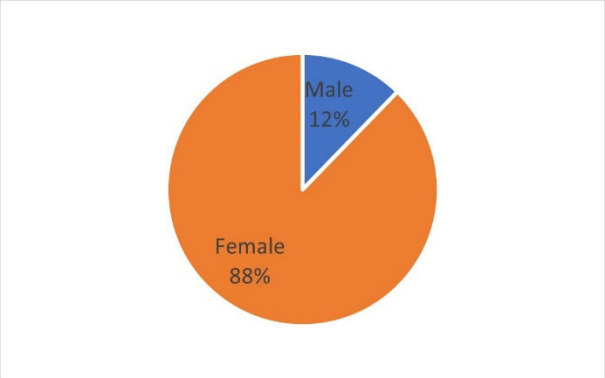
Annexe B – Midterm demographic data



Consent to participate in the study



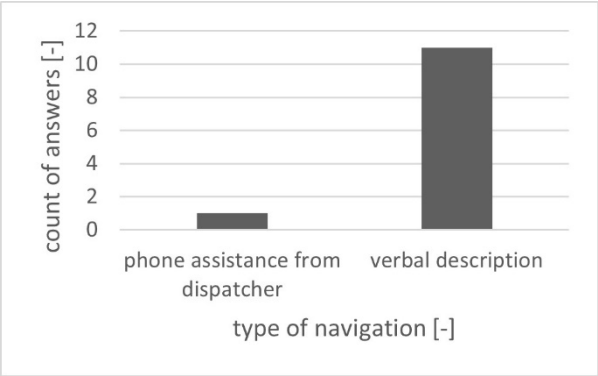
Age of the participants in five categories



gender distribution of the participants

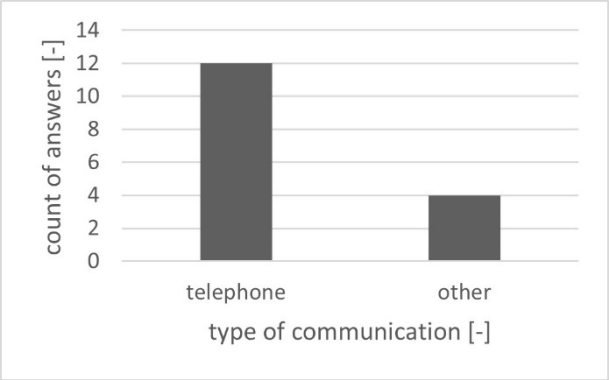
Annexe C – Pathfinding and communication

In modern Emergency Medical Systems, the patient's home or location is navigated to using GPS, in Rwanda this is not yet the case as shown in the figure below (n=12). In no case (0%) satellite navigation is used, in one case (8.3%) the driver is assisted by the dispatcher via telephone and in the other eleven cases (91.7%) the driver receives a verbal description before leaving the hospital.



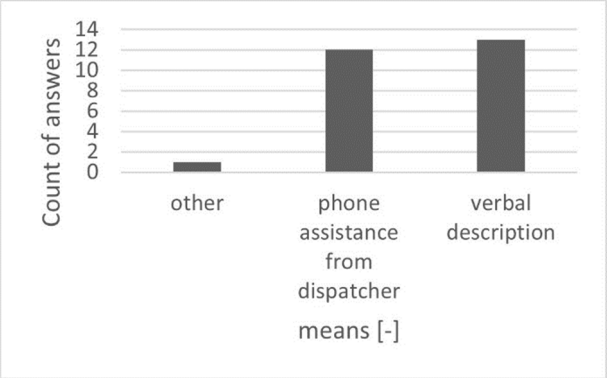
Means of navigation to the place of assignment according to nurses

Communication between the EMS and the admitting hospital is an important factor, that allows the hospital staff to prepare all necessary equipment before the patient arrives at the emergency department. As shown in the figure below(n=16), this is the case via telephone in twelve cases (75%) and only in four cases (25%), there is another way of communication. In all four cases, “other” was further specified as no communication at all.



Means of communication ambulance with the admitting hospital according to nurses

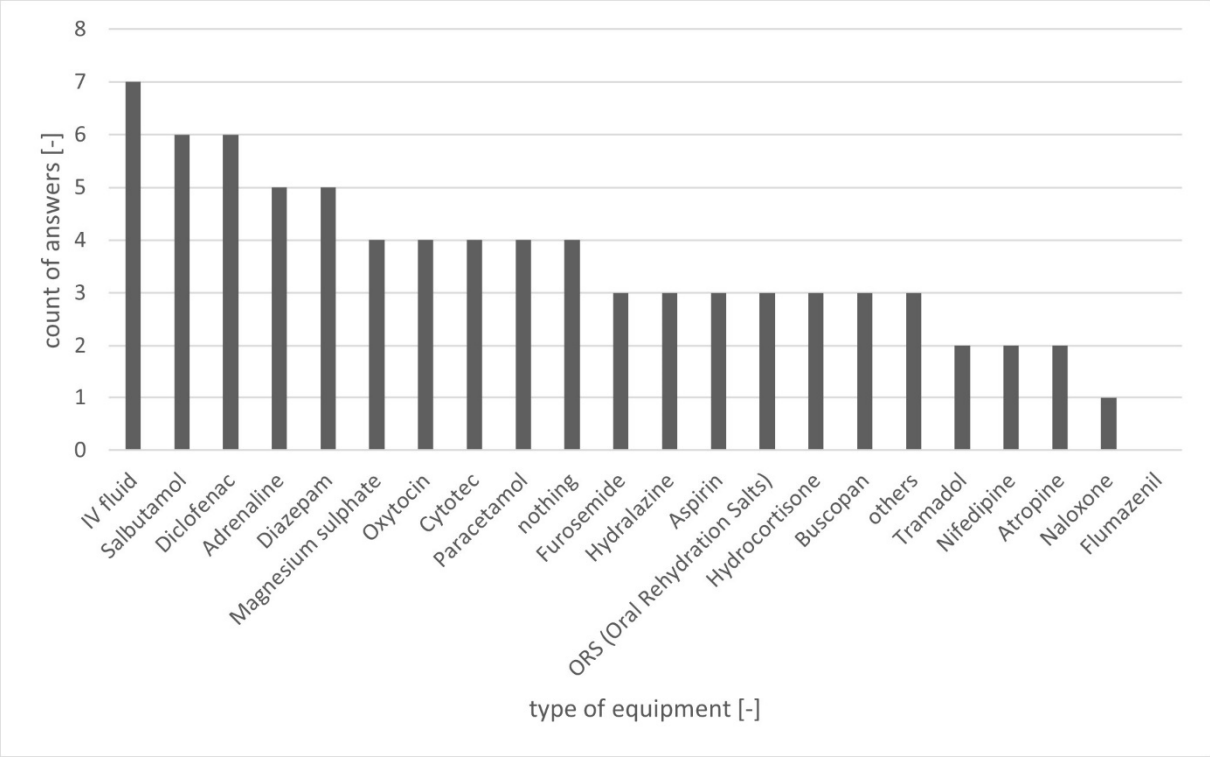
As shown in the figure below (n=26), the patients’ home or location is navigated to, in 13 cases (50%), via verbal description prior the deployment. In twelve cases (46.2%) the driver receives assistant via phone and in one case (3.8%) the means of navigation was given as “other” and specified that the nurse is guiding the driver.



Means of navigation according to drivers

Annexe D – Emergency Drugs

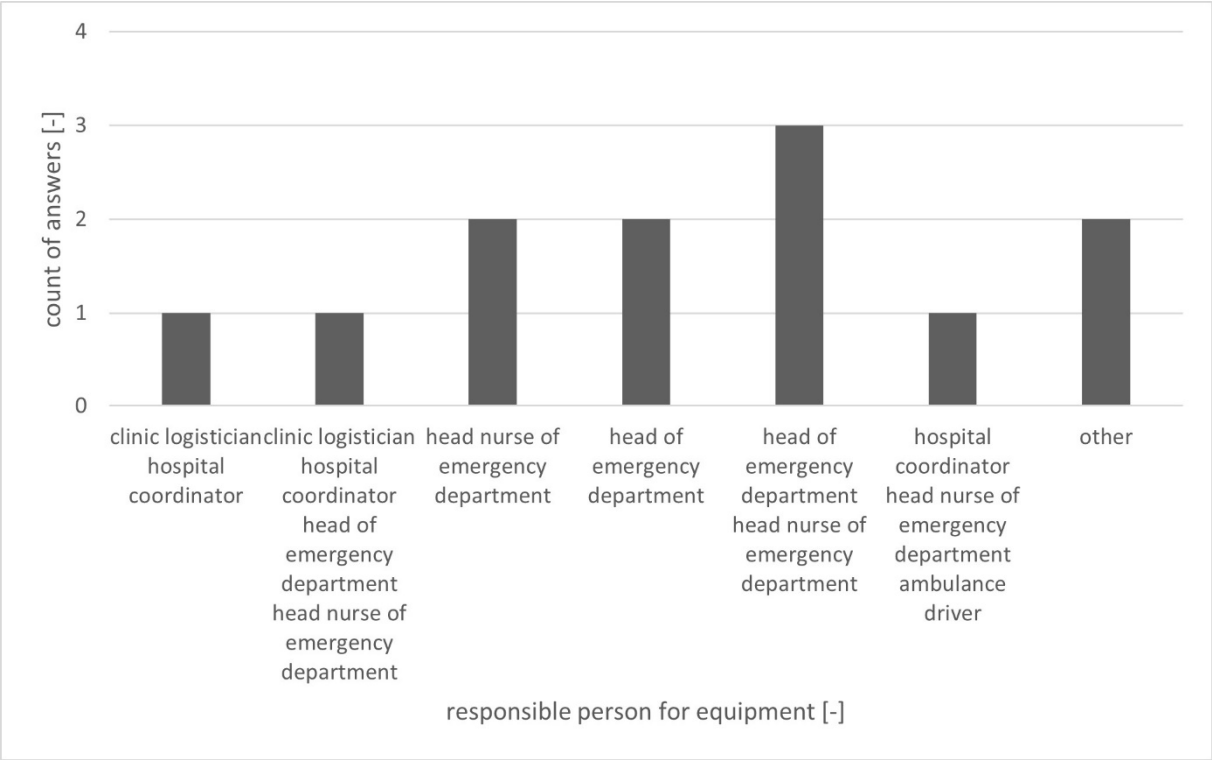
Also, the availability of emergency drugs was inquired (figure below, n=12). Twelve answers were received. In four cases (33.3%) no emergency drugs are available, in one case (8.3%) the emergency drugs carried in the ambulance are arranged according to the primary information available before deployment. Adrenaline, as a standard emergency drug in all resuscitation guidelines (e.g. Soar *et al.*, 2015), is available in five (41.7%) of the cases and IV fluids, used to compensate blood or fluid loss, are available in seven (58.3%) of the cases.



available emergency drugs according to nurses/ midwives

Annexe E – Supply chain responsibility

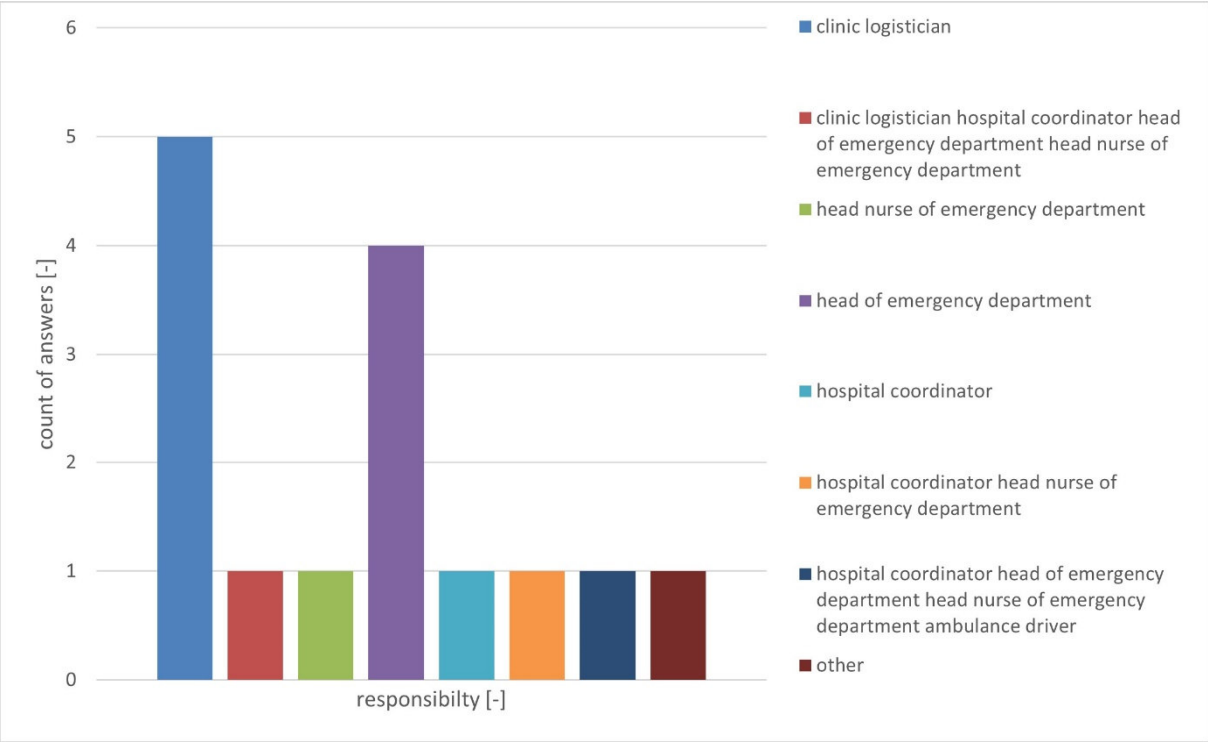
To avoid surprises with the ambulance equipment, especially that materials are out of stock, it is important to have a transparent and reliable supply chain management. As the figure below(n=12) shows, this responsibility is not with the same positions in the different hospitals. The head of emergency department is solely responsible in two cases (16.7%), the head nurse of the emergency department as well in two cases (16.7%). Both positions together are responsible in three cases (25%), in the other five (41.7%) cases, the responsibility is also shared among different positions, e.g clinic logistician, hospital coordinator and ambulance driver.



Responsibility of the supply chain according to nurses/ midwives

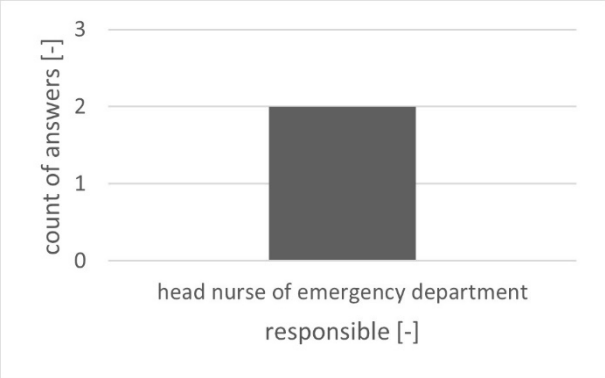
The supply chain responsibility for equipment lays with different positions, as shown in the figure below(n=15). In one third of the cases (33.3 %, five), the responsibility is with the clinic logistician, in four cases (26.7 %) with the head of emergency department, which usually is a medical doctor. All, the following, other positions responsible or shared responsibilities were only mentioned once each (6.7 %)

- Head nurse of the emergency department
- Hospital coordinator
- Hospital coordinator, head nurse of the emergency department
- Hospital coordinator, head of emergency department, head nurse of emergency department, ambulance driver
- Clinic logistician, hospital coordinator, head of emergency department, head nurse of emergency department
- Other, specified as pharmacist.



Responsibility of the supply chain according to management staff

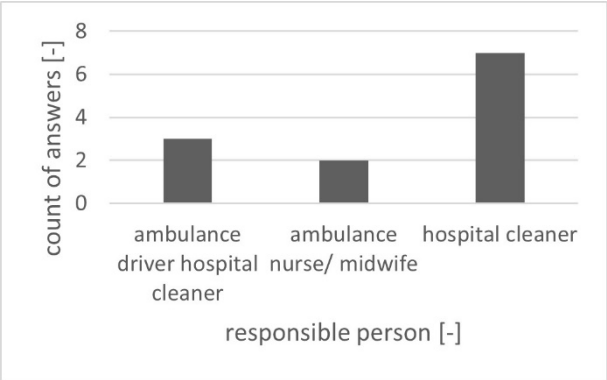
As shown in the figure below (n=2), the responsibility for the supply chain of ambulance equipment lies with the head nurse of the emergency department in both cases (100%).



responsibility of supply chain according to clinical directors

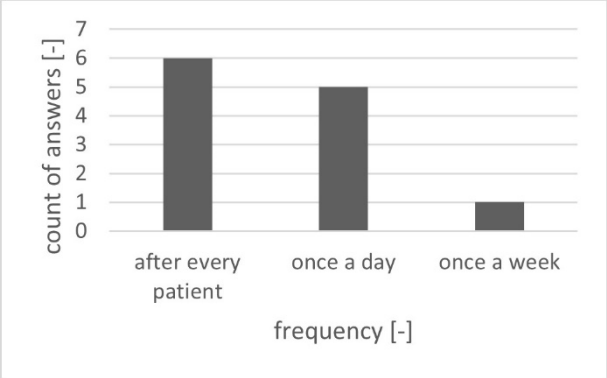
Annexe F – Ambulance cleaning and disinfection

An additional aspect of the operation of an EMS is the cleaning/ disinfection of the ambulance. As shown in the figure below (n=12), the responsibility lays with different positions. In most of the cases, seven (58.3%), the hospital cleaner is solely responsible, in two (16.7%) the ambulance nurse/ midwife holds the responsibility and in three (25%) the ambulance driver shares the responsibility with the hospital cleaner.



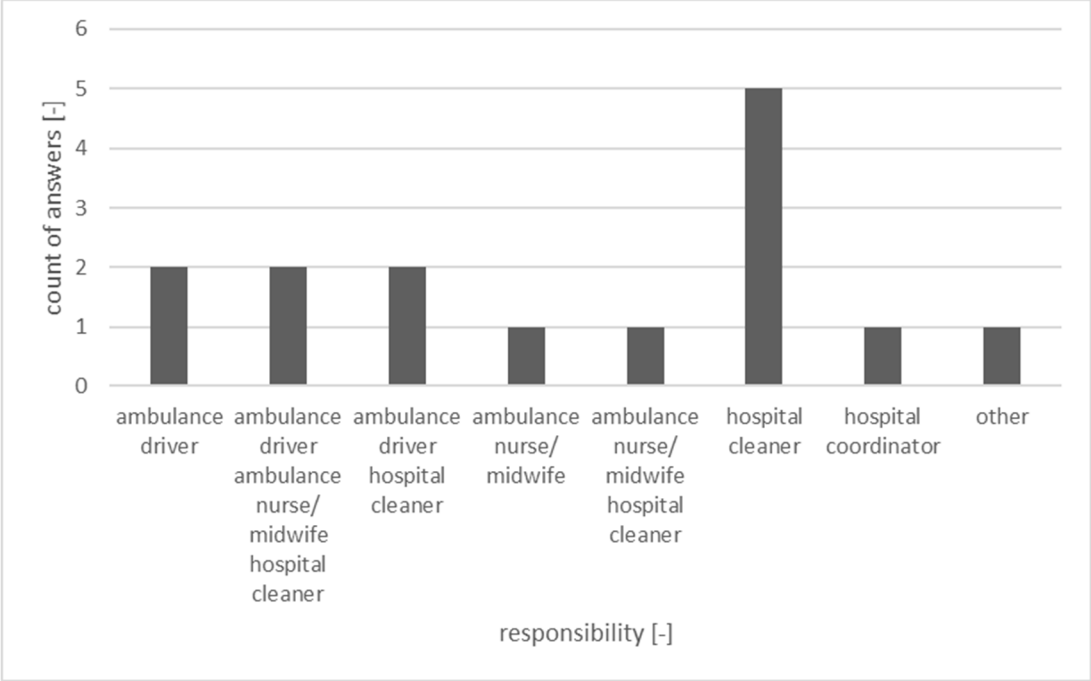
Ambulance cleaning responsibility according to nurses/ midwives (baseline)

Ambulances are especially prone to contamination, hence, a regular and effective cleaning and disinfection is necessary. As every patient can transmit such germs, cleaning and disinfection is needed after every patient. (cf. Nobile *et al.*, 2018)
In Rwanda, as shown in the figure below (n=12), this is not always the case. While in six cases (50%), cleaning/ disinfection is processed after every patient, in five cases (41.7%) it is done only once a day and in one case (8.3%) it is only done once a week.



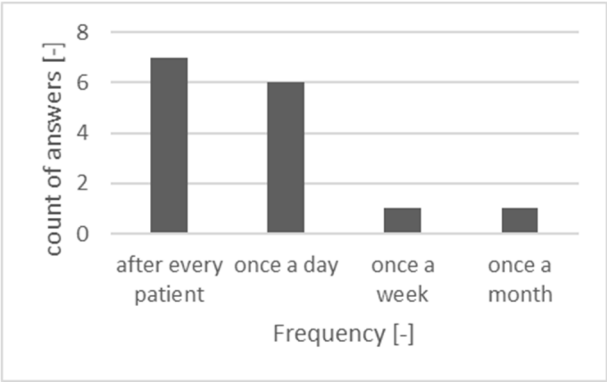
Ambulance cleaning frequency according to nurses/ midwives (baseline)

As shown in the figure below (n=15), the cleaning and disinfecting responsibility of ambulances is shared widely. In five cases (33.3 %), the hospital cleaner has the solely responsibility, in two cases (13.3 %) the ambulance driver, in one (6.7 %) the hospital coordinator, in one case (6.7 %) the ambulance nurse/ midwife and in one case (6.7 %) a not specified “other” person is responsible. In the five other cases (33.3 %) the responsibility is shared between different positions.



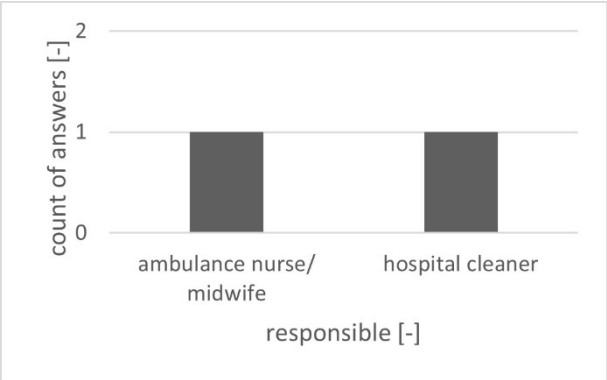
responsibility of cleaning and disinfection according to management staff (baseline)

In the figure below (n=15), one can see the frequency of cleaning of ambulance cars. While in 46.7 % (seven) of the cases the ambulance is cleaned after every patient, in 40 % (six) of the cases it is done once a day. In one case (6.7 %) it is only done once a week and in also one case (6.7 %) it is only done once a month.



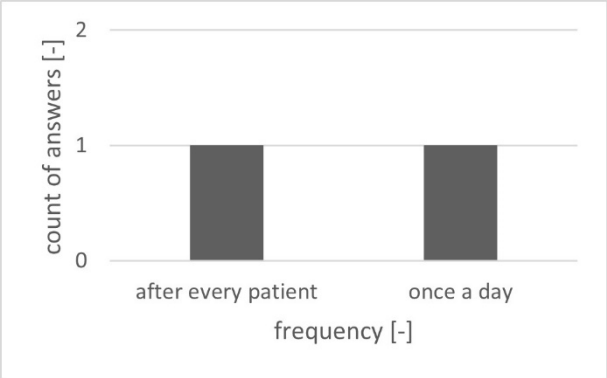
cleaning frequency of ambulances according to management staff (baseline)

As shown in the figure below (n=2), the responsibility for the cleaning and disinfection of ambulances lies with different positions. In one (50%) case, the ambulance nurse/ midwife is responsible, in the other case (50%), the ambulance driver is the responsible person.



responsibility of ambulance car cleaning and disinfection according to nurses/ midwives (midterm)

As shown in the figure below (n=2), also the frequency of cleaning varies. In one case (50 %), the ambulance is cleaned after every patient, in the other case (50 %) the car is only cleaned once a day.



frequency of ambulance car cleaning and disinfection according to nurses/ midwives (midterm)

Annexe G – Baseline questionnaires

Questionnaire for ambulance nurses/midwives and doctors

This questionnaire aims to collect data regarding Emergency Medical Service (EMS) and will serve as the baseline in order to know how these services need to be improved. Most of the program apply to EMS in your hospital.

Preamble
- This questionnaire is anonymous, you will not provide your name or phone number
- Please answer all questions
- Please sign the consent before you fill in the questionnaire

1 Socio demographic data
1.1 Gender:

_____
1.2 Age:

_____
1.3 District

_____
1.4 Highest level of education

_____
1.5 Position within hospital
[ ] nurse [ ] midwife [ ] medical doctor
[ ] head nurse of department [ ] head midwife of department [ ] head of department (MD)

2 Ambulances
2.1 How many ambulance cars are available in the catchment area of your hospital? (tick only one)
[ ] 1
[ ] 2
[ ] 3
[ ] 4
[ ] don't know
[ ] ____
2.2 How many of these ambulance cars are operational? (tick only one)
[ ] 1
[ ] 2
[ ] 3
[ ] 4
[ ] don't know
[ ] ___
2.3 How do you arrange to respond to calls if your ambulance cars are not operational? (tick all that applies)
[ ] call for help to another district hospital
[ ] receiving a spare ambulance car from the MoH
[ ] we do not respond to calls if no ambulance is available
[ ] other, please specify
_____
___
2.4 Do you have enough ambulances to cover all emergency calls?
[ ] yes
[ ] no
2.4.1 If no, how many more would you need in the catchment area of your hospital/ district?
[ ] _____
2.5 How are the ambulances staffed? (tick only one)
[ ] With one driver only
[ ] with one driver and an ambulance nurse/ midwife
[ ] with one driver, one nurse/ midwife and a doctor

[ ] different (please specify)

_____

2.6 Do you have enough staff to operate all ambulance cars?
[ ] yes
[ ] no
2.6.1 If no, staff of which profession are you lacking? (tick all that applies)
[ ] drivers
[ ] nurses
[ ] midwifes
[ ] doctors
[ ] others, please specify _____
2.7 How often do your ambulances deploy per day (24h) in average?
[ ] ____
2.8 To which emergencies do your ambulances respond to? (tick all that applies)
[ ] trauma
[ ] internal medicine
[ ] maternity cases
[ ] paediatric cases
2.9 How many ambulance deployments do you have per month?
[ ] _____
2.10 Which of the following cases, are the main reasons for ambulance deployments at
your hospital? (please tick the two most common)
[ ] trauma cases
[ ] internal medicine cases
[ ] maternity cases
[ ] paediatric cases
[ ] others, please specify _____
2.11 Do you feel like there is an organised Emergency Medical Service (EMS) all over the
country?
[ ] yes, please specify _____
[ ] no, please specify _____
2.12 Do you know what an Emergency Medical Technician (EMT) is?
[ ] yes, please specify _____
[ ] no
3 Challenges
3.1 Which challenges do you meet during your pre- hospital work?

_____

_____
_____
_____
_____
_____
_____

4 Education

4.1 Which position on an ambulance do you cover?

[ ] ambulance nurse
[ ] ambulance midwife
[ ] ambulance doctor

4.2 What is your highest medical education?

[ ] PhD
[ ] Master's degree
[ ] A0 – bachelor's degree
[ ] A1 - diploma
[ ] A2 – secondary school certificate

4.3 Have you received a special training for pre- hospital care? (tick all that applies)

[ ] First Aid Training
[ ] PHTLS training (Pre-hospital Trauma Life Support)
[ ] BLS training (Basic Life Support)
[ ] ALS training (Advanced Life Support)
[ ] Other, please specify

_____

[ ] No

4.3.1 If yes, in which year did you do the basic training?

[ ] _____

4.3.2 Have you participated in a refresher training ever since? (tick only one)

[ ] yes, once
[ ] yes, every two years
[ ] yes, every year
[ ] no
[ ] other, please specify

_____

4.4 How many years are you working in the ambulance service?

[ ] _____

4.5 How many CPRs (Cardiopulmonary Resuscitations) have you performed?

[ ] _____

4.5.1 How many of those where successful?

[ ] _____

5 Ambulance equipment

5.1 Which of the following basic equipment is available in your ambulance (tick all that applies)?

[ ] oxygen

[ ] ventilation bag
[ ] AED (Automated External Defibrillator)
[ ] nebulization mask
[ ] blood pressure monitor
[ ] blood glucose monitor
[ ] stethoscope
[ ] thermometer
[ ] oxygen saturation measurement device (pulsoxymeter)
[ ] syringes different sizes
[ ] needles (IV, IM, SC) different sizes

5.2 Which of the following trauma equipment is available in your ambulance (tick all that applies)?

[ ] spine board
[ ] scoop stretcher
[ ] vacuum mattress
[ ] c collar
[ ] arm splint
[ ] leg splint
[ ] bandages
[ ] dressing
[ ] adhesive tape
[ ] gauze
[ ] disinfectant
[ ] burn dressing

5.3 Which emergency drugs are available in your ambulance? (tick all that applies)

[ ] Adrenaline
[ ] Furosemide
[ ] Magnesium sulphate
[ ] Hydralazine
[ ] Oxytocin
[ ] Cytotec
[ ] Aspirin
[ ] Diazepam
[ ] IV fluid
[ ] Salbutamol
[ ] ORS (Oral Rehydration Salts)
[ ] Diclofenac
[ ] Paracetamol
[ ] Tramadol
[ ] Nifedipine
[ ] Atropine
[ ] Hydrocortisone
[ ] Buscopan
[ ] Naloxone

[ ] Flumazenil
[ ] others, please specify
_____
_____
5.4 Which of the following equipment for delivery is available in your ambulance? (tick all that applies)
[ ] cord clamps
[ ] sterile scissor
[ ] forceps
[ ] towels
[ ] neonatal suctioning device (penguin suction device)
[ ] sterile gloves
[ ] container for placenta
[ ] ventilation bag for neonate
[ ] other, please specify
5.5 Which of the following personal protective equipment is available in the ambulance? (tick all that applies)
[ ] face mask
[ ] gloves
[ ] goggles
[ ] apron
[ ] overall
[ ] hat
[ ] helmet
[ ] shoe cover (hoof)
[ ] other, please specify
_____
___
5.6 In the ambulance car, what is available to clean your hands? (tick all that applies)
[ ] water
[ ] soap
[ ] alcohol
[ ] hand sanitizer
[ ] antiseptic
[ ] nothing
[ ] other, please specify _____
5.7 Have you ever experienced a surprise in the ambulance equipment? (tick all that applies)
[ ] equipment was not available (out of stock)
[ ] equipment was damaged/ not working
[ ] equipment was missing
[ ] other, please specify _____
5.8 Who is responsible for the supply chain of ambulance equipment? (tick all that

applies)
[ ] clinic logistician
[ ] hospital coordinator
[ ] head of emergency department
[ ] head nurse of emergency department
[ ] ambulance driver
[ ] other, please specify

_____
_____

5.9 Who is responsible for cleaning and disinfecting the ambulance car? (tick maximum two)
[ ] ambulance driver
[ ] ambulance nurse/ midwife
[ ] ambulance doctor
[ ] fleet manager
[ ] hospital coordinator
[ ] hospital cleaner
[ ] no one
[ ] other, please specify _____
5.9.1 How often is the ambulance cleaned/ disinfected? (tick only one)
[ ] after every patient
[ ] once a day
[ ] once a week
[ ] once a month
[ ] other, please specify
6 Treatment action
6.1 Are you able to provide: (tick all that applies)
[ ] Assessment of patient
[ ] bleeding control
[ ] resuscitation of adults
[ ] start IV line
[ ] fluid administration
[ ] emergency drug administration
[ ] intubation
[ ] splinting
[ ] rescue, positioning and transportation in different cases
[ ] normal vaginal delivery
[ ] complicated vaginal delivery
[ ] monitoring of labour
[ ] new-born resuscitation
[ ] new-born care
[ ] paediatric resuscitation
[ ] management of pregnancy complications (e.g. preeclampsia, eclampsia, …)
[ ] Psychosocial First Aid

[ ] guidance for SGBV victims
[ ] guidance for abused/ neglected children
[ ] triage in mass casualty events
[ ] post-partum haemorrhage
[ ] other, please specify _____

6.2 Which measurements do you take in case of hypovolaemic shock? (tick all that applies)
[ ] preventing body heat loss
[ ] positioning on the back with elevated legs
[ ] continuous IV fluid management
[ ] continuous vital signs monitoring
[ ] seek for advanced care – transportation to the hospital
[ ] other, please specify
_____

6.3 Which measurements do you take in case of burns? (tick all that applies)
[ ] cooling of the affected area
[ ] nothing, just transport to the hospital
[ ] putting ice on the burn
[ ] apply special burn dressing
[ ] IV fluid management
[ ] other, please specify
_____
_____

6.4 Which measurements do you take in case of heart attack?
[ ] please specify
_____
_____
_____

6.5 Which measures do you take in case of stroke?
[ ] please specify,
_____
_____
_____

6.6 Which measures do you take in case of severe haemorrhage?
[ ] please specify,
_____

_____

6.7 Which measures do you take in case of head injury?

[ ] please, specify _____

_____

7 Communication

7.1 From whom do you receive calls for ambulance deployments (tick all that applies)

[ ] patients/ population
[ ] community health worker
[ ] health posts
[ ] health centres
[ ] district hospital
[ ] traffic police
[ ] SAMU emergency line (912)

7.2 Who dispatches the ambulances? (tick all that applies)

[ ] dispatcher
[ ] head nurse of emergency department
[ ] hospital coordinator
[ ] other, please specify

_____

7.3 How do you navigate to the place of assignment? (tick only the one, mainly used)

[ ] satellite navigation (GPS)
[ ] road maps
[ ] verbal description
[ ] phone assistance from dispatcher
[ ] other, please specify

_____

7.4 How do you communicate the transfer information to the admitting hospital? (tick all that applies)

[ ] telephone
[ ] VHF radio
[ ] other, please specify _____

7.5 Which information are you communicating to the admitting hospital? (tick all that applies)

[ ] vital parameters
[ ] diagnose
[ ] treatment received
[ ] emergency treatment needed in-hospital
[ ] number of the client
[ ] ETA (estimated time of arrival)

[ ] time of accident/ symptoms onset
[ ] other, please specify
_____
____
7.6 Do you keep up communication during transport?
[ ] no
[ ] yes, please specify how
_____
_____
8 Procedures
8.1 Have you experienced any hazardous situation during your ambulance duties? (tick all that applies)
[ ] contaminated blood
[ ] accident with hazardous goods
[ ] CBRN (chemical, biological, radioactive, nuclear) contaminated scene
[ ] violence against ambulance staff
[ ] other, please specify
_____
[ ] no
8.2 Do you see any need for the further development of ambulance service (training, equipment, …)?
[ ] yes, please specify the kind of the need _____
_____
___
[ ] no
8.3 How do you prioritise patients which arrive in the hospital with ambulances?
[ ] use of triage system
[ ] first come, first serve
[ ] other, please specify
_____
_____
8.4 Do you have additional resources you can mobilize in case of a mass casualty event?
[ ] yes, we appoint staff from other departments to the emergency
[ ] yes, we can call doctors/nurses/midwives off-duty to help in emergency
[ ] no, all situations have to be handled by the staff on duty
[ ] other, please specify
_____
_____
8.5 Where in your hospital is the emergency department located?
[ ] next to the entrance/ parking spot
[ ] far away from the entrance/ parking spot
[ ] other, please specify
_____

8.5.1 Is there an easy access for ambulance cars to your emergency room?
[ ] yes, they can easily access from the ambulance parking spot even with the stretcher
[ ] yes, they can easily access from the ambulance parking spot, but there are obstacles for the stretcher
[ ] no, it is a long way from the ambulance parking spot to the emergency room
[ ] no, it is not possible to enter the emergency room with a stretcher
8.6 Do you use a standard patient care report form for ambulance deployments?
[ ] yes
[ ] no
8.7 Do you have guidelines for pre-hospital treatment?
[ ] yes, please specify for which cases
_____
_____
[ ] no
8.8 Does the insurance cover the costs of ambulance deployments?
[ ] yes, 100%
[ ] yes, but the patient has to add ___% of the total costs him/herself
[ ] no
8.8.1 What happens if the insurance of the patient doesn't cover the ambulance costs?
[ ] the patient has to pay him/herself
[ ] the hospital covers the costs
[ ] the patient will not be transported
[ ] other, please specify
_____
_____
Thank you for your participation.

Questionnaire for clinical directors, fleet managers and hospital coordinators

This questionnaire aims to collect data regarding Emergency Medical Service (EMS) and will serve as the baseline in order to know how these services need to be improved. Most of the program apply to EMS in your hospital

Preamble
- This questionnaire is anonymous, you will not provide your name or phone number
- Please answer all questions
- Please sign the consent before you fill in the questionnaire

1 Socio demographic data

1.1 Gender:

_____

1.2 Age:

_____

1.3 District

_____

1.4 Highest level of education

_____

1.5 Position within hospital

[ ] clinical director [ ] hospital coordinator [ ] logistician
[ ] fleet manager

2 Ambulances

2.1 How many ambulance cars are available in the catchment area of your hospital? (tick only one)

[ ] 1
[ ] 2
[ ] 3
[ ] 4
[ ] don’t know
[ ] ____

2.2 How many of these ambulance cars are operational? (tick only one)

[ ] 1
[ ] 2
[ ] 3
[ ] 4
[ ] don’t know
[ ] ___

2.3 How do you arrange to respond to calls, if your ambulance cars are not operational? (tick all that applies)

[ ] call for help to another district hospital
[ ] receiving a spare ambulance car from the MoH
[ ] we do not respond to calls if no ambulance is available
[ ] other, please specify

_____
___
2.4 Do you have enough ambulances to cover all emergency calls?
[ ] yes
[ ] no
2.4.1 If no, how many more would you need in the catchment area of your hospital/ district?
[ ] _____
2.5 How are the ambulances staffed? (tick only one)
[ ] With one driver only
[ ] with one driver and an ambulance nurse/ midwife
[ ] with one driver, one nurse/ midwife and a doctor
[ ] different (please specify)
_____
_____
2.6 Do you have enough staff to operate all available ambulance cars?
[ ] yes
[ ] no
2.6.1 If no, staff of which profession are you lacking? (tick all that applies)
[ ] drivers
[ ] nurses
[ ] midwifes
[ ] doctors
[ ] others, please specify _____
2.7 What are the recruitment criteria for ambulance staff? (clinical directors only)
[ ] please specify
_____
_____
_____
2.8 How often do your ambulances deploy per day (24h) in average?
[ ] ____
2.9 To which emergencies cases do your ambulances respond to? (tick all that applies)
[ ] trauma cases
[ ] internal medicine cases
[ ] maternity cases
[ ] paediatric cases
2.10 How many ambulance deployments do you have per month?
[ ] _____
2.11 Which of the following cases, are most reason for ambulance deployments? (tick the two most common)
[ ] trauma cases
[ ] internal medicine cases
[ ] maternity cases
[ ] paediatric cases

[ ] others, please specify _____

2.12 Do you feel like there is an organised Emergency Medical Service (EMS) all over the country?

[ ] yes, please specify _____

[ ] no, please specify _____

2.13 Do you know what an Emergency Medical Technician (EMT) is?

[ ] yes, please specify _____

[ ] no

3 Challenges

3.1 Which challenges do you meet during your pre- hospital work?

_____

_____

_____

_____

3.2 Do you have a strategic plan to overcome the todays challenges in ambulance service in your hospital? (clinical directors only)

[ ] yes, please specify _____

_____

[ ] no

4 Education

4.1 What is your highest medical education? (tick only one)

[ ] PhD

[ ] Master's degree

[ ] A0 – bachelor's degree

[ ] A1 - diploma

[ ] A2 – secondary school certificate

[ ] none

4.2 Do you see any need for ambulance services (training, equipment, …)?

[ ] yes, please specify the kind of the need _____

_____

[ ] no

4.3 Have you received any additional training, related to ambulance work? (tick all that applies)

[ ] First Aid Training
[ ] PHTLS training (Pre-hospital Trauma Life Support)
[ ] BLS training (Basic Life Support)
[ ] ALS training (Advanced Life Support)
[ ] Other, please specify

_____

4.3.1 If yes, in which year did you take the training?

_____

4.3.2 If yes, have you participated in a refresher training ever since? (tick only one)
[ ] yes, once
[ ] yes, every two years
[ ] yes, every year
[ ] no
[ ] other, please specify

_____

5 Ambulance equipment

5.1 Who is responsible for the supply chain of ambulance equipment? (tick maximum two)
[ ] clinic logistician
[ ] hospital coordinator
[ ] head of emergency department
[ ] head nurse of emergency department
[ ] ambulance driver
[ ] other, please specify

_____

5.2 Who is responsible for cleaning and disinfecting the ambulance car? (tick maximum two)
[ ] ambulance driver
[ ] ambulance nurse/ midwife
[ ] ambulance doctor
[ ] fleet manager
[ ] hospital coordinator
[ ] hospital cleaner
[ ] no one
[ ] other, please specify

_____

5.2.1 How often is the ambulance cleaned/ disinfected? (tick only one)
[ ] after every patient
[ ] once a day
[ ] once a week
[ ] once a month
[ ] other, please specify

6 Cooperation

6.1 How do you collaborate with local leaders?

_____
_____
_____

6.2 Are the district leaders involved in decisions on the ambulance service?
[ ] no
[ ] yes, please specify

_____
_____
_____
_____

7 Communication
7.1 From whom do you receive calls for ambulance deployments (tick all that applies)
[ ] patients/ population
[ ] community health worker
[ ] health posts
[ ] health centres
[ ] district hospital
[ ] traffic police
[ ] SAMU emergency line (912)
[ ] others, please specify _____
7.2 Who dispatches the ambulances? (tick all that applies)
[ ] dispatcher
[ ] head nurse of emergency department
[ ] hospital coordinator
[ ] other, please specify

_____
8 Procedures
8.1 Do you use a standard patient care report form for ambulance deployments?
[ ] yes
[ ] no
8.2 Do you have/use guidelines for pre-hospital treatment?
[ ] yes, please specify for which cases

_____
_____
[ ] no
8.3 Does the insurance cover the costs of ambulance deployments? (tick only one)
[ ] yes, 100%
[ ] yes, but the patient has to add ___% of the total costs him/herself
[ ] no
8.3.1 What happens if the insurance of the patient doesn’t cover the ambulance costs? (tick
only one)
[ ] the patient has to pay him/herself

[ ] the hospital covers the costs
[ ] the patient will not be transported
[ ] other, please specify

8.4 How do you prioritise patients, which arrive in the hospital with ambulances? (tick only one)
[ ] use of triage system
[ ] first come, first serve
[ ] other, please specify

_____

8.5 Do you have additional resources you can mobilize in case of a mass casualty event?
(tick all that applies)
[ ] yes, we appoint staff from other departments to the emergency
[ ] yes, we can call doctors/nurses/midwives off-duty to help in emergency
[ ] no, all situations have to be handled by the staff on duty
[ ] other, please specify

_____

8.6 Where in your hospital is the emergency department located? (tick only one)
[ ] next to the entrance/ parking spot
[ ] far away from the entrance/ parking spot
[ ] other, please specify

_____

8.6.1 Is there an easy access for ambulance cars to your emergency room? (tick only one)
[ ] yes, they can easily access from the ambulance parking spot even with the stretcher
[ ] yes, they can easily access from the ambulance parking spot, but there are obstacles for the stretcher
[ ] no, it is a long way from the ambulance parking spot to the emergency room
[ ] no, it is not possible to enter the emergency room with a stretcher

Thank you for your participation.

Questionnaire for ambulance drivers

This questionnaire aims to collect data regarding EMS and will serve as the baseline in order to know how these services need to be improved. Most of the program apply to Emergency Medical Services (EMS) in your hospital.

Preamble
- This questionnaire is anonymous, you will not put your name or telephone number
- Please answer all questions
- Sign the consent before you fill in the questionnaire

1 Socio demographic data
1.1 Gender:

_____
1.2 Age:

_____
1.3 District

_____
1.4 Highest level of education

_____
2 Ambulances
2.1 How are the ambulances staffed? (tick only one)
[ ] With one driver only
[ ] with one driver and an ambulance nurse/ midwife
[ ] with one driver, one nurse/ midwife and a doctor
[ ] different (please specify)
_____
_____
2.2 Are you involved in the rescue and treatment of patients?
[ ] Yes, please specify how
_____
___
[ ] No
3 Challenges
3.1 Which challenges do you meet during your pre- hospital work?
_____
_____
_____
_____
_____
_____
_____
_____
4 Education
4.1 Which education do you have? (tick all that applies)

[ ] driver
[ ] first aid training
[ ] other, please specify

_____

4.2 Have you received a special training for pre- hospital care?
[ ] Yes, please specify

_____

[ ] No
4.2.1 If yes, in which year did you do the training?

_____

4.2.2 If yes, have you participated in a refresher training ever since?
[ ] yes, year(s) _____
[ ] no
4.3 Are there any guidelines you have to follow?
[ ] yes, please specify

_____

[ ] no
4.4 How many years are you working in the ambulance service?
[ ] _____
4.5 How many years are you working as a driver?
[ ] _____
5 Communication
5.1 From whom do you receive calls for ambulance deployments? (Tick all that applies)
[ ] patients/ population
[ ] community health worker
[ ] health posts
[ ] health centres
[ ] district hospital
[ ] traffic police
[ ] SAMU emergency line (912)
[ ] ambulance nurse
5.2 Who dispatches the ambulances? (tick all that applies)
[ ] dispatcher
[ ] head nurse of emergency department
[ ] hospital coordinator
[ ] other, please specify

_____

5.3 How do you navigate to the place of assignment? (tick only the one, mainly used)
[ ] satellite navigation (GPS)
[ ] road maps
[ ] verbal description
[ ] phone assistance from dispatcher
[ ] other, please specify

_____
__

5.4 How do you communicate the transfer information to the admitting hospital? (tick all that applies)

[ ] telephone

[ ] VHF radio

[ ] other, please specify _____

Thank you for your participation.

Questionnaire for patients/population

This questionnaire aims to collect data regarding Emergency Medical Service (EMS) and will serve as the baseline in order to know how these services need to be improved. Most of the program apply to EMS in your hospital

Preamble
- This questionnaire is anonymous, you will not provide your name or phone number
- Please answer all questions
- Please sign the consent before you fill in the questionnaire

1 Socio demographic data
1.1 Gender:

_____
1.2 Age:

_____
1.3 District

_____
1.4 Highest level of education

_____
2 Emergencies/ illnesses
2.1 Whom do you contact first when you or someone of your family or friends feel sick?
[ ] family members
[ ] community health worker
[ ] health post
[ ] health centre
[ ] SAMU
[ ] other, please specify

_____
_____
2.2 In which case(s) do you call for an ambulance? (tick all that applies)
[ ] signs of malaria
[ ] respiratory problems
[ ] heart problems
[ ] road accident
[ ] labour
[ ] delivery
[ ] disaster
[ ] (S)GBV ((Severe) Gender Based Violence)
[ ] unconscious person
[ ] person in cardiac or pulmonary arrest
[ ] others, please specify _____
[ ] I would never call for an ambulance
2.2.1 If you don’t call for an ambulance, why so?

[ ] I don’t know the number
[ ] It is too expensive
[ ] other, please specify _____
2.3 Will you use any other means of transport, rather than an ambulance, to go to the hospital? (tick all that applies)
[ ] bicycle
[ ] moto taxi
[ ] taxi
[ ] friends (moto or car)
[ ] other, please specify _____
2.4 Can you name the countrywide emergency number for:
[ ] fire brigade _____
[ ] police _____
[ ] traffic police (accident) _____
[ ] Ambulance service _____
2.5 Have you ever participated in a First Aid Training?
[ ] yes
[ ] no
2.5.1 If yes, in which year did you do the training?
_____
2.5.2 If yes, did you participate in any refresher training ever since?
[ ] yes, once
[ ] yes, every year
[ ] yes, every two years
[ ] no, never
[ ] other, please specify _____
2.5.3 Which first aid actions do you take in case of burns?
[ ] please specify,
_____
_
_____
_____
2.5.4 Which first aid action will you take in case of heart attack?
[ ] please specify
_____
_____
___
_____
___
[ ] I don’t know what is a heart attack?
2.5.5 Which measures do you take in case of a stroke?
[ ] please specify,
_____

_____
___
_____
___
[ ] I don’t know what a stroke is.
2.5.6 Which first aid action will you take in case of severe haemorrhage?
[ ] please specify, _____
_____
___
[ ] I don’t know what this is.
2.5.7 Which first aid action will you take in case of head injury?
[ ] please, specify _____
_____
___
[ ] I don’t know what it is.
3 Have you ever been transported by an ambulance?
[ ] yes
[ ] no
If yes, continue with 4
3.1 If no, did you ever accompany a relative or friend during ambulance transport?
[ ] yes
[ ] no
If yes, continue with 5
3.1.1 If no, where you ever present when a relative/friend was picked up by an ambulance?
[ ] yes
[ ] no
If yes, continue with 6
If no, thank you for your participation
4 Ambulance transport
4.1 How long did you wait for the ambulance? (tick only one)
[ ] 1- 15 minutes
[ ] 16- 30 minutes
[ ] 31 minutes- 1 hour
[ ] 1- 2 hours
[ ] _____
4.2 Were you satisfied with the treatment received?
[ ] yes
[ ] no, please specify why not
_____
4.3 How did you feel treated as a person?
[ ] very well

[ ] well
[ ] bad
[ ] very bad
4.4 Did you receive any instructions from the health care provider (either dispatcher or ambulance team)?
[ ] yes, please specify

_____
[ ] no
4.5 Did the ambulance team explain their findings and treatments to you?
[ ] yes, I always felt well informed
[ ] yes, only ones
[ ] no, not at all
4.6 Did your situation/ condition improve through the ambulance team treatment?
[ ] yes, I felt a lot better
[ ] yes, a little bit
[ ] no
4.7 Did the ambulance team make your situation/life a priority?
[ ] yes, they transported me directly to the hospital
[ ] no, we stopped ones on the way to the hospital
[ ] no, we stopped multiple times on the way to the hospital
4.8 How many staff members came with the ambulance? (tick only one)
[ ] only the driver
[ ] one driver and one nurse/ midwife
[ ] one driver, one nurse/midwife and one doctor
[ ] other, please specify

_____
____
4.9 Did the ambulance team take care of you during the transport?
[ ] yes, there was always one person with me
[ ] no, the staff was sitting in the front cabin
4.10 Did your health insurance cover the costs of the ambulance transport?
[ ] yes, 100%
[ ] yes, but I had to add ___% of the total costs by myself
[ ] no, not at all
4.11 Do you have any comment or suggestion for the further development of the ambulance service?

_____
_____
_____
_____
_____
_____
5 Accompanied ambulance transport
5.1 How long did you wait for the ambulance? (tick only one)

[ ] 1- 15 minutes
[ ] 16- 30 minutes
[ ] 31 minutes- 1 hour
[ ] 1- 2 hours
[ ] _____

5.2 Were you satisfied with the treatment your relative/ friend received?
[ ] yes
[ ] no, please specify why not

_____

5.3 How did you feel treated as a person?
[ ] very well
[ ] well
[ ] bad
[ ] very bad

5.4 Did you receive any instructions from the health care provider (either dispatcher or ambulance team)?
[ ] yes, please specify

_____

[ ] no

5.5 Did the ambulance team explain their findings and treatments to you?
[ ] yes, I always felt well informed
[ ] yes, only ones
[ ] no, not at all

5.6 Did your situation/ condition of your relative/ friend improve through the ambulance team treatment?
[ ] yes, s/he seemed a lot better afterwards
[ ] yes, s/he seemed a little better afterwards
[ ] no

5.7 Did the ambulance team make the situation/life of your relative/friend a priority?
[ ] yes, they transported her/him directly to the hospital
[ ] no, we stopped ones on the way to the hospital
[ ] no, we stopped multiple times on the way to the hospital

5.8 How many staff members came with the ambulance? (tick only one)
[ ] only the driver
[ ] one driver and one nurse/ midwife
[ ] one driver, one nurse/midwife and one doctor
[ ] other, please specify

_____

5.9 Did the ambulance team take care of your relative/friend during the transport?
[ ] yes, there was always one person with me
[ ] no, the staff was sitting in the front cabin

5.10 Do you have any comment or suggestion for the further development of the ambulance service?

_____
_____
_____
_____
_____
_____

6 Present at scene

6.1 How long did it take until the ambulance arrived? (tick only one)

[ ] 1- 15 minutes
[ ] 16- 30 minutes
[ ] 31 minutes- 1 hour
[ ] 1- 2 hours
[ ] _____

6.2 Did you receive any instructions from the health care provider (either dispatcher or ambulance team)?

[ ] yes, please specify

_____

6.3 How many staff members came with the ambulance? (tick only one)

[ ] only the driver
[ ] one driver and one nurse/ midwife
[ ] one driver, one nurse/midwife and one doctor
[ ] other, please specify

_____
____

6.4 Do you have any comment or suggestion for the further development of the ambulance service?

_____
_____
_____
_____
_____
_____

Thank you for your participation.

Annexe H – Midterm questionnaires

Questionnaire for Ambulance nurses, midwives and doctors

This questionnaire aims to collect data regarding EMS and will serve as the midterm survey in order to know how these services improved. Most of the program apply to Emergency Medical Services (EMS) in your hospital.

Preamble

- This questionnaire is anonymous, you will not provide your name or telephone number
- Please answer all questions
- Sign the consent before you fill in the questionnaire

1 Socio demographic data

1.1 Position within hospital

[ ] nurse [ ] midwife [ ] medical doctor

[ ] head nurse of department [ ] head midwife of department [ ] head of department (MD)

2 Education

2.1 What is your highest medical education?

[ ] PhD [ ] Master's degree

[ ] A0 – bachelor's degree [ ] A1 – diploma [ ] A2 – secondary school certificate

2.2 Have you received a special training for pre- hospital care? (tick all that applies)

[ ] First Aid Training [ ] PHTLS training (Pre-hospital Trauma Life Support)

[ ] BLS training (Basic Life Support) [ ] ALS training (Advanced Life Support)

[ ] Other [ ] No

2.2.1 If yes, in which year did you do the basic training?

[ ] _____

2.2.2 Have you participated in a refresher training ever since? (tick only one)

[ ] yes, once [ ] yes, every two years [ ] yes, every year

[ ] no [ ] other

2.3 How many years are you working in the ambulance service?

[ ] _____

2.4 How many CPRs (Cardiopulmonary Resuscitations) did you perform in 2019?

[ ] _____

2.4.1 How many of those where successful?

[ ] _____

3 Treatment action

3.1 Are you able to provide: (tick all that applies)

[ ] Assessment of patient [ ] bleeding control [ ] resuscitation of adults

[ ] start IV line [ ] fluid administration [ ] emergency drug administration

[ ] intubation [ ] splinting [ ] normal vaginal delivery
[ ] rescue, positioning and transportation in different cases [ ] complicated vaginal delivery
[ ] monitoring of labour [ ] new-born resuscitation [ ] new-born care
[ ] paediatric resuscitation [ ] management of pregnancy complications (e.g. preeclampsia, eclampsia, …)
[ ] Psychosocial First Aid [ ] guidance for SGBV victims [ ] guidance for abused/ neglected children
[ ] triage in mass casualty events [ ] post-partum haemorrhage
[ ] other

3.2 Which measurements do you take in case of hypovolaemic shock? (tick all that applies)
[ ] preventing body heat loss [ ] positioning on the back with elevated legs
[ ] continuous IV fluid management [ ] continuous vital signs monitoring
[ ] seek for advanced care – transportation to the hospital [ ] other

3.3 Which measurements do you take in case of burns? (tick all that applies)
[ ] cooling of the affected area [ ] nothing, just transport to the hospital
[ ] putting ice on the burn [ ] apply special burn dressing [ ] IV fluid management
[ ] other

3.4 Which measurements do you take in case of heart attack?
[ ] call for help [ ] nothing, just transport to the hospital
[ ] place in comfortable position [ ] place patient in flat position
[ ] administer high flow oxygen [ ] administer Aspirin
[ ] no need for transport [ ] rapid transport
[ ] other

3.5 Which measures do you take in case of stroke?
[ ] call for help [ ] monitor vital signs
[ ] place in comfortable position [ ] perform FAST Assessment
[ ] ABCDE Approach [ ] administer Aspirin
[ ] no need for transport [ ] rapid transport
[ ] other

3.6 Which measures do you take in case of severe haemorrhage?
[ ] stop bleeding [ ] monitor vital signs
[ ] position patient with feet up [ ] control the patients temperature
[ ] ABCDE Approach [ ] administer IV fluids
[ ] administer high flow oxygen [ ] rapid transport
[ ] other

3.7 Which measures do you take in case of head injury?
[ ] wound dressing [ ] monitor vital signs

[ ] position patient with head up [ ] position patient with feet up
[ ] ABCDE Approach [ ] administer high flow oxygen
[ ] wait until symptoms get better [ ] rapid transport
[ ] other

3.8 Which information are you communicating to the admitting hospital? (tick all that applies)

[ ] vital parameters [ ] diagnose
[ ] treatment received [ ] emergency treatment needed in-hospital
[ ] number of the client [ ] ETA (estimated time of arrival)
[ ] time of accident/ symptoms onset [ ] other

3.9 Do you keep up communication during transport?

[ ] no [ ] yes

4 Procedures

4.1 Have you experienced any hazardous situation during your ambulance duties? (tick all that applies)

[ ] contaminated blood [ ] accident with hazardous goods
[ ] CBRN (chemical, biological, radioactive, nuclear) contaminated scene
[ ] violence against ambulance staff [ ] no
[ ] other

4.2 What kind of development does the Ambulance service need for further development?

[ ] training [ ] equipment
[ ] more staff [ ] none

4.3 Do you use a standard patient care report form for ambulance deployments?

[ ] yes [ ] no

4.4 Do you have guidelines for pre-hospital treatment?

[ ] yes [ ] no

Thank you for your participation.

Questionnaire for Head of EMD

This questionnaire aims to collect data regarding EMS and will serve as the midterm survey in order to know how these services improved. Most of the program apply to Emergency Medical Services (EMS) in your hospital.

Preamble
- This questionnaire is anonymous, you will not provide your name or telephone number
- Please answer all questions
- Sign the consent before you fill in the questionnaire

1 Socio demographic data
1.1 Position within hospital
[ ] nurse [ ] midwife [ ] medical doctor
[ ] head nurse of department [ ] head midwife of department [ ] head of department (MD)
2 Education
2.1 What is your highest medical education?
[ ] PhD [ ] Master's degree
[ ] A0 – bachelor's degree [ ] A1 – diploma [ ] A2 – secondary school certificate
2.2 Have you received a special training for pre- hospital care? (tick all that applies)
[ ] First Aid Training [ ] PHTLS training (Pre-hospital Trauma Life Support)
[ ] BLS training (Basic Life Support) [ ] ALS training (Advanced Life Support)
[ ] Other [ ] No
2.2.1 If yes, in which year did you do the basic training?
[ ] _____
2.2.2 Have you participated in a refresher training ever since? (tick only one)
[ ] yes, once [ ] yes, every two years [ ] yes, every year
[ ] no [ ] other
2.3 How many years are you working in the ambulance service?
[ ] _____
2.4 How many CPRs (Cardiopulmonary Resuscitations) did you perform in 2019?
[ ] _____
2.4.1 How many of those where successful?
[ ] _____
3 Ambulance equipment
3.1 Which of the following basic equipment is available in your ambulance (tick all that applies)?
[ ] oxygen [ ] ventilation bag [ ] AED (Automated External Defibrillator)
[ ] nebulization mask [ ] blood pressure monitor [ ] blood glucose monitor

[ ] stethoscope [ ] thermometer [ ] syringes different sizes
[ ] oxygen saturation measurement device (pulsoxymeter) [ ] needles (IV, IM, SC) different sizes

3.2 Which of the following trauma equipment is available in your ambulance (tick all that applies)?

[ ] spine board [ ] scoop stretcher [ ] vacuum mattress
[ ] cervical collar [ ] arm splint [ ] leg splint
[ ] bandages [ ] dressing [ ] adhesive tape
[ ] gauze [ ] disinfectant [ ] burn dressing

3.3 Which emergency drugs are available in your ambulance? (tick all that applies)

[ ] Adrenaline [ ] Furosemide [ ] Magnesium sulphate
[ ] Hydralazine [ ] Oxytocin [ ] Cytotec
[ ] Aspirin [ ] Diazepam [ ] IV fluid
[ ] Salbutamol [ ] ORS (Oral Rehydration Salts) [ ] Diclofenac
[ ] Paracetamol [ ] Tramadol [ ] Nifedipine
[ ] Atropine [ ] Hydrocortisone [ ] Buscopan
[ ] Naloxone [ ] Flumazenil
[ ] others

3.4 Which of the following equipment for delivery is available in your ambulance? (tick all that applies)

[ ] cord clamps [ ] sterile scissor [ ] forceps
[ ] towels [ ] neonatal suctioning device (penguin suction device)
[ ] sterile gloves [ ] container for placenta [ ] ventilation bag for neonate
[ ] other

3.5 Which of the following personal protective equipment is available in the ambulance? (tick all that applies)

[ ] face mask [ ] gloves [ ] goggles
[ ] apron [ ] overall [ ] hat
[ ] helmet [ ] shoe cover (hoof) [ ] other

3.6 In the ambulance car, what is available to clean your hands? (tick all that applies)

[ ] water [ ] soap [ ] alcohol
[ ] hand sanitizer [ ] antiseptic [ ] nothing
[ ] other

3.7 Have you ever experienced a surprise in the ambulance equipment? (tick all that applies)

[ ] equipment was not available (out of stock)
[ ] equipment was damaged/ not working
[ ] equipment was missing
[ ] other

3.8 Who is responsible for the supply chain of ambulance equipment? (tick all that applies)

[ ] clinic logistician [ ] hospital coordinator [ ] head of emergency department
[ ] head nurse of emergency department [ ] ambulance driver
[ ] other

3.9 Who is responsible for cleaning and disinfecting the ambulance car? (tick only one)

[ ] ambulance driver [ ] ambulance nurse/ midwife [ ] ambulance doctor
[ ] fleet manager [ ] hospital coordinator [ ] hospital cleaner
[ ] no one [ ] other

3.9.1 How often is the ambulance cleaned/ disinfected? (tick only one)

[ ] after every patient [ ] once a day [ ] once a week
[ ] once a month [ ] other

4 Treatment action

4.1 Are you able to provide: (tick all that applies)

[ ] Assessment of patient [ ] bleeding control [ ] resuscitation of adults
[ ] start IV line [ ] fluid administration [ ] emergency drug administration
[ ] intubation [ ] splinting [ ] normal vaginal delivery
[ ] rescue, positioning and transportation in different cases [ ] complicated vaginal delivery
[ ] monitoring of labour [ ] new-born resuscitation [ ] new-born care
[ ] paediatric resuscitation [ ] management of pregnancy complications (e.g. preeclampsia, eclampsia, …)
[ ] Psychosocial First Aid [ ] guidance for SGBV victims [ ] guidance for abused/ neglected children
[ ] triage in mass casualty events [ ] post-partum haemorrhage
[ ] other

4.2 Which measurements do you take in case of hypovolaemic shock? (tick all that applies)

[ ] preventing body heat loss [ ] positioning on the back with elevated legs
[ ] continuous IV fluid management [ ] continuous vital signs monitoring
[ ] seek for advanced care – transportation to the hospital [ ] other

4.3 Which measurements do you take in case of burns? (tick all that applies)

[ ] cooling of the affected area [ ] nothing, just transport to the hospital
[ ] putting ice on the burn [ ] apply special burn dressing [ ] IV fluid management
[ ] other

4.4 Which measurements do you take in case of heart attack?

[ ] call for help [ ] nothing, just transport to the hospital
[ ] place in comfortable position [ ] place patient in flat position

[ ] administer high flow oxygen [ ] administer Aspirin
[ ] no need for transport [ ] rapid transport
[ ] other

4.5 Which measures do you take in case of stroke?
[ ] call for help [ ] monitor vital signs
[ ] place in comfortable position [ ] perform FAST Assessment
[ ] ABCDE Approach [ ] administer Aspirin
[ ] no need for transport [ ] rapid transport
[ ] other

4.6 Which measures do you take in case of severe haemorrhage?
[ ] stop bleeding [ ] monitor vital signs
[ ] position patient with feet up [ ] control the patients temperature
[ ] ABCDE Approach [ ] administer IV fluids
[ ] administer high flow oxygen [ ] rapid transport [ ] other

4.7 Which measures do you take in case of head injury?
[ ] wound dressing [ ] monitor vital signs
[ ] position patient with head up [ ] position patient with feet up
[ ] ABCDE Approach [ ] administer high flow oxygen
[ ] wait until symptoms get better [ ] rapid transport [ ] other

4.8 Which information are you communicating to the admitting hospital? (tick all that applies)
[ ] vital parameters [ ] diagnose
[ ] treatment received [ ] emergency treatment needed in-hospital
[ ] number of the client [ ] ETA (estimated time of arrival)
[ ] time of accident/ symptoms onset [ ] other

4.9 Do you keep up communication during transport?
[ ] no [ ] yes

5 Procedures

5.1 Have you experienced any hazardous situation during your ambulance duties? (tick all that applies)
[ ] contaminated blood [ ] accident with hazardous goods
[ ] CBRN (chemical, biological, radioactive, nuclear) contaminated scene
[ ] violence against ambulance staff [ ] no [ ] other

5.2 What kind of development does the Ambulance service need for further development?
[ ] training [ ] equipment
[ ] more staff [ ] none

5.3 Do you use a standard patient care report form for ambulance deployments?
[ ] yes [ ] no

5.4 Do you have guidelines for pre-hospital treatment?
[ ] yes [ ] no

Thank you for your participation.

Questionnaire for clinical directors

This questionnaire aims to collect data regarding EMS and will serve as the midterm survey in order to know how these services improved. Most of the program apply to Emergency Medical Services (EMS) in your hospital.

Preamble

- This questionnaire is anonymous, you will not provide your name or telephone number
- Please answer all questions
- Sign the consent before you fill in the questionnaire

1 Ambulances

1.1. How do you arrange to respond to calls, if your ambulance cars are not operational? (tick all that apply)

[ ] call for help to another district hospital
[ ] receiving a spare ambulance car from the MoH
[ ] we do not respond to calls if no ambulance is available
[ ] other

1.2. Do you have enough ambulances to cover all emergency calls?

[ ] yes [ ] no

If no, how many would you need in the catchment area of your hospital/ district?

[ ] _____

1.3. How are the ambulances staffed? (tick only one)

[ ] With one driver only
[ ] with one driver and an ambulance nurse/ midwife
[ ] with one driver, one nurse/ midwife and a doctor
[ ] other

1.4. Do you have enough staff to operate all available ambulance cars?

[ ] yes [ ] no

If no, staff of which profession are you lacking? (tick all that applies)

[ ] drivers [ ] nurses
[ ] midwifes [ ] doctors
[ ] others

1.5. How often do your ambulances deploy per day (24h) in average?

[ ] _____

1.6. To which emergencies cases do your ambulances respond to? (tick all that applies)

[ ] trauma cases [ ] internal medicine cases
[ ] maternity cases [ ] paediatric cases
[ ] other

1.7. How many ambulance deployments do you have per month?

[ ] _____

1.8. Do you know what an Emergency Medical Technician (EMT/ECAs) is?

[ ] yes [ ] no

2. Education

2.1. Do you see any need for ambulance services (training, equipment, …)?

[ ] equipment [ ] training

[ ] other [ ] no

3. Ambulance equipment

3.1. Who is responsible for cleaning and disinfecting the ambulance car? (tick only one)

[ ] ambulance driver [ ] ambulance nurse/ midwife

[ ] ambulance doctor [ ] fleet manager

[ ] hospital coordinator [ ] hospital cleaner

[ ] no one [ ] other

4. Communication

4.1. From whom do you receive calls for ambulance deployments (tick all that applies)

[ ] patients/ population [ ] community health worker

[ ] health posts [ ] health centres

[ ] district hospital [ ] traffic police

[ ] SAMU emergency line (912) [ ] others

4.2. Who dispatches the ambulances? (tick all that applies)

[ ] dispatcher [ ] head nurse of emergency department

[ ] hospital coordinator [ ] other

5. Procedures

5.1. Do you use a standard patient care report forms for Ambulance deployments?

[ ] yes [ ] no

5.2. Do you have/use guidelines for pre-hospital treatment?

[ ] yes [ ] no

5.3. Do you have additional resources you can mobilize in case of a mass casualty event? (tick all that applies)

[ ] yes, we appoint staff from other departments to the emergency

[ ] yes, we can call doctors/nurses/midwives off-duty to help in emergency

[ ] no, all situations have to be handled by the staff on duty

[ ] other

5.4. Is there an easy access for ambulance cars to your emergency room? (tick only one)

[ ] yes, they can easily access from the ambulance parking spot even with the stretcher

[ ] yes, they can easily access from the ambulance parking spot, but there are obstacles for the stretcher

[ ] no, it is a long way from the ambulance parking spot to the emergency room

[ ] no, it is not possible to enter the emergency room with a stretcher

Thank you for your participation.

Questionnaire for fleet managers

This questionnaire aims to collect data regarding EMS and will serve as the midterm survey in order to know how these services improved. Most of the program apply to Emergency Medical Services (EMS) in your hospital.

Preamble

- This questionnaire is anonymous, you will not provide your name or telephone number
- Please answer all questions
- Sign the consent before you fill in the questionnaire

1. How many Ambulances are available in the catchment area of your hospital? (tick only one)

[ ] 1
[ ] 2
[ ] 3
[ ] 4
[ ] don’t know
[ ] ____

2. How many of these Ambulances are operational? (tick only one)

[ ] 1
[ ] 2
[ ] 3
[ ] 4
[ ] don’t know
[ ] ___

Thank you for your participation.

Questionnaire for Ambulance drivers

This questionnaire aims to collect data regarding EMS and will serve as the midterm survey in order to know how these services improved. Most of the program apply to Emergency Medical Services (EMS) in your hospital.

Preamble

- This questionnaire is anonymous, you will not provide your name or telephone number
- Please answer all questions
- Sign the consent before you fill in the questionnaire

1 Ambulances

1.1 Are you involved in the rescue and treatment of patients?

[ ] Yes [ ] No

2 Education

2.1 Which medical education do you have? (tick all that applies)

[ ] First aid training [ ] EMT / ECA [ ] nurse

[ ] midwife [ ] other

2.2 Have you received a special training for pre- hospital care?

[ ] Yes [ ] No

2.2.1 If yes, in which year did you do the basic training?

[ ] _____

2.2.2 Have you participated in a refresher training ever since? (tick only one)

[ ] yes, once [ ] yes, every two years [ ] yes, every year

[ ] no [ ] other

2.3 Are there any guidelines you have to follow?

[ ] yes [ ] no

2.4 How many years are you working in the Ambulance Service?

[ ] _____

2.5 How many years are you working as a driver?

[ ] _____

Thank you for your participation.

Questionnaire for patients and population

This questionnaire aims to collect data regarding EMS and will serve as the midterm survey in order to know how these services improved. Most of the program apply to Emergency Medical Services (EMS) in your hospital.

Preamble

- This questionnaire is anonymous, you will not provide your name or telephone number
- Please answer all questions
- Sign the consent before you fill in the questionnaire

1 Socio demographic data

1.1 Gender: _____

1.2 Age: _____

1.3 District: _____

1.4 Highest level of education: _____

2 Have you ever been transported by an ambulance?

[ ] yes

[ ] no

If yes, continue with 3

2.1 If no, did you ever accompany a relative or friend during ambulance transport?

[ ] yes

[ ] no

If yes, continue with 4

2.1.1 If no, where you ever present when a relative/friend was picked up by an ambulance?

[ ] yes

[ ] no

If yes, continue with 5

If no, thank you for your participation

3 Transported by Ambulance

3.1 How long did you wait for the ambulance? (tick only one)

[ ] 1- 15 minutes [ ] 16- 30 minutes

[ ] 31 minutes- 1 hour [ ] 1- 2 hours [ ] _____

3.2 Were you satisfied with the treatment received?

[ ] yes [ ] no

3.3 How did you feel treated as a person?

[ ] very well [ ] well

[ ] bad [ ] very bad

3.4 Did you receive any instructions from the health care provider (either dispatcher or ambulance team)?

[ ] yes [ ] no

3.5 Did the ambulance team explain their findings and treatments to you?

[ ] yes, I always felt well informed
[ ] yes, only ones
[ ] no, not at all

3.6 Did your situation/ condition improve through the ambulance team treatment?
[ ] yes, I felt a lot better
[ ] yes, a little bit
[ ] no

3.7 Did the ambulance team make your situation/life a priority?
[ ] yes, they transported me directly to the hospital
[ ] no, we stopped ones on the way to the hospital
[ ] no, we stopped multiple times on the way to the hospital

3.8 How many staff members came with the ambulance? (tick only one)
[ ] only the driver
[ ] one driver and one nurse/ midwife
[ ] one driver, one nurse/midwife and one doctor
[ ] other

3.9 Did the ambulance team take care of you during the transport?
[ ] yes, there was always one person with me
[ ] no, the staff was sitting in the front cabin

4 Accompanied by relative or friend in the Ambulance

4.1 How long did you wait for the ambulance? (tick only one)
[ ] 1- 15 minutes [ ] 16- 30 minutes
[ ] 31 minutes- 1 hour [ ] 1- 2 hours [ ] _____

4.2 Were you satisfied with the treatment your relative/ friend received?
[ ] yes [ ] no

4.3 How did you feel treated as a person?
[ ] very well [ ] well
[ ] bad [ ] very bad

4.4 Did you receive any instructions from the health care provider (either dispatcher or ambulance team)?
[ ] yes [ ] no

4.5 Did the ambulance team explain their findings and treatments to you?
[ ] yes, I always felt well informed
[ ] yes, only ones
[ ] no, not at all

4.6 Did your situation/ condition of your relative/ friend improve through the ambulance team treatment?
[ ] yes, s/he seemed a lot better afterwards
[ ] yes, s/he seemed a little better afterwards
[ ] no

4.7 Did the ambulance team make the situation/life of your relative/friend a priority?
[ ] yes, they transported her/him directly to the hospital
[ ] no, we stopped ones on the way to the hospital
[ ] no, we stopped multiple times on the way to the hospital

4.8 How many staff members came with the ambulance? (tick only one)
[ ] only the driver
[ ] one driver and one nurse/ midwife
[ ] one driver, one nurse/midwife and one doctor
[ ] other

4.9 Did the ambulance team take care of your relative/friend during the transport?
[ ] yes, there was always one person with me
[ ] no, the staff was sitting in the front cabin

5 Present at scene

5.1 How long did it take until the ambulance arrived? (tick only one)
[ ] 1- 15 minutes [ ] 16- 30 minutes
[ ] 31 minutes- 1 hour [ ] 1- 2 hours [ ] _____

5.2 Did you receive any instructions from the health care provider (either dispatcher or ambulance team)?
[ ] yes [ ] no

5.3 How many staff members came with the ambulance? (tick only one)
[ ] only the driver
[ ] one driver and one nurse/ midwife
[ ] one driver, one nurse/midwife and one doctor
[ ] other

Thank you for your participation.

Annexe I – ECA curriculum

Emergency Care Assistant (ECA) Training Curriculum

FOREWORD

Around the world, Emergency Medical Services (EMS) are needed daily. It is for that reason, Rwanda Red
Cross society (RRCS) in collaboration with different partners, is aiming to establish the Emergency Medical
Service in order to strengthen the health service in Rwanda.
In execution of its mandate, Rwanda Red Cross Society and its partners have prepared the curriculum for
Emergency Care Assistant (ECA) training and ECA profession profile in Rwanda as well as developing the
trainee and trainer manuals for ECA education.
The Emergency Medical Services (EMS) will be provided by an equipped ambulance vehicle, with a
properly trained Emergency Care Assistant, to conduct pre-hospital care of emergency cases and conduct
transport of patients to higher-level health facilities, in order to minimize complications or in extreme case
subsequent death of emergency patient in health facilities.
However, as we look into the future of pre-hospital emergency medical care, we are called upon to evaluate
our role and the possible need for change in the context of a rapidly evolving medical care system. We must
look at what we have learned from the international standards and adapt them to the context of Rwanda.
Rwanda Red Cross Society is committed to creating a vision for the future of EMS in Rwanda.
The Emergency Care Assistants are called upon to act as multi-faceted first responders to emergency
medical calls from health centres, from accident sites or from disaster sites. By tackling the challenge of
EMS in Rwanda, we will continue to meet the needs of the communities we serve and do what we have to
do best to save lives of populations.

Mr. Apollinaire KARAMAGA
Secretary General RRCS

LIST OF ABBREVIATIONS

ABCDE Airway Breathing Circulation Disability Exposure
AED Automated External Defibrillator
AustRC: Austrian Red Cross
AVPU Alert, Voice, Pain, Unresponsive
BRC: Belgium Red Cros
CP Clinical Placement
CPD Continuous Professional Development
CPR Cardiopulmonary Resuscitation

DH District Hospital
ECA: Emergency Care Assistant
EMS Emergency Medical Service
EMT Emergency Medical Technician
GCS Glasgow Coma Scale
HRH: Human Resources for Health
MD Medical Doctor
MOH Ministry of Health
NCD: Non-Communicable Diseases
RN: Registered Nurse
PPH Post-Partum Hemorrhage
RRCS Rwanda Red Cross Society
SAMPLE Scene, Allergies, Medication, Last in/ last out, Exposure
SAMU Service d'Assistance Médicale d'Urgence
SDL: Self-Directed Learning

Table of content

ACKNOWLEDGMENTS AND LIST OF PARTICIPANTS TO THE DEVELOPMENT OF THE TRAINING PROGRAMME

Rwanda Red Cross Society wishes to thank the following persons who participated in the development of
this curriculum:

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Introduction

The curriculum presents a coherent and significant set of competencies to be acquired prior to assuming the occupation of an Emergency Care Assistant (ECA). It is designed with an approach that takes into account the training needs, the work situation, as well as the goals and the means to
implement training.

The modules of the curriculum include a description of the module training hours, credits and expected
results at the end of training. They have a direct influence on the choice of theoretical and practical learning
activities to be undertaken. The competencies are the targets of training and the acquisition of each is
required for certification.

The curriculum is the reference to carry out the assessment of learning. Assessment tools of learning are
developed on the basis of this document.
The pages describing the modules are the heart of a curriculum. They present the title of the module, the
length of training, the amount of credits, the learning units and learning outcomes.
In each module, a course structure is provided. The course structure describes the learning outcomes
(knowledge, skills and attitude) and the learning contents related to each learning unit. Also, the learning
activities and resources for learning are suggested.
Emergency Care Assistants provide out of hospital emergency medical care and transportation for critical
and emergent patients who access the emergency medical services (EMS) system. ECAs have the basic
knowledge and skills necessary to stabilize and safely transport patients ranging from non-emergency and
routine medical transports to life threatening emergencies. Emergency Care Assitants function as part of a
comprehensive EMS response system, under medical oversight. Emergency Care Assistants perform
interventions with the basic equipment typically found on an ambulance. ECAs are a critical link between
the scene of an emergency and the health care system.

Rationale of the Programme

Emergency Medical Services (EMS) in Rwanda have always been part of the health system in Rwanda and have been always contributing to the initial care of patients, victims of road accidents and victims of disasters.
Despite the integration of EMS in overall health system of the government of Rwanda it has remained
somewhat separate from the health care system due to its unique position and function in the community.
According to the exploration study done by Rwanda Red Cross in collaboration with Austrian Red Cross in
2017 (Hansak, 2016) and researches done on EMS in Rwanda such as the one published by Bahati et
al.(2013), it has been remarked that the EMS is suffering from serious problems of lack of qualified
personnel in pre-hospital care.
Currently in Rwanda, emergency medical services are provided by health professionals with little formal
training in emergency care. At the district hospital level, emergency services are partially present especially
in terms of ambulance services, availability of trained staff and formal means for triaging patients who
arrive with potentially life threatening medical and surgical conditions are still insufficient.

Looking at health statistics, in the past 15 years, childhood mortality is higher in rural areas than in urban
areas. While prevalence has decreased in major communicable diseases, Rwanda is experiencing an
increased incidence of non‐communicable diseases (NCDs) such as cardiovascular diseases, diabetes,
chronic respiratory diseases, etc. NCDs are estimated to account for 35% of all deaths in Rwanda.(Ministry
of Health, 2015).
The epidemiology of road traffic injuries in 2016 showed that primary victims of crashes were mainly in
cars (53.9 %), followed by motorcycles (15.4 %), trucks (11 %) and pedestrians and cyclists (11.4 %).(Patel
et *al*.,2016).
According to Bahati et *al* (2013), despite that there is a training underway for Emergency physicians who
generally will work at the referral hospital level in providing initial triage and stabilization for patients with
a wide variety of medical, surgical, and traumatic conditions at all times of the day and night. Key
challenges remain for EMS in Rwanda (Especially in District Hospitals) in terms of Human Resource for
Health (HRH).
Though, there is a need for pre-hospital and Emergency Care Assistants, fully dedicated to pre-hospital care,
management and evacuation of patients. Due to the differences in in-hospital and pre-hospital care a
specialization of staff is crucial.

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It has been observed that in rural areas, the medical personnel of the ambulances are provided by the
hospitals. These vehicles are not staffed with non-physicians anesthetists (as required by MoH), but only
with nurses and a driver. The driver usually has no medical or further training in handling emergencies, only
a general first Aid training for some of them. For these reasons, most patients are transported as quickly as
possible between hospitals, and receive little or no first aid services during the transportation, which can
severely increase complications.

Key challenges remain for EMS in Rwanda in terms of Human Resource for Health (HRH), including the
need for pre-hospital and Emergency Care Assistants, fully dedicated to pre-hospital care, management and
evacuation of patients. Due to the differences in in-hospital and pre-hospital care a specialization of staff is
crucial. Therefore, the development of the Emergency Care Assistant profession, as a first step and the
Paramedic profession at a later stage, is one mean to short-circuit the issue of EMS in Rwanda, as a short
and long term solution. For the first stage, an Emergency Care Assistant training curriculum has been
developed by Rwanda Red Cross Society in collaboration with national institutions, closely connected to the
health system in Rwanda, especially the Ministry of Health (MOH), District Hospitals (DH) and University
of Rwanda College of Medicine and Health Sciences (UR-CMHS). Other collaborators include the EMS
experienced Austrian Red Cross (AustRC) and the Belgian Red Cross-Flanders (BRC).

Job Description of the graduate

- Participate in 24/7 service requiring night shifts on a regular basis.
- Make reply adequately to the calls from dispatching following the existing protocol.
- Apply timely and qualitative pre-hospital treatment at the scene and en route to the hospital.
- Perform adequately under pressure and remain professional physically and in psychosocial demanding situation.
- Record all services provided to the patients followed by a report at the end of each shift.
- Comply with strict confidentiality with regard to patient's medical records and treatment.
- Operate emergency medical care for patients in pre-hospital environment.
- Comply with the regulation on handling of crime scene and pre-hospital death by notifying appropriate authorities and arrange for protection of property and evidence.
- Provide assistance to the receiving facility staff upon urgency and request.
- Prepare and make careful examination of all equipment to ensure availability of the ambulance for the next call.
- Utilize Microsoft Office and internet skills for reporting, communication and presentations.
- Demonstrate excellent knowledge of English and Kinyarwanda skills both written and verbal for daily work communication and reporting.
- Demonstrate Self-motivation to respond to the needs of most vulnerable people.
- Demonstrate capacity to operate ambulance and hold a driving license category B.

PROGRAMME AIM & OUTCOMES

4.1. Aim of the programme

The aim of this programme is to train and develop graduates to deliver pre-hospital emergency care services to the Rwandan community, participate in the implementation of national health system and respond to emergency medical services in relation to the national needs.

4.2. Programme outcomes

At the successful completion of the programme, the learner shall be able to:

- Demonstrate effective communication and apply the principles of medical ethics, professional behavior and the legal framework to the context within which emergency care assistants operate while maintaining personal health, wellness and safety.
- Demonstrate understanding of the structure and function of emergency medical service (EMS) system in Rwanda and how they relate to the broader health care structures within the country.
- Demonstrate knowledge and understanding of human and basic sciences underpinning emergency care.
- Provide emergency medical care within an emergency medical service environment to all sectors of the community within the emergency care assistant scope of practice.

11 | Page

Teaching and Learning Strategies

Pursuant to the aim and outcomes, strategies have been developed to ensure that learners achieve their aims, outcomes and objectives. To this end, content has been developed prudently in a manner that shows organization, relevance and sequence. In addition, innovative teaching/learning methods have been selected to enable learners acquire knowledge and understanding, skills and to develop professional /practical skills.

Such teaching/learning methods include: interactive lectures, small group discussions, group work and presentations, problem based learning and activities, self-directed learning, practical sessions, laboratory work using skills lab methodology, seminars, and workshops, use of videos, tutorials, small group tutorials, assignment presentations, educational visits, field visits and case studies.

Student-centered learning approach has been preferred to develop trainee's autonomy and independence by putting responsibility for the learning path in the hands of trainees by providing them with skills and basis on how to learn specific subjects of Emergency Care Assistant programme. Though, learner-centered instructions focus on skills and practices of emergency medical services that enables lifelong learning and independent problem-solving.

During the whole training, trainees are challenged to solve problems on their own. This occurs during the classroom lectures as well as during internship. The focus lays on the capability of the trainees to use their knowledge to solve job-related complex situations.

12 | Page

Entry requirements

For a student to be admitted into this programme, they will have to be eighteen or above years, and will have to meet certain entry requirements that have been set as mandatory. The requirements include qualification at senior certificate level ('A' Level certificate) or its equivalent. Compulsory subjects include mathematics, biology and/or physical sciences. Applicants with foreign academic qualifications will be required to show certified proof of

equivalence to the above stated qualifications. They must also be proficient in English as required by the National Policy.
The applicant must pass the medical fitness and physical Fitness evaluations.
A minimum of 40 hours voluntary duties in emergency medical services is added advantage.
Healthcare providers wishing to pursue a career as Emergency Care practitioners will be considered on case by case basis through a selection panel made of experts as well as persons who are already in medical career with well-known and proven experience will be also considered case by case.

Programme Structure & Regulations

Programme duration

Learners shall be required to achieve all the credits for both the fundamental/foundational and core components of the programme for a minimum period equivalent to one academic year. A minimum of 120 credits shall be required to achieve to meet the requirements for the qualification.

Credit weighting

The minimum credit hours for a unit course shall be equivalent to either 10 hours of lecture or 20 hours of tutorial hours and 30 hours for a practical session. One credit shall be equal to 10 hours of student's notional learning effort. One unit of medical learning is equivalent to one week of teaching. The total number of credits to be covered in the program is 120 credits.

Minimum curriculum content

The components of this programme include the foundations of Emergency Care Assistant, mental health and wellness, basic physics and chemistry, anatomy, physiology and basic pharmacology of emergency drugs, emergency medical care and clinical practice modules.

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Clinical training/placement

Clinical sessions are an essential element of the programme. During the entire professional training, students will be required to undertake a considerable portion of work experience in emergency settings across the country at all levels of health delivery services. Clinical placement provides an opportunity to the learners to integrate the knowledge acquired in the theory based professional units with the practical skills attained in the clinical placement areas.

To broaden the learner's clinical skills and abilities, a variety of emergency units will be accessible to enable them gain experience in a variety of procedures and type of equipment for purposes of achieving curriculum and module outcomes. Learners will be expected to demonstrate understanding and performance in clinical competencies in emergency trauma, obstetrics and gynecology interventions, and medical emergencies. The programme is structured in such a manner that the timing of the acquisition of competencies is linked to the taught theory. It is expected that at the end of the programme, the learner will have demonstrated competencies at the levels required in order to practice emergency care medicine with minimal supervision. During the clinical placement period, it is expected that the learner demonstrates the ability to empathize with patients and understand the requirements for procedures being performed. Learners are expected to analyze image patterns for interpretation of image quality.
To acquire the necessary skills, the learner should have performed under supervision or participated in (where applicable), as evidenced in the practical logbooks, the following number of investigations in a diagnostic imaging department:

N. Areas of learning Number of cases

1 Maternity 100

2 Emergency department 100
3 Pediatrics 100
4 Pre-hospital service 100
Total 400 procedures/cases
Award and title of the graduate
On completion of the training, the graduate shall be awarded a Higher Certificate in Emergency Care. The Holder of the Certificate shall be given a protected professional title of an "Emergency Care Assistant".

Assessment Guidelines

9.1. Assessment Methodology

To assess knowledge, practical, and application skills through a panel of experts during continuous evaluation that encourages learners to display understanding of the principles in application to set practical tasks and their attendance in various theoretical sessions.

9.2. Clinical Portfolio

A portfolio is a collection of learner work representing learner performance. It is a folder (or binder or even a digital collection) containing the learner's work as well as the learner's evaluation of the strengths and weaknesses of the work. Portfolios reflect not only work produced (such as papers and assignments, direct demonstration, indirect demonstration, products, documents), but also it is a record of the activities undertaken over time as part of learner learning. The portfolio is meant to show learner growth, development, and achievements in the education system. It also shows that you have met specific learning goals and requirements. A portfolio is not a project; it is an ongoing process for the formative assessment. The portfolio output (formative assessment) will be considered only as enough for complementary and general modules. Besides, it will serve as a verification tool for each candidate that he/she attended the whole training before he/she undergoes the summative assessment for specific modules.
There are two types of assessment (Formative Assessment and Summative/Integrated Assessment). Each assessment has its own rule for passing to be declared competent.

9.3. Formative Assessment

This is applicable to all types of modules (Foundational and core modules)
A trainee to be competent for a formative module must have at least 85% on checked items or "yes" in indicators (e.g. questions, indicators in the checklist)
All formative assessment should be passed at 60% and above before taking the summative/integrated assessment.

9.4. Summative Assessment

- All Summative/Integrated assessment should match with the content of the module in the curriculum.
- Summative/Integrated Assessment shall be comprised by both theoretical and practical with the practical overriding the theoretical component.
- Teaching faculty/facilitators shall be mandatorily developing clinical scenarios referring to the task to be carried out during the assessment. Case studies shall be the hallmark during the assessment.
- A panel of expert shall constitute the examining body of not less than five practitioners.

9.5. Dishonesty

Any kind of dishonesty in any form will not be tolerated and is ground for immediate dismissal from the program and other administrative action by the Program.

9.6. Cheating in any form ·

- Falsification or forgery of academic documents, applications, clinical evaluations, etc.
- Plagiarism (including copying and pasting of electronic text into assigned work).

9.7. Grading Scale

- 90 to 100% A
- 80 to 89% B
- 70 to 79% C
- 60 to 69% D
- Below 60% F

17 | Page

Programme Structure

Organization of Prescribed Programme modules

No Code **Module Learning Units**
Credits
Hours
Theory
SDL
Practical
Total
1 EMA
111

Fundamentals of Emergency Care

Introduction to Emergency Medical Services
2 6 6 8 20
Communication 1 2 2 6 10
Pre-hospital care equipment 2 6 6 8 20
Ambulance communication, documentation and reporting
2 6 6 8 20
Legislation, law, ethics and Health care 2 8 6 6 20
Medical rescue safety 2 8 6 6 20
Evidence-Based Medicine 1 2 2 6 10
Principles of Emergency Services Operation and first aid
3 8 8 14 30
S/Total 15 46 42 62 150
2 EMA
112

Anatomy, physiology and basic physics and chemistry

Human anatomy 5 15 15 20 50
Human Physiology 5 15 15 20 50
Basic physics and chemistry
S/total
3 EMA
113

Emergency medical care

Airway management, respiration and
artificial ventilation
2 5 5 10 20
Patient assessment 2 5 5 10 20
Cardiopulmonary resuscitation 2 5 5 10 20
Trauma emergencies 6 20 20 20 60
Medical emergencies 6 20 20 20 60

18 | Page
Obstetric and gynaecological
emergencies
6 20 20 20 60
Neonatal and paediatrics emergencies 6 20 20 20 60
Psychiatric emergencies and
psychosocial support
2 5 5 10 20
Disaster management 2 5 5 10 20
Gender based Violence and Child abuse 1 4 4 2 10
Pharmacology of emergency drugs 5 15 15 20 50
S/total
4 EMA
114

Clinical practice

Pre-hospital ambulance service 15 150 150
General Emergency department 11 110 110
Pediatric emergency unit 12 120 120
Maternity department 12 120 120
S/total 50 500 500
120 214 20
7
779 120
0

19 | Page

Description of Modules

Fundamentals of Emergency Care Service

The introductory module provides the learner with all necessary basics on Emergency Medical Service (EMS) and working with humans. Therefore, the module covers the Rwandan Health Care System including EMS, communication, ambulance equipment, evidence based medicine as well as the principles of First Aid and medical ethics.
After this module the learners are able to engage deeper in the respective topics throughout the following modules.

Module
Code
Module Name Fundamentals of Emergency Care Services
Credit: 15 Theory: 9 Practical: 6
EMA 111 Pre-requisite None
Indicative
Content
This module will provide participants with the

opportunities to:
- Discuss and understand the Rwandan healthcare system, EMS and the responsibilities of an ECA
- Explore methodologies for a successful communication
- Get familiar and practice with emergency care equipment
- Develop skills in documentation and effective reporting
- Explore evidence-based medicine
- Develop and practice safe rescue operations
- Develop the principles of Emergency Care and First Aid

Learning outcome

Demonstrate effective communication and apply the principles of medical ethics, professional behavior and the legal framework to the context within which emergency care assistants operate while maintaining personal health, wellness and safety.

Learning and Teaching Methods
- Presenter input
- Scenario plays
- Reading and research
- Practical exercise

Learning units

1. Introduction to Emergency Medical Services
i. Understand the healthcare system and structure in Rwanda
ii. Describe the roles of EMS in the health care system.
iii. Understand the duties and responsibilities of an ECA.
iv. Learn the scope of work for an ECA.

2. Communication
i. Understand the art of effective communication in various surroundings and emergency situations with co-workers, or other external involved agencies.
ii. Communicate with the patient clearly and in a manner and pace that is appropriate to their level of understanding, culture, situation and their need for reassurance and support
iii. Reflect professionalism through use of appropriate language while speaking to the dispatcher team
iv. Understand how to engage with a senior medical staff for support in case of the situation

beyond your ECA competences.
3. Pre-hospital care equipment
i. Understand and describe the handling and maintenance of medical equipment
ii. Use properly medical equipment according to manufacturer's instructions
iii. Understand and apply safety, hygiene and disinfection of ambulance and medical equipment
iv. Store medical equipment in good condition accordingly.
4. Ambulance communication, documentation and

reporting
i. Perform an effective handover with receiving health facility personnel for effective continuous assessment and treatment.
ii. State the importance of accurately reporting and recording the baseline vital signs of the patient
iii. Make full and effective use of any protocols, guidelines and other sources of guidance and advice to inform decision making
iv. Demonstrate clear understanding and application of the reporting and documentation formats in pre-hospital care.
5. Legislation, law, ethics and Health care
i. Recognize the boundary of one's role and responsibility and seek supervision when situations are beyond one's competence and authority
ii. Understand and describe relevant medico-legal principles in management of patients.
iii. Respect the patient's privacy, dignity, wishes and beliefs
iv. Perform the duties of an ECA with regard for medical-legal and ethical consideration, within the scope of practice.
v. Define consent and discuss the methods of obtaining consent.

6. Medical rescue safety
i. Understanding and application of hand washing techniques
ii. Ensure that all safety precautions are taken at the scene of the emergency
iii. Sum up the scene quickly and ensure that it is safe by taking appropriate measures
iv. Plan and organize activities to be carried out at the scene in order to be rapid and effective without compromising safety of patient care
v. Understand the importance of being alert to health, safety, and security hazards at the emergency site
7. Evidence-Based Medicine

i. Implement the best solution for each emergency based on available scientific evidences
ii. Follow prescribed procedures and steps involved in an emergency or triage context
iii. Understand the communication protocols for medical situations
iv. Communication between the ECA and the higher medical staff prior to the ECA rendering medical services to the patients outside the hospital
v. Demonstrate professional judgement in determining treatment modalities within the parameters of relevant protocols
vi. Understand the universal approach to critical patient care and package-up-patient algorithm (transport protocol)
8. Principles of Emergency Services Operation and first aid
i. Apply principles of emergency medical services operations: Considering ambulance transportation of casualties, Multiple casualty incidents, Gaining access to and extricating patients and Responding to situations involving mass destruction
ii. Understand the importance of first aid and triage
iii. Understand and apply first aid principles in

context of emergency environment
iv. Prepare tools and equipment, drugs and consumables of first aid kit.
v. Handle and transport casualties of different situations

Anatomy and Physiology

This module provides the learner with the basic knowledge of the human body. To become an Emergency Care Assistant (ECA), it is vital to understand the structure and the systems of the human body.

Module Code
Module Name Anatomy, Physiology And Pharmacology Of Emergency Drugs
Credit: 15 Theory: 9 Practical: 6
EMA 112 Pre-requisite None
Learning Outcome
Demonstrate knowledge and understanding of human and basic sciences underpinning emergency care.
Learning units and outcomes

Human anatomy
i. Describe and differentiate the anatomy of the following major body systems:
- Nervous system
- Cardio-respiratory system

- Digestive system
- Urinary system
- Reproductive system
- Skin and musculoskeletal system

Human Physiology
ii. Describe and differentiate the functions of the

following major body systems:
i. Understand the lungs functions
ii. Understand alveolar capillary gas exchange
iii. Understand the physiology of the heart and vessels
iv. Describe major muscles&bones and their functions
v. Understand the function of the central nervous system and peripheral system
vi. Understand the functions of the major parts of gastro intestinal tract
vii. Understand urogenital and reproductive system functions

Pharmacology of emergency drugs
Understand the pharmacology of emergency drugs used in prehospital, their properties, effects and interactions and demonstrate how they are used in emergency by emergency care assistant.
i. Identify which medications will be carried on the unit.
ii. Identify the medications with which the ECA may use to assist the patient.
iii. Discuss the forms in which the medications may be found.
iv. Learn ways and routes of administration of medications.
v. Discuss indications, contra-indication and side effects of drugs
vi. Identify and classify medication used for pain management
vii. Identify medication used during anaphylaxis and other emergency situations

Emergency Medical Care

Starting with patient assessment, this chapter is covering all emergency treatment in different medical patterns. After successful completion of this chapter, the learner will be able identify different emergencies and treat them accordingly.

Module Code
Module Name
Emergency Medical Care
Credit: 35 Theory: 22 Practical: 13
EMA 113 Prerequisite
None
Learning outcome
Provide emergency medical care within an emergency medical service environment to all sectors of the community within the

emergency care assistant scope of practice.

Learning units and outcomes

1. Airway management, respiration and artificial ventilation

i. List the signs of inadequate breathing.
ii. Perform emergency airway opening techniques
iii. Describe the techniques of suctioning.
iv. Describe artificial ventilation of a patient with a bagvalve-mask (Ambu Bag)
v. List the parts of a bag-valve-mask system.
vi. Describe the signs of adequate artificial ventilation using the bag-valve-mask
vii. Describe how to measure and insert a laryngeal tube.
viii. Define the components of an oxygen delivery system.
ix. Demonstrate the use of prescribed medication for patient with asthma attack
x. Demonstrate the adequate positions to the patient with breathing difficulties
xi. Demonstrate the use of nebulizer mask and machine
xii. Demonstrate how to artificially ventilate the infant and child patient.
xiii. Demonstrate oxygen administration for the infant and child patient.
xiv. State the signs and symptoms of a patient with breathing difficulty.

xv. Describe the emergency medical care of the patient with breathing difficulty
xvi. State the generic name, medication forms, dose, administration, action, indications and contraindications for the prescribed inhaler.
xvii. Differentiate between upper airway obstruction and lower airway disease in the infant and child patient.
xviii. Defend ECA treatment regimens for various respiratory emergencies.

2. Patient assessment

i. Learn how to identify quickly the situations and being adapted accordingly
ii. Perform quick assessment and secondary assessment
iii. Demonstrate the skills in assessment of all vital signs.
iv. Differentiate signs and symptoms.
v. Recognize promptly any life-threatening or high risk conditions
vi. Describe ways of managing any behavioural emergency patient
vii. Recognize the signs and symptoms of post-traumatic stress disorder.
viii. Recognize pain score and different method used to help reduce/alleviate pain
ix. Recognize the patient level of consciousness by using AVPU or GCS

x. Identify the components of the SAMPLE history.
xi. Perform the triage using different methods in handling victims of mass casualty incidents and disasters
3. Cardiopulmonary resuscitation
i. Describe the emergency medical care of the patient experiencing chest pain/discomfort.
ii. Describe the use, indications and contra-indications of automated external defibrillation (AED).
iii. Define the role of ECA in the emergency cardiac care system.
iv. Discuss the position of comfort for patients with various cardiac emergencies.
v. Establish the relationship between airway management and the patient with cardiovascular compromise.
vi. Discuss the fundamentals of early defibrillation.
vii. Explain the importance of urgent transport to a facility with Advanced Cardiac Life Support if it is not available in the pre-hospital setting.
viii. Explain the considerations for interruption of CPR, when using the automated external defibrillator.
ix. Differentiate between the single rescuer and multirescuer care with an automated external defibrillator.
x. Discuss the importance of post-resuscitation care.
xi. List the indications for the use of nitroglycerin.
xii. State the contraindications and side effects for the use of nitroglycerin.
xiii. Demonstrate the assessment and emergency medical care of a patient experiencing chest pain/discomfort.
xiv. Practice writing a pre-hospital care report for patients with cardiac emergencies.

4. Trauma emergencies
Bleeding and shock
i. Describe and apply the method of stopping active bleeding (Ways of stopping/ controlling bleeding)
ii. Differentiate between external and internal bleeding
iii. Identify signs and symptoms of internal bleeding
iv. Handle a patient with internal bleeding
v. Determine signs and symptoms of hypovolemic shock
vi. Give initial treatment of a patient in shock
Soft tissue injuries and Burns
vii. Identify different types of soft tissue injuries.
viii. Differentiate between different causes of burns
ix. Stop burning progression by soaking with water or saline
x. Remove clothing and accessories from burnt tissues safely.
xi. Provide Emergency medical care for burns.
xii. Apply general principles of dressing of a wound and bandaging.
xiii. Apply general principles of dressing of a burn wound.
Musculoskeletal Injuries
xiv. Differentiate between open and closed fractures.

xv. Apply different immobilization/stabilization techniques depending on injury.
xvi. Assess pulses, motor and sensation before and after splinting to avoid complications.
Injuries to Head and Spine
xvii. Assess head/ spinal injuries

xviii. Determine complications of head or spinal injuries.
xix. Enumerate signs/ symptoms of neurological deficit (change in personality, irritability, lethargy, confusion, changes in consciousness, paralysis of one side of the body, seizures).
xx. Neck and Spine stabilization / immobilization.
xxi. Lifting and log-roll for patients with suspected/ frank head or spinal injury
5. Medical emergencies
i. Identify the patient taking diabetic medications with altered mental status and the implications of a diabetes history.
ii. Establish the relationship between airway management and the patient with altered mental status.
iii. Recognize signs and symptoms of hypoglycemia or hyperglycemia
iv. Demonstrate the use of finger strip blood glucose check
v. Demonstrate the steps in the emergency medical care for the patient taking diabetic medicine with an altered mental status and a history of diabetes.
vi. Demonstrate the assessment and documentation of patient response to oral glucose.
vii. Demonstrate how to complete a pre-hospital care report for patients with diabetic emergencies.
viii. Recognize the patient experiencing an allergic reaction.
ix. Describe the emergency medical care of the patient with an allergic reaction.
x. Establish the relationship between the patient with an allergic reaction and airway management.

xi. Describe the mechanisms of allergic response and the implications for airway management.
xii. State the generic and trade names, medication forms, dose, administration, action, and contraindications for the epinephrine.
xiii. Demonstrate the assessment and documentation of patient response to an epinephrine injection.
xiv. Transport of allergic patient to the appropriate health facility
xv. Demonstrate completing a pre-hospital care report for patients with allergic emergencies.
xvi. List signs/symptoms associated with poisoning.
xvii. Discuss the emergency medical care for the patient with possible overdose.
xviii. Describe the steps in the emergency medical care for the patient with suspected poisoning.

xix. Establish the relationship between the patient suffering from poisoning or overdose and airway management.
xx. State the generic and trade names, indications, contraindications, medication form, dose, administration, actions, side effects and re-assessment strategies for activated charcoal
xxi. Demonstrate the steps in the emergency medical care for the patient with possible overdose.
xxii. Demonstrate the steps in the emergency medical care for the patient with suspected poisoning.
xxiii. Demonstrate the assessment and documentation of patient response
31 | Page
xxiv. Demonstrate completing a pre-hospital care report for patients with a poisoning/overdose emergency.
6. Obstetric and gynaecological emergencies
i. Identify and explain the use of the contents of an obstetrics kit.
ii. Identify pre-delivery emergencies.
iii. State indications of an imminent delivery.
iv. Differentiate the emergency medical care provided to a patient with pre-delivery emergencies from a normal delivery.
v. State the steps to assist in the delivery.
vi. Describe how and when to cut the umbilical cord.
vii. Discuss the steps in the delivery of the placenta.
viii. List the steps in the emergency medical care of the mother post-delivery.
ix. Summarize neonatal resuscitation procedures.
x. Describe the procedures for the following abnormal deliveries: Breech birth, prolapsed cord, limb presentation.
xi. Demonstrate the steps to assist in the normal cephalic delivery.
xii. Demonstrate post-delivery care of a newborn.
xiii. Demonstrate the procedures for the following abnormal deliveries: vaginal bleeding, breech birth, prolapsed
32 | Page
cord, limb presentation.
xiv. Demonstrate completing a pre-hospital care report for patients with obstetrical/gynecological emergencies.
7. Neonatal and paediatrics emergencies
i. Indicate various causes of respiratory emergencies in pediatrics.
ii. List the steps in the management of foreign body airway obstruction.
iii. Summarize emergency medical care strategies for respiratory distress and respiratory failure.
iv. Identify the signs and symptoms of shock (hypo perfusion) in the infant and child patient.
v. State the usual cause of cardiac arrest in infants and children.
vi. Discuss the field management of the infant and child

trauma.
vii. Summarize the indicators of possible child abuse and neglect.
viii. Describe the medical legal responsibilities in suspected child abuse
ix. Demonstrate the techniques of foreign body airway obstruction removal in infants and children.
x. Demonstrate bag-valve-mask artificial ventilations for the infant and Child.

xi. Demonstrate oxygen delivery for the infant and child.
8. Psychiatric emergencies and psychosocial support
i. List psychiatric emergencies and to deal with psychiatric patients
ii. understand psychosocial aspects of Severe Gender Based Violence (SGBV)
iii. understand psychosocial aspects of abused/ neglected children
iv. deliver Psychological First Aid and provide support about loss and grieve
9. Disaster management
i. Demonstrate knowledge and understanding of the role of emergency care providers during a major incident in line with the principles of the major incident management system.
ii. Definition of disaster, effect, safety and scene control are explained in cases of multiple casualty incidents.
iii. Communication, triage, access, evacuation, transportation and the role of EMS is explained in relation to major incident management system.
10. Gender based Violence and Child abuse
i. Identify gender-based violence and to keep evidence
ii. Understand the possible referral path for a SGBV victim and to communicate with a SGBA victim
iii. understand psychosocial aspects of Severe Gender Based Violence (SGBV)
iv. approach the abused/ neglected child in the correct way and take care of an abused child

Clinical Practice

During the clinical practice, the learner is able to use his/her theoretical knowledge and practical skills, gained through modules EMA 111 to EMA 113, on real cases. However, the clinical practice is supervised by accredited health staff and evaluated by teaching- nurses from the University of Rwanda, College of Medicine and Health Sciences, School of Nursing and Midwifery.

Module Code
Module Name Clinical practice
Credit: 50 Theory: None Practical: 50
EMA 114 Pre-requisite None
Learning Outcome
Demonstrate and apply practical skills and procedures in clinical

placement sites, by assessing patients and applying immediate management prior to hospital settings, appropriate evacuation of patients and managing acute phases of disorders before handing over to higher level staff

Clinical placement sites and outcomes

1. Pre-hospital ambulance service

i. Receive a vehicle and equipment hand-over from the outgoing ambulance personnel

ii. Perform pre-shift vehicle check

iii. Use a map book to quickly locate an address and navigate to it.

iv. Perform a scene assessment and report the findings to the control center.

v. Clear and restock ambulance after an emergency call

vi. Perform a vehicle and equipment handover to the incoming ambulance personnel

vii. Accurate patients triage

viii. Quickly and efficiently request higher staff assistance if required

ix. Undertake primary and secondary surveys

x. Load the patient into an ambulance using appropriate techniques

2. General Emergency Department

i. Demonstrate knowledge, skills and attitudes required to assess and manage common adult and pediatric emergencies;

ii. Demonstrate, where possible, the practice of key emergency procedural skills such as cannulation, wound care, suturing and splinting as well as basic life support skills.

iii. Demonstrate the development of attitudes, knowledge and skills for competent care of injured and /or infirmed individuals of all ages.

iv. Demonstrate cognitive, technical and interpretive skills in undertaking an accurate, detailed system focused history from a range of patients.

v. Use knowledge of common and important conditions, the patient history and physical examination findings, and clinical data, to undertake clinical reasoning and formulate probable and differential diagnoses.

vi. Recognize and assess deteriorating and critically unwell patients who require immediate care. Perform common emergency and life support procedures.

3. Paediatric emergency unit

i. Competently perform procedures in emergency pediatrics, including being able to describe the steps in the procedure, indications, contraindications, complications, pain management, post-procedure care.

ii. Perform appropriate therapeutic skills, to apply relevant information to patient care and practice, and to educate patients regarding prevention of common health problems.

iii. demonstrate clear, concise and accurate communication when interacting with pediatric clients and their families as an effective member of the health care team through verbal responses that will foster a trusting relationship and integrity
iv. Demonstrate, where possible, the practice of key emergency procedural skills such as cannulation and basic life support skills in pediatrics emergencies.
4. Maternity department
i. Discuss the management of a patient in labour during all phases of labour after admission to the labour ward
ii. Discuss and well perform assessment of pregnant women in delivery room
iii. Demonstrate skills in determining pregnancy complications signs and how to manage them and be able to look for higher staff advice or referral.
iv. Demonstrate knowledge and skills in assessment of women in delivery room, detecting abnormal presentations and other disorders and take decision on the way forward
v. Demonstrate knowledge and skills in assessment and

management of post-partum complications.