UiT The Arctic University of Norway

Faculty of Health Sciences

Construction and Implementation of First Aid Courses in Rural Populations: A Narrative Review

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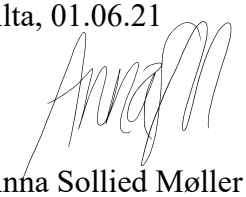
Preface

I was introduced to the project Rural Health for Peace (RHfP) through one of my classmates February 2020. He did his medical research year in a rural village in Colombia devoid of state funded health institutions with the purpose of finding out which barriers exist between rural populations in Colombia and health care. During his stay in this village, he conducted a multitude of interviews with the inhabitants. In several of these interviews it was mentioned that a first aid course would be useful for the village. I spent most of my time during my own medical research year working with topics quite on the other side of the research scale: in a lab doing experimental, quantitative research on antibiotic resistance. I've always been curious and enjoyed learning new things, so I welcomed this new project that is a little closer to the clinical medicine, and which hopefully could have immediate utility, with open arms.

This project required no REK-approval. I initially received funding from NCRM to travel to Colombia, but because of the covid-situation I had them transferred to 2022 in hopes of being able to fulfill the original plan then. The literature search and writing were conducted by myself, but I could not have made it without excellent help and guidance from my supervisor Torsten Risør. I also want to thank Eirik Reierth at the Health Faculty library who gave me a crash course in systematic literature searches and helped me discover acceptable search terms.

Alta, 01.06.21



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Summary

Background: Colombia is in the process of healing after many years of civil war. Several measures have been taken to aid the peace process, among them the Colombian-Norwegian cooperation Rural Health for Peace (RHfP) that aims to strengthen primary health care in the areas most afflicted by the war. Several villages are part of the collaboration. The inhabitants in one of them have made their own 'micro-healthcare' in lack of access to formal healthcare services, but voiced a wish for a first aid course to further empower themselves. A plan to use community-based participatory research (CBPR) to make a locally appropriate course was made, starting with a literature search to explore what such a course should contain.

Methods: A semi-systematic literature search was conducted in MEDLINE. The inclusion criteria comprised experimental or observational studies that report on development, implementation, sustainability and effect of first aid education in rural populations. Search terms used includes various terms for first aid education, educational assessment and rural populations. Of 875 identified studies, 19 were selected for qualitative synthesis to answer the research question "What are the most important aspects to bring into the making of a first aid course in rural Colombia?".

Results: Several topics recur in the included studies: the importance of a needs assessment, using the existing infrastructure to successfully improve or implement a prehospital system, utilization of cheap and locally sourced tools, effect of simulation training, the importance of refresher training, possibilities of group dynamics, benefits of delegating away the role of instructor, the importance of course evaluation, and finally, the use of creative methods to reach goals.

Conclusion: This narrative review identified many important aspects that can aid the construction of a successful first aid course. It underscores the need for strong user involvement in both development and implementation of the course. In addition, the possibilities for productive group processes and refresher training needs to be explored. Creativity is perhaps the least predictable aspect found in the review, but may be key to the transfer of insights from around the world to a particular geographical and cultural context. Hopefully this review can thus constructively inform the making of a future course.

Abbreviations

BLS	Basic Life Support
LSFA	Life Supporting First Aid
AMI	Acute Myocardial Infarction
CPR	Cardiopulmonary Resuscitation
AED	Automatic External Defibrillator
OHCA	Out-of-Hospital Cardiac Arrest
MOH	Ministry of Health
EMS	Emergency Medical Services
OSCE	Observed Structured Clinical Examination
RCDP	Rapid Cycle, Deliberate Practice
TEAM	Team Emergency Assessment Measure
PHC	Primary Health Care
CBPR	Community-based Participatory Research
RHfP	Rural Health for Peace
NCRM	Norwegian Centre for Rural Medicine
LMIC	Low- to Middle Income Iountries
SLWEREI	The Sachigo Lake Wilderness Emergency Response Education Initiative
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
MeSH	Medical Subject Headings

1 Introduction

Colombia has been through five decades of civil war and unrest between the state and guerrilla groups and is currently in the process of healing. Several measures have been taken to aid the peace process, one of them being the Colombian-Norwegian cooperation Rural Health for Peace (RHfP) that aims to strengthen primary health care (PHC) in the areas most afflicted by the war. A previous study done by Søndenå (verbal communication, not yet published) have shown that even though there is no state funded health care in a rural village in Colombia, the inhabitants there make up their own kind of "micro healthcare" with the resources they have. The need for a first aid course was mentioned during the interviews Søndenå carried out. There is a strong local will to act, so there is a potential for targeted training to further enhance learning in regard to health. The purpose of this thesis is thus to perform a literature search to explore what a first aid course in a rural setting could and should contain.

1.1 First aid in a rural context

Injury is one of the greatest causes of premature death and disability in the world(1). Of all injury, non-fatal injuries occur more often than fatal ones and can have a huge impact on the injured persons' life when it comes to subsequent disability, loss of productivity and work, and treatment cost(2). Injury-avoidance strategies focus on primary prevention, e.g. keeping injuries from happening in the first place, and secondary prevention, meaning the medical response to injury to minimize the harm following the damage already done. Rapid secondary prevention by qualified health personnel following injury can in many instances save lives, reduce disability and improve long-term outcomes, but in many parts of the world there is little to no access to this basic level of medical care(1). Where injury is one of the leading causes to premature death and disability, ischemic heart disease has historically been the top leading cause in developed countries(3). Latin America has experienced major changes in demography, epidemiology, and nutrition over the last decades caused by economic growth, urbanization, decreased infant mortality and increased life expectancy. This has led to a shift in mortality and morbidity that previously was attributed to communicable diseases, and which are now rather due to cardiovascular disease. It is expected that this will be the main cause of death in the region for a while(4). It is known that the survival rate in patients undergoing an acute myocardial infarction (AMI) may be higher for those that receive

cardiopulmonary resuscitation (CPR) immediately(5), and even so for those that receive early defibrillation(6).

One of the most highlighted challenges in public health development in rural areas is the distance between rural populations and the nearest urban hospital. In the Framework for Remote Rural Workforce Stability it is described how access to public healthcare is the main challenge in rural areas of most countries in the world – not only because of actual distance in miles, but also because of lack of skilled labour, continuity of care and economic and material resources(7). Even though the public health system might be absent from the rural context, the different health issues that afflict us all, is not. To deal with health issues that can arise in a rural setting, the inhabitants are dependent on each other. Some inhabitants may take on roles as midwives or pharmacies, or learn how to suture wounds or apply bandages. In the literature these inhabitants would fall under the category informal healthcare provider, e.g. practitioners who provide services that they are neither trained, or licensed for(8). These informal healthcare providers are widespread in the world, and specially in low-resource populations without means to travel to the nearest public hospital(9). Evidence shows that first aid done by laypeople is likely to have an effect on mortality and subsequent disability in regard to injury(10). Knowledge about basic first aid is important, especially in remote and rural areas where a lack of professional pre-hospital services can render this the only help available. In a WHO publication about prehospital trauma care system, the possibility to incorporate laypeople (or informal health care providers) into the health system is highlighted; *"Where no prehospital trauma care system exists, the first and most basic tier of a system can be established by teaching interested community members basic first aid techniques. These first responders can be taught to recognize an emergency, call for help and provide treatment until formally trained health-care personnel arrive to give additional care. It may be possible to identify particularly motivated or well-placed workers, such as public servants, taxi drivers, or community leaders, and train them to provide a more comprehensive level of prehospital care"*

1.2 Colombia

Colombia is in a process of possible recovery from the five-decade long civil war that has led to devastating losses and left the county in a state of unrest. Its people are split in divisions; either in support or opposition to the former FARC, sharing only their caution or mistrust against everything new. Any new project or policy needs to be seen in a contextual condition

for it to form a basis of something that can last. The conflict is complex, but there are some key drivers that seem to have contributed to start it all off, maybe most importantly the introduction of a more capitalist policy for agriculture in the 1950s that gave rise to tension between major landowners and small-scale farmers (11, 12). The Colombian government gave their support to the major industrial landowners and used armed confrontation when met with resistance, thus creating the need for armed protection for the farmers. All of this happened in a context of high social and economic inequality between rural and urban areas. Together, these key points contributed to the start of a civil war between guerrilla groups of small farmers and the Colombian government with its national state institutions that were to last half a century with 160.000 missing individuals, 220.000 deaths, and six million people displaced from their home.

A peace treaty between the Colombian state and FARC, the largest guerrilla group, was finally agreed on and signed in 2016. Norwegian diplomats were involved in the negotiations leading up to the peace treaty and was invited to continue their involvement in the aftermath (memorandum attached). In the follow-up of this treaty, health is an important theme. Access to basic health care can be difficult for people in rural areas for several reasons, some mentioned in the previous subchapter. A relative peace has been created in Colombia, but many put mistrust in the outcome of the peace process, and there is still tension between the two divisions(13). Many fear that promises given in the treaty will not be met, and that violence and civil unrest may return. Colombia's 1993 health care expansion ensured mandatory health insurance for all, but because of the conflict many rural areas have had little to no public health care. Healthcare access has in fact been written into the peace treaty, explicitly. It is essential to provide sustainable and available primary healthcare for all to develop and preserve peace, and to start the healing of the division and distrust between the two former opposing sides(14).

1.3 Rural health for peace

In December 2016 the ministries of health in Colombia and Norway agreed on working together to develop adequate healthcare in Colombia, with the main focus being primary care and rural medicine(15). The operational task was given to Norwegian Centre for Rural Medicine (NCRM) at UiT Arctic University of Norway at the Norwegian side, and to academics and clinicians at University of Sabana in Bogotá and University of Tolima on the Colombian side. The shared project is called Rural Health for Peace (project description

attached). One of the underlying ambitions of the project is to engage local populations in the co-production of healthcare to make sure that the projects initiated match the local needs and priorities.

One of the communities selected by the ministry of health in Colombia as starting points for research in RHfP is Icononzo. People from the area have indicated that they feel abandoned by the public healthcare system. In this municipality there is a vereda (administrative subunit of a municipality) called El Triunfo. This village has about 40 families, all deeply affected by the civil war. The local health post is abandoned because of financial restructuration, politics and changes in budget, and the inhabitants must therefore travel to Sumapaz Hospital for public health services – a trip taking approximately one hour by car, on narrow and bumpy roads. They lack vehicles for transport, and the village does not fulfill the set criteria to establish a public bus route between the hospital and the village(13). Public health services are in other words theoretically available to the population, but the real accessibility is low.

1.4 Health services in rural Colombia

A lot has happened in regard to health in Colombia. The health reforms from 1993 have drastically improved access to health for all, increasing the insurance coverage of the population from 25% to 90% according to WHO(16). The poorest 20% have seen an increase in coverage from 6% to 70% (data from 2007), and thus decreasing the inequity in health services. A law from 2011 modified the health system further by putting primary health care at the center of the system to improve the health in the country, but there are still areas not touched by formal health care(17). Inhabitants in these areas might use some traditions that persist from before the reform, especially the use of natural medicine in form of different plants as remedies(18). Most of the conditions treated with plants are used in a public health sense, treating non-acute general illness without specific symptoms(19). As mentioned before, acute injury is one of the leading causes of mortality and disability in the world(1), and especially so in rural and remote areas. It is safe to assume that plants might be of little help in a trauma-situation, or if someone were to suffer from a heart attack. Basic knowledge about first aid is crucial to save lives, but also to prevent further illness or injury(20). It can be initiated by anyone on anyone, including self-care, but correct application is dependent on adequate training. Such training can be implemented in different settings, including small villages without direct access to public health care. Evidence has shown that doing so can greatly improve the initiation and correct execution of first aid(21).

1.5 Community-based participatory research

Participatory action research (PAR) has been defined as "systematic inquiry, with the collaboration of those affected by the issue being studied, for purposes of education and taking action or effecting social change"(22). It is based on a rather different approach than conventional public health research which often comprise of a top-to-bottom model where the researchers chose what or who to research, how they are going to do it and how the data should be interpreted afterwards. PAR is based on reflection, collection of data, and action aimed at improving health and reducing health inequities in a community by involving the people living there in all of these processes(23). Both partners, the researcher and the community, should be involved at all stages: designing and implementation of the project, data analysis and publication of the results(24). To ensure that the course is relevant for the region and for the needs of its inhabitants, we have to include the population in the construction of the course. The village has its own health committee consisting of inhabitants they've elected themselves, that are working voluntarily with the village's health matters. It would be ignorant to assume that we know what their village needs in terms of health better than them. Including the inhabitants in the process of making a course might also make them gain ownership of the process, and thus increase motivation to participate. One of the key philosophies behind the project RHfP is that local engagement can promote peace – if we can build up a local cooperation and ownership to the health services, then, hopefully, we can lower the risk of new conflicts and internal disagreement.

Community-based participatory research (CBPR) is a broad field, but during my preparations for this thesis I could only encounter one study that used CBPR in the development, implementation and evaluation of a first aid course. The article *Where there is no paramedic: the Sachigo Lake wilderness emergency response education initiative* by Orkin et al. presents the Sachigo Lake wilderness emergency response education initiative (SLWEREI) in Canada, a collaboration between physicians, first aid educators, researchers, and a remote indigenous community to develop and deliver a life supporting first aid program (25). They had community partners integrated in every phase of the initiative, and together they made a 5-day program based on curriculum and pedagogical approach designed specifically for the community. They had no pre- or post-test to assess whether the participants had acquired the skills and knowledge that were taught in the course but had the public health and capacity-building effects as this project´s most important outcome. We should use CBPR not only

because it would strengthen project in quality and relevance, but also because it appears to be the best way to ensure its utility for the people in the village. Several studies thus show to the many advantages of involving those that are to benefit from the research(26), and the importance on doing so on their own arena(24, 27). When constructing this first aid-course, standardized approaches made in hospitals will not necessarily fit into this rural setting.

1.6 Purpose and goals

With Colombia's recent history and the current political peace process between the government and the various guerrillas it makes sense to assume that improving rural primary health services can be an important factor in improving public health, but also in making the population stand together to help the ongoing peace process. A study done by Søndenå in El Triunfo (not yet published, based on verbal communication) revealed the physical and abstract barriers that exist between the village and public healthcare, and also illuminated the most fundamental needs in the population by using ethnographic field work with participant observation and interviews. It sheds light on the immense amount of health resources that nonetheless exist there, even though nurses and doctors on state payroll are absent. People make do with what they have, and gain experience on a voluntary basis to participate in the health work inside the village. Even though they have developed their own kind of micro-healthcare, they have recognized their own limitations regarding first aid.

The goal of my project is to start the process with developing and implementing a functioning first aid course in the village in collaboration with its inhabitants. I will do this by conducting a literature search to explore what such a course should contain and how it should be executed to ascertain that the relevance and utility for the village is high. This project builds directly on the data already gathered by Søndenå in his previous study. It is part of a series of small research projects with the purpose to improve rural primary care in Colombia with rural inhabitants as the key reference point, source of experience, and co-creators in the process, done in the context of Rural Health for Peace, the bilateral collaboration between Colombia and Norway to strengthen the ongoing peace process in Colombia.

2 Method

This thesis was originally made to be something else. When I chose the theme for my thesis the ongoing Covid-19 pandemic was still just something reported on the news, happening far away from Norway and Colombia. I finished the project description with the research

question “Construction and implementation of basic first aid-course in rural Colombia using participatory research” and made plans to travel to Colombia in December 2020. I read up on relevant literature and established contact with the health committee in the village. I even got a grant from NSDM to cover the expenses for travelling there and executing the course. When it became apparent that this wasn’t going to happen, we tried to postpone it. Surely it would be possible to travel in March after the practical part of my fifth year was done. I made sure that the applications for REK and NSD were in order, I had formatted the project description to match the requirements to send to the ethics committee in Colombia and I had started to design the interview guide I was going to use. March came, and I realized that the chance for me to travel to Colombia was diminishing. I briefly considered trying to postpone the deadline for the thesis so I could travel to Colombia during the summer, but I soon decided to convert the project to a literature review as a starting point for the original project. That way I didn’t start completely from scratch, but I still had to decide on a new research question that would fit into the new study design and learn how to conduct literature searches in a short amount of time. Already knowing the intervention I’d like this review to result in (a first aid course constructed together with the population it was to be made for) made the subsequent process in designing the project a bit challenging. I considered “what is known from the literature about using community-based participatory research (CBPR) when constructing first aid courses" as a research question. The subsequent literature search only yielded two results, and both of them from the SLWEREI, suggesting that it is not very common to use CBPR in first aid courses. I finally settled on “what are the most important aspects to bring into the making of a first aid course in rural Colombia?” with the goal to hopefully make the would-be first aid course as good as it could and should be.

2.1 Choosing type of review

First aid is a vast subject that probably has been around as long as modern humans have existed, and it has been described in the literature since (and probably also before) the founding of the Dutch Humane Society in 1768(28). To be able to predict what could fit into a first aid course for a rural population in Colombia, it was necessary to find, and to get an overview of the existing literature concerning these subgroups of first aid. Literature searches pool together existing knowledge on any subject and thus allow you to relate it to your own research (29). Before conducting such a search, it is important to settle on a suitable study design to adequately answer the research question. There are several: the systematic literature

review that synthesizes research in a systematic, transparent and reproducible way, the semi-systematic or narrative review for topics that have been explored differently among different groups of researchers and thus hinders a full systematic review process, and the integrative review that is related to the semi-systematic review but differs in that its aim is to enable new theoretical frameworks and perspectives to emerge(30). The systematic review is considered the gold standard among reviews(31), but requires a narrow research question. Because of my broad research question, I found that the best way to answer it would be to make a narrative review and perform a literature search with controlled search terms.

2.2 Data source and search strategy

A literature search was performed by following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Two searches were conducted on the 29th of April in MEDLINE using the search engine Ovid. They consisted of a combination of the controlled search terms called Medical Subject Headings (MeSH) and relevant terms from keywords, title and abstract. In the first search the search terms were allocated in two groups: CBPR and First aid education. Of these, only two articles concerned the use of CBPR in constructing a first aid course, and they were from the same project, the beforementioned SLWEREI. The search terms for the second search were allocated in three groups: Fist aid education, rural health/areas/populations, and learning assessment. After having screened these articles by assessing title and abstract, and then subsequently by reading the full text of the ones I'd chosen, I realized that I only had 2 articles that concerned areas in Latin America. A third search was conducted the 9th of May with the search terms allocated in two groups: First aid education and Colombia/Latin America. This was to find more articles from Colombia and Latin America that might fit the inclusion criteria. The search terms within each group were grouped together using the OR-command, and the groups pertaining the different categories were combined using the AND-command. Some of the articles referenced in the included articles from the literature search were added. The reference lists of the articles from SLWEREI and *Layperson trauma training in low- and middle-income countries: a review*? were screened, resulting in a few more articles. Due to time restrictions, I did not include any articles beyond the mentioned screening. Figures 1 and 2 show the search terms for the literature search.

2.3 Selection criteria

I used the Population, Intervention, Comparison, and Outcome (PICO) format to develop the inclusion and exclusion criteria for this thesis. The populations included were experimental or observational studies that report on development, implementation, sustainability and effect of first aid or prehospital education in rural populations. Interventions were education of health providers and laypersons by first aid or prehospital courses. Comparators were current practice before intervention. Outcomes assessed were effect of course/initiative on learning. I chose to exclude articles concerning over-specialized themes or the use of advanced equipment (e.g., extracorporeal membrane oxygenation), articles with no full-text available, and articles with topics irrelevant to this thesis. I also excluded articles with specialized health workers as the study population unless the results could be thought to apply to other, less-specialized populations. I'll elaborate on this choice in the discussion.

2.4 Literature search and data extraction

The literature search was conducted in the database Medline. The first search yielded a total of 864 records, and the second a total of 11 records. The records were imported to Endnote X9 and screened for eligibility by going through title and abstract. 841 records were then excluded from the first search, and 10 from the second search due to either not matching inclusion criteria, or by matching one or more of the exclusion criteria. The remaining 24 articles were analyzed by reading the full text, and from them a total of 13 articles were chosen as eligible for qualitative synthesis. 6 articles were included after screening the reference lists of the included articles and some key articles. The process is shown in Figure 3.

2.5 Data selection and analysis

The selected articles were read, and relevant information was transferred from EndNote X9 to Table 1-4. This information included author name, year of publication, title, study setting, study design and study population. The results were divided into 4 subgroups based on their main theme: effects of first aid education, different methods to improve learning, evidence that support that the inhabitants in El Triunfo should be the course instructors in the would-be course, and examples of improving prehospital care in different countries.

2.6 GRADE

I've used the GRADE-guidelines (Grades of Recommendation, Assessment, Development and Evaluation) to assess the quality of some of the studies included from the literature search (attached). It is a method used by systematic reviewers and those developing guidelines to decide whether or not to recommend an intervention. This is done by ranking the article from very low, low, moderate, to high based on the study design, risk of bias and the effect size amidst other things(32). Due to time constraints, I did not assess them all.

3 Results

19 out of a total of 875 articles identified in the literature search were included to answer the research question "What are the most important aspects to bring into the making of a first aid course in rural Colombia?". All of the articles included are either experimental or observational studies. They are presented chronologically in their respective groups to answer the following questions: 1) what effects can be seen in the participants that attend local first aid courses, 2) what methods can be used to facilitate the acquisition of the required knowledge in such courses, 3) who should most appropriately apply these methods to achieve these effects, and 4) when local first aid is insufficient and there is a need for specialized help in a hospital, how can the transfer from the prehospital setting to the hospital be executed in a good and effective way?

3.1 Effects of first aid education

All of the articles included in this group address the impact such courses have on participants; how much knowledge they acquired immediately after the course based on pre- and post-tests, and whether this knowledge persisted over time. The articles in this group are presented in Table 1.

Practical examination of bystanders performing Basic Life Support in Germany: a prospective manikin study(33) from Wiese et al. in 2008. Time is essential when someone suffers a heart attack, it is therefore crucial that bystanders initiate first aid – but it has to be done correctly to improve survival. The authors wanted to investigate to what extent laypeople could correctly perform BLS in a standardized manikin scenario, and whether course repetitions increased success. 100 participants were included in the study by consecutive sampling over 3 months, divided into two groups (group 1: previously attended

BLS course, and group 2: no previous attendance) and tested prospectively over a period of 3 months. The course followed the guidelines for conducting such courses in Germany and lasted 120 minutes in total, with theory and practice, making it comparable to nationwide courses. In each group the participants were divided into smaller groups of approximately 10 people that received training carried out by the same instructor. There was no pre-test of the participants, and no instructions were given. Testing was carried out by a person who had nothing to do with the course concept, and who were blinded. Success was determined by the performance of effective resuscitation according to the current ERC guidelines for BLS. Only 22% of all the participants managed to do this. Group 1 performed significantly better than the group with no previous training in BLS (32.7% vs. 10.4%; $p < 0.01$). They conclude that these courses should be modified to increase success and call for mandatory refresher courses in the future.

Olumide et al. made an article in 2015 with the title *Effect on first aid education on first aid knowledge and skills of commercial drivers in South West Nigeria*(34). Mortality among seriously injured patients is higher in low- and middle-income countries, and the majority of deaths occur in the prehospital phase. Making improvements in the prehospital care could probably have a greater impact in post-crash deaths compared with improvements in hospital care. The WHO advocate improving the informal prehospital services that already exist, therefore the authors proposed that first aid training for commercial drivers might be helpful in countries with no formal emergency services because they already partake in the transport of patients. 128 drivers were sampled by balloting to participate in the project, 62 in the case group receiving first aid training, and 66 in the control group who also received training, but in HIV/AIDS prevention. The case group had a 2-day training session in first aid with didactic lectures, practical demonstrations, and skill-building exercises. This was based on the Basic Trauma Life Support manual, and executed by the first author, a certified trainer from the Nigerian Red Cross, and a senior officer from the Federal Road Safety Commission in the area. The drivers were trained in groups of 10-20 to enhance participation. They were assessed at baseline, immediately post-intervention, and three months after intervention. There was a significant increase in the intervention drivers' mean scores over the three assessment periods while among the controls, the scores remained approximately the same. This confirmed that the first aid training was effective. They noted a small reduction in the first aid skills in the third post-intervention phase, implying a need for refresher trainings.

They also noted that while the drivers initially had potentially dangerous behavior in the crash scene simulations (hurrying away with the victim without thinking about their own safety or proper lifting techniques), this improved a lot after the training intervention.

The development and implementation of a layperson trauma first responder course in La Paz, Bolivia: a pilot study (35) by Boeck et al. in 2017 (Bolivia/USA). There is a need for increased focus on trauma victim survival in low- and middle-income countries, and this relies heavily on effective prehospital care systems. Road traffic incidents are the third leading cause of disability-adjusted life years in Bolivia, and therefore members of the Northwestern Trauma and Surgical Initiative sought to develop and implement a layperson trauma first-responder course in La Paz and the rural town of Coroico. La Paz and Coroico are connected by what has been named the rural "death road" because of the road fatalities that happen there. The course was built upon topics from existing layperson training initiatives from the WHO, the Red Cross and other universities in the USA, but the curriculum development also included input from local "bomberos" (local firemen), physicians and stakeholders to ensure relevancy and efficacy. They focused on skills that doesn't need a first aid kit to make it more applicable. It is intended for laypeople, but in this pilot, they first tested it out on health professionals: 159 firefighters, police, nurses, doctors and medical students were included in the study. 67.3% reported prior trauma training. They paid a nominal fee to participate. The course lasted approximately 8 hours and included practical sessions. A criterion exam was handed out before and after the course to map prior knowledge, and to measure learning after the course. Overall scores improved pre- and post-test, and the self-reported confidence from the participants increased. The results support further use of the course but there is a need for course review and revision by Bolivian prehospital care experts to sustain the relevance to the area.

The *Evaluating a novel simulation course for prehospital provider resuscitation training in Botswana*(36). Kosoko et al. in 2019, set in Botswana but with collaborators from the USA. Poor outcomes in developing emergency medical services are often due to a lack of resources, insufficient training, and other system deficiencies. In 2012 The ministry of health (MOH) in Botswana established the country´s first prehospital emergency medical service program (EMS). At the time of the study there was no formal training for the EMS recruits in Botswana, and those recruited were mostly staff from the Ministry of Health healthcare providers e.g., nurses and healthcare attendants. To optimize the education and training of the

prehospital workers, the authors first made a formal needs assessment to identify knowledge gaps and opportunities for educational development. A two-day, simulation-based training curriculum derived from the assessment and from input from the Botswana MOH leadership was offered to 31 off-duty prehospital care providers in the three largest cities in Botswana, Gabarone, Francistown, and Mahalapye. The participants were later evaluated with written, multiple-choice tests, videotaped traditional simulation scenarios, and self-efficacy surveys administered before and after the training. The simulations represented common calls to the prehospital system in Botswana. They chose rapid-cycle deliberate practice (RCDP) format for the course because it has been shown to improve key performance measures in resuscitation. No control group because of the lack of prehospital providers (only 46 in total). 100% of the participants deemed the course useful, especially the simulation training with RCDP. Many requested a longer curriculum with other teaching methods, like video. Overall, the participants reported improved self-efficacy in the topics covered and improved both written and simulation practical testing. The next step is to give refresher courses and find local practitioners that can teach the curriculum themselves. Ongoing research looks at patient outcome after the course, and preliminary results show that there has been a significant increase in the completion of tasks.

3.2 Articles proposing methods to heighten knowledge acquisition and retention

Where the above text describes the impact such courses can have on participants, this section will address different methods to achieve such effects. The articles are presented in table 2.

Life supporting first aid (LSFA) teaching to Brazilians by television spots(37) by Capone et al. in 2000, Brazil (collaborators in the USA). They wanted to see if they could teach several LSFA steps to 240 Brazilian industry workers by exposing them three times to TV spots that demonstrated eight skills. First the participants were interviewed by a nurse about their educational background and previous exposure to first aid education or practice. After the interview the employee was asked to demonstrate on the nurse or on manikin their clinical reaction to a clinical situation, as a pre-test (30 min). Then they were separated in two groups. After one week the TV group watched each of the eight skills demonstrated in less than 60 seconds on non-professional TV clips. The same clips were shown Monday, Wednesday, and Friday for 1 week only. There was no other demonstration or teaching. The control group

received no verbal or visual information. The skill test was performed at 1 week, 1 month, and 13 months later: the evaluating nurses used themselves or the manikin for skill testing after TV exposure at the three time-intervals; and at the same time intervals in the control group without TV exposure. The TV exposure group improved its correct performance rate of skills from very low levels at pretest to over 48% at 1 week and 1 month, with some drop-off in performance rates at 13 months. The exception was for skill 6, 7 and 8, all of them steps in correctly performed CPR. The proportion of good performance in the control group without TV viewing increased from 2% of trainees at the first interview to 16% 1 week later, and 31% 1 year later (the authors speculate that the trainees of the TV group passed on the information to the control group through verbal communication). The authors recommend the promotion of special TV spots for demonstrating LSFA skills worldwide, and self-practice at home to enhance acquisition of CPR skills.

The use of video was also explored in *The Effectiveness of Ultrabrief and Brief Educational Videos for Training Lay Responders in Hands-Only Cardiopulmonary Resuscitation: implications for the Future of Citizen Cardiopulmonary Resuscitation Training(37)* by Bobrow et al. in 2011, USA. Chest compression-only CPR (without the ventilation) has been shown to be least as effective as standard CPR, and it may be quicker and easier to learn and perform by laypeople. The authors wanted to find out whether lay rescuers without recent training would be more likely to attempt CPR after watching brief and ultra-brief videos, and whether adding manikin practice would further improve quality of chest compression. 336 subjects were verbally recruited from a church and were then randomized to 1 of 4 groups. A control group (C-group) where subjects received no training intervention, an ultra-brief video-group (UBV-group) where subjects viewed a 60-second ultra-brief video, a brief video-group (BV-group) where subjects viewed a 5-minute video, and a brief video with practice-group (BVP-group) where subjects viewed an 8-minute video together with CPR practice during the viewing. Group UBV, BV and BVP were also divided into two, half of the subjects were tested immediately, the other half two months after the training. The subjects who viewed a single Hands-Only CPR training video were significantly more likely in both the immediate and delayed evaluation groups to attempt any resuscitation compared to those in the control group. They also showed superior skills to the controls. The authors conclude that this has huge public health implications because of the well-known hesitancy of untrained rescuers to even attempt CPR. Any bystander resuscitation attempt improves outcomes compared to no CPR at all.

Video-based feedback as a method for training rural healthcare workers to manage medical emergencies: a pilot study(38) by Oseni et al. in 2017 is another article that explores the use of video. It is based in Thailand and Papua New Guinea (PNG), where there is a high deficit of healthcare professionals which means that treating acute illness becomes the responsibility of primary care workers, nurses, and laypeople. The current study takes place at three clinics at the Thailand-Myanmar border and at a hospital in PNG (with a focus on the three clinics at the Thailand-Myanmar border). It builds on earlier work where they looked at the use of structured ABCDE approach to train rural staff at the three clinics, then using didactic teaching and the Observed Structured Clinical Examination (OSCE) method. The authors wanted to see if video-assisted feedback and low fidelity simulation could be effective means of training for rural healthcare workers in low-resource settings to enable them to manage acute illnesses appropriately, and to surpass cultural barriers to feedback in Asia ("loss of face"). Training material was tailored to equipment and medication available at the sites, and the clinical scenarios were written by the trainer and sent to physicians experienced in working locally, and some scenarios were made from specific cases observed at one of the clinics. 8 participants (4 medics, 2 nurses, 1 junior and 1 senior midwife) at each of the 4 sites were chosen to undergo training and assessment in using an ABCDE approach in medical emergencies. There were no control group. The amount of training given at each site varied to ascertain how many sessions were needed to maintain knowledge at 6 weeks. In Thailand-Myanmar border they made an assessment of the baseline knowledge using a scoring form, then immediately after the participants were brought together and videoed managing the same scenario as a team. The video was then replayed for the team and a discussion was facilitated by the trainer that gave feedback. The same scenario was repeated and videoed, and then replayed and discussed. The participants were scored again, and the recordings were later reviewed to score teamwork using the Team Emergency Assessment Measure (TEAM). Focus group discussions were facilitated using a semi-structured interview, and themes arising from this were identified and coded using thematic analysis. Participants were also asked to rank their confidence. This session took about 4 hours, subsequent training at 2, 3 and 4 took on average 45 minutes and included videoing the participants and discussing it afterwards. TEAM scores were improved 1-week post-baseline training, mainly in the areas of leadership, teamwork and task management, and this improvement was sustained until the follow up assessment at 6 weeks post-baseline. The participants felt more confident after the training, mostly because they had learned to use a systematic approach in medical

emergencies. The practical nature of the training was a contributor to their increased knowledge, but what contributed most to their learning was the video-assisted feedback. The teamwork approach was also important for their learning.

Kovács et al. explored the effect testing can have on retention of knowledge in *The timing of testing influences skill retention after basic life support training: a prospective quasi-experimental study*(39) from 2019. BLS skills after training deteriorate in 3-6 months if not used and many studies have sought to identify the best educational method to achieve long term retention. The authors wanted to find out whether testing effect (the fact that repeated retrieval of memories during testing enhances knowledge) could help retain knowledge. They split 464 Hungarian fifth year medical students undergoing a compulsory emergency medicine course into three groups, all of them having 45-min BLS lecture and 90-min BLS training session in accordance with the guidelines of ERC. The first group had no exam after testing, the second group had an exam directly after the end of the course and the third group had an exam 3 months after the course. All of them had a skill retention assessment 2 months after the exam (no exam-group 2 months after the course). The no exam-group and the group who had their exam immediately after the course showed similar skill retention. There was no pre-test. The mean total score of the students was significantly higher in the group that had their exam after 3 months compared to the two other groups, indicating that testing skills after 3 months may be more effective than either testing immediately at the end of the course or no testing at all.

In the article *Acquisition of knowledge and practical skills after a brief course of BLS-AED in first-year students in nursing and physiotherapy at a Spanish university* from Spain in 2019 looks at duration of theory and training(40). There is no universally accepted and proven gold standard efficiency method for CPR and AED training. Méndez-Martínez et al. consulted several articles where 1-4 hours training, and then 1-6 months after retraining to refresh the knowledge was proposed as the best way to teach first aid. They then made a 4-hour educational action for 112 nursing and physiotherapy students, following the guidelines of the European Resuscitation Council (2015). During the 4 hours they had a pre-test questionnaire, 15 min theoretical lesson, then 20 minutes BLS sequence practicing, 20 minutes AED practical training, 20 minutes CPR practical training and then 120 minutes practical evaluation before the post-test questionnaire. Knowledge improvement was significant after the educational action. They therefore propose that 15 minutes with theory is sufficient to

acquire the necessary knowledge of CPR. The educational action was not effective regarding the practical skills achieved in CPR, as the results obtained lie under the values that clinical practice recommend. This might be caused by the limited time for the practical training (20 minutes), the large number of students for each session, or the training method used. In regard to the training with the AED they concluded that it was effective, with 90% of the participants obtaining the necessary knowledge and skills. Early defibrillation significantly increases the percentage of survival after a cardiac arrest and should therefore be implemented in all BLS courses in places where AED´s are available in public spaces. They have to figure out the acceptable time between course and refresher course.

3.3 Articles regarding why the inhabitants could and should be the course-instructors.

It is established that first aid training is effective, and there are several methods to promote learning and maintenance of knowledge. How can these methods be applied, and who should do it? Based on the fact that participation have been seen to increase ownership and sustainability of a program(41) the most prudent choice for course instructor in a rural village in Colombia would be one of the inhabitants. Articles selected for this subgroup highlight that this could be possible. The articles are presented in Table 3.

Teaching public access defibrillation to lay volunteers – a professional health care provider is not a more effective instructor than a trained lay person(42) from 2004. There is a need for more instructors in courses for automated external defibrillators (AED), and not enough health professionals to take on the instructor role. Castrén et al. from Finland wanted to figure out if laypeople could be eligible for this instead. Instructors and study subjects were selected among employees from organizations in Helsinki with plans to implement public access defibrillators. They used first aid personnel from the red cross as reference group. 4 lay persons and 4 health professionals got a 4-hour course in BLS and defibrillation by the same instructor, and then two weeks later they got a 4-hour instructor course. Then they trained 19 pairs of volunteers, all with previous training in CPR, but not in defibrillation. They were all blinded from study purpose. The volunteers were assessed by OSCE in two scenarios (ventricular fibrillation and asystole) 2-3 weeks later. They were informed about their evaluation just before the assessment started. There was no statistical difference in performance levels between the volunteers trained by laypeople and those trained by health

professionals. The control group with first aid personnel that practice every two weeks performed the tasks almost 100% correctly, indicating the importance of continuous training.

Learning by teaching basic life support: a non-randomized controlled trial with medical students(43). There is a need to increase medical students' acquisition of knowledge and a need to educate the population in basic life support in Brazil. Veloso et al. wanted to see if there is a way to do something about this problem by combining these two needs in a project where medical students were to train laypeople in BLS. The students received 26 hours of theoretical classes and simulations, and then 4 hours of assessment. They were then divided into a case- and a control group, where the case group prepared a course, made booklets and posters and then held a 4h x 2 course with different health professionals and laymen before they were assessed again. The case group made booklets and posters before they were assessed, and then they also held a course. The case group obtained cognition and skills performance superior to the control group. 94,6% of community members felt capable to perform BLS. 100% of the students in the case group felt capable, while only 73% felt able to perform these techniques in the control group, with only classroom learning. This indicates that BLS teaching activity can be a viable and effective method to increase students' knowledge and skills while at the same time offer effective training for community members, thus serving both the students and the community.

The challenge of implementing the "stop the bleed" campaign in Latin America(21). Orlas et al. in 2020, Colombia (collaborators in the USA). Hemorrhage is the leading cause of preventable death in trauma cases. "Stop the bleed" (STB) is an initiative to empower the public to act as immediate responders in front of hemorrhaging victims, and so the authors wished to evaluate effectiveness of implementing this initiative in Latin America. 243 students in medicine/nursing (the majority of students were in this group) and in engineering/humanities/social and economic sciences from two universities were included in the study. The instructors were either surgeons (case) or fifth year medical students (control) who had finished the course themselves, the participants were assigned to training groups in a blinded way. The training consisted of five phases: pre-course survey, pretest to evaluate the baseline knowledge, STB course lecture, hands-on skills practice, and post-course written and practical competency test. Classes lasted between 1-2 hours and was divided into lecture and hands-on skills practice. 98% of participants perceived that they would be likely to aid a bleeding victim after completing the course, regardless of the instructor's background. Their

results indicate that there is a possibility to expand the campaign to other environments if more instructors are taught. No information about long term retention in participants, or the applicability of these skills in real scenarios and the possibility to have access to bleeding control kits. The majority of the participants were health students, and one-third had already received first aid training with hemorrhage control. The authors conclude that it is a need for future studies that assess layperson scenarios.

3.4 Improving prehospital care: experiences from different countries

In most cases where first aid is needed there is no need for hospital admittance. When local first aid is not sufficient and there is a need for specialized help at a hospital, how can the transfer from rural to urban be made most efficient? Some countries lack state funded prehospital services, and in other places they exist, but are not available for people living in rural areas. The articles in this subgroup concern the making, or improvement of prehospital care services in low- to middle income countries (LMIC) or rural areas with long distance to health care. They are presented in Table 4.

Improvements in Prehospital Trauma Care in an African Country with No Formal Emergency Medical Services(44) by Mock et al. in 2002, Ghana (collaborators from the USA). Many trauma patients in developing countries do not have access to formal EMS, so patient transport is mainly done by some type of commercial vehicle. In Ghana, the trauma mortality rate is approximately 50% higher than in developed countries, and most of the fatalities occur prehospitally. The authors sought to improve the already existing informal prehospital system existing in the three Ghanese towns Accra, Kumasi, and the more rural city Brong-Ahafo, by providing first aid training to commercial drivers. 250 drivers answered the questionnaire for a background survey before they underwent a 6-hour course with a training program comprising of didactic lectures and practical drills specifically put together for the commercial drivers. The educational material was based on background material from other countries, the Red Cross in Ghana and the USA, and was based on practical real-world circumstances for the drivers. It was oriented for their educational level (most had no or only rudimentary education). Airway management, external bleeding control, splinting, spinal precautions, triage, and crash scene management and extrication. At the end of the course the participants were instructed in putting together their own practical first aid kit consisting of

low-cost items that are easily obtained locally to keep in their car. 1 year after the course the authors contacted the drivers to assess whether they had used the knowledge they acquired from the course. Those that had provided first aid had their act rated from 0 (potentially harmful) to 10 (perfect) by the interviewers. They found that the majority of the drivers had used their acquired skills and had provided first aid, and they found no difference in the quality of the aid that was provided by drivers with different levels of education. Some of the drivers reported that they had passed on their knowledge to other drivers. The authors conclude with that this low-cost program led to improvement in the prehospital process in Ghana and plan to scale up to train more drivers. Improvements in prehospital care could lower the trauma mortality by up to 30%. They recommend similar pilot programs in other LMIC, based on the existing prehospital transport patterns they have in each country, and they advise that it should be conducted with sufficient monitoring of results.

Husum et al. went a bit further with their project described in the article *Rural Prehospital Trauma Systems Improve Trauma Outcome in Low-Income Countries: A Prospective Study from North Iraq and Cambodia*(45) from 2003. Implementing prehospital trauma life support programs in LMICs' has demonstrated a reduction in prehospital fatality rates, but these programs have all been in patient population groups with a hospital nearby, and thus not representative for the rural populations hardest hit by trauma where transit times often exceeds two hours. In this study set in Kurdistan (in North Iraq) and Cambodia prehospital transit times had been reported to be 4 to 8 hours. The authors surveyed the mine casualty management in the target districts to find a mortality rate of 40% or higher, with typical victims being local farmers and their children. They then elected a core group of 22 health care workers from each country (selected from three target areas located in dense mine belts in each country) for a three-year training program based on a teaching manual for prehospital care in low-resource communities. The training consisted of three 150-hours training sessions with working periods of 6-12 months in-between. During those periods in their home area, they should train at least 50 village first responders during 2-day village first aid courses, followed by a 1-day rehearsal training after 6-12 months. From 1997-2001 the number of medics trained had gone from 40 to 135, who in their turn had trained a total of 5237 village first responders. In the study period from 1997 to 2001 they registered that the physiologic score improved during the prehospital group for those that received treatment by laypeople or medics. The mean response time from injury to the first medical contact was reduced from 2,9 hours to 1,8 hours. The mortality rate in the study population fell from 40% pre-intervention

to 15%. They saw that patients managed by experienced medics had lower mortality rate, indicating the importance of rehearsing. The authors made a low-cost, sustainable trauma system that relied on the existing infrastructure and invested heavily in training and teaching aids rather than expensive equipment. They conclude that the observed improvement of trauma outcome reflects an increasing coping capacity of the existing primary health care network.

Jayaraman et al. made a prehospital trauma course in a pilot study in Kampala in 2008, and looks at the effectiveness and scalability in their article *First things first: effectiveness and scalability of a basic prehospital trauma care program for lay first-responders in Kampala, Uganda*(46) from 2009 (6 months after the implementation of the course). The course was a 1-day modified basic first-aid course on trauma adapted from prior models by local stakeholders and based on an initial needs assessment of staffing and resources(47). The 309 participants (police, taxi drivers, community leaders) were sampled through convenience sampling from the area around Mulago Hospital. They received a first aid kit after completion of the course, and instructions on how to restock the kit. A half-day refresher course was held after three months. Cross-sectional surveys and knowledge tests were conducted immediately before and after training, and at three and six months. 41% were evaluated at three months, and 62% at six months. 98% of the participants rated the usefulness of the course and the kit to a 4-5 out of 5. Their confidence also increased after the course. 97% had used at least one skill taught in the course and 96% had used at least one component of the kit at six months. Participants got 94% correct answers on the knowledge test. Attending the 3-month refresher course had no effect on test scores at 6 months. They made no direct measure of mortality due to a small sample size and the poor health system infrastructure, but the authors conclude that this lay first responder program was a practical and effective step towards developing a formal emergency system in Uganda, and that establishing and scaling up this intervention should be a key priority for Ugandan policymakers.

Rørtveit et al. also look at improving prehospital care, but in small, isolated Islands in Norway. *First responder resuscitation teams in a rural Norwegian community: sustainability and self-reports of meaningfulness, stress and mastering*(48) from 2010 is set in Austevoll in Western Norway. It consists of several inhabited islands with no bridge connection to the mainland, which means that doctor and ambulance calls to these islands at the time of the study were by ambulance boat and taxi. The most important factor for survival in cardiac

arrest is the time, and so local initiators cooperated with a local supplier of medical equipment and the municipality doctor to set up first responder teams consisting of laypeople living on these islands. The authors wanted to explore whether this was feasible and sustainable over time, to which extent the team members reported stress, and if lives could be saved. Each island received an AED, and 42 persons in two groups (a workplace- and a neighborhood group) were given a course in BLS combined with defibrillation training developed by the Norwegian resuscitation council. In an emergency call with suspected acute myocardial infarction or cardiac arrest, the doctor on duty would alert the first responder team. Participation was voluntary and without renumeration. Before the start of the project, the teams got a survey to establish their background and their expectations for the course. 6 months after they received another one, and then a survey annually. The teams underwent retraining and redelegation once a year plus follow-up meetings. At the end of the 5-year period, 27 members were still participating, and all four teams were still functioning. Over the study period the participants generally reported a reasonable self-evaluated competence in CPR, a high degree of meaningfulness of the participation, and low self-rated stress. During the study period there was no incidence of primary ventricular fibrillation e.g., shockable rhythm, and the numbers of AMI were extremely low. No life-saving effect was thus detected. In the discussion the authors implies that medical professional organizing first responder schemes should consider thoroughly which practical circumstances ought to be present for a project to be successful. At the yearly training and delegation, there should have been an informal discussion with the team, with emphasis on how the group members feel about their participation.

Geduld et al. also tried to establish a prehospital system by following WHO's recommendations. *Taxi driver training in Madagascar: the first step in developing a functioning prehospital emergency care system*(49) from 2011is set in Mahajanga, Madagascar. There were no functioning emergency care prehospitally, so the patients were referred to hospital in bus, car or by taxi. To improve this informal prehospital system the authors from South Africa used models of first responder programs from other articles and had local input from Madagascar (discussions with local stakeholders) to make a 1-day course. 26 taxi drivers selected by the local municipality to participate. The course consisted of 4 workshops: prehospital scene management, bleeding and broken bones, mobilization and patient movement, and labour and delivery of babies (the last workshop requested by local stakeholders and the participants). It made use of commonly available items like string,

towels, packets etc. and took use of hands-on training. Local doctors from the university hospital in Mahajanga were invited to be instructors to familiarize them and to provide locally appropriate input. No pre- or post-test were done, but the participants deemed the course successful. The course was low cost and low tech, and it can therefore be implemented in any environment. Involvement of local instructors provide local context and ownership to the course, and at the time of the study they were planning to repeat the course in the city and also within the rural districts. A follow-up is also planned, but anecdotal reports suggest a positive impact with patients being transferred more confidently to hospital by taxi drivers.

Prehospital care education for the Nepal Mountaineering Association(50). Kinsman 2015, Nepal/USA. There is a lack of health facilities in the Himalayas and difficulties associated with high-altitude patient transport, so there is a need for prehospital emergency care training programs. Kinsman et al., together with the Nepal Mountaineering Association (NMA) made a program based on first responder course content developed by Tulane Global Trauma Education Program and epidemiology research on wilderness and high-altitude medicine. They also had pretraining collaboration with NMA to ensure specific content development and culturally competent instruction. 62 trekking guides, police officers and students attended a 2-day training program with hands-on training and locally available materials. The NMA anticipated that most of the participants would have a high education, so they included relatively advanced content. At the beginning of the course, they handed out surveys to see if the program they had made matched the needs of those that it was intended for. Although there was no written post-test, the course utilized multiple instrumental, practical, and clinical modalities to make sure that the participants learned the material. The course was deemed successful by the instructors, the NMA leaders and the participants who all achieved the course objectives. To further improve the course, the authors indicate that a collaboration with the Nepal Ministry of Health, the Nepalese Red Cross, and local health facilities would lead to more accurate epidemiologic emergency data to tailor future training content.

Lay first responder training in Eastern Uganda: leveraging transportation infrastructure to build an effective prehospital emergency care training program(51) in 2018, Uganda (collaborators from USA). There is no formal prehospital emergency system in Iganga district. Delaney et al. followed guidelines stating that laypersons already involved in prehospital transport and care should be trained and made a lay first responder program to improve the prehospital transportation of patients. They did this by using locally devised,

evidence-based, practical demonstrations and by partnering up with the municipal motorcycle taxi ("boda-boda") association. Because of their placement all around town in so called "stakes" they were deemed the most effective choice: they would always be around high-density areas with probability of witnessing traffic accidents. Curriculum was adapted from another project with changes made to fit the rural nature of Iganga. The course was coordinated and co-taught with experienced, local trainers from the Red Cross. 154 drivers were taught in 5-hours sessions and provided with a first aid kit. A survey was given pre- and post-test the same day, and there were follow up interviews 9 months post training conserving whether they had used first aid during this period, their confidence in doing so, and what they would like to refresh. Of 110 surveyed, 76 had used first aid, and 70 of those felt confident in the care they provided. A common wish was more supplies in the first aid kit, plus refreshment courses on several of the topics that were taught. No follow-up assessment yet.

4 Discussion

This narrative review aimed to explore what the literature says about the construction, execution and effect of first aid courses in rural settings. First, I will summarize what I found in the literature search. Second, I will elaborate on recurrent themes in the articles selected from my search and discuss how and why I think that what I found can be useful to inform the making of a first aid course. Third, I will discuss the transferability of the articles included. Fourth, I will address the limitations to this thesis. And finally, the implications it can have for further studies.

4.1 Summary of evidence

19 articles fit the inclusion criteria and were included in this thesis. 3 of them are experimental studies(37, 42, 52), 5 are quasi-experimental studies(21, 34, 39, 40, 43), 1 is a case/control study(33), and the remaining 10 are cohort studies(35, 36, 38, 44-46, 48-51). 4 of the articles concern the effects of the acquisition and retention of first aid education for laypeople and other groups of non-health professionals. In 5 of the articles the authors explore different methods to facilitate acquisition and retention of knowledge when it comes to BLS. 3 articles concern ability to, and effects of the act of teaching first aid. In the final 7 of the included articles the authors try to incorporate or improve a prehospital service in a low-resource setting. There are some overlap between the different subgroups.

The first subgroup in the results concern the effects of first aid on learning and usage of skills. Wiese et al.(33) looked at the effectiveness of a standard BLS course in Germany. It was not regarded as very effective because of the low amount of people that managed to do CPR correctly after finishing the course. The other articles included in the first subgroup reported on successful and effective courses. Olumide et al. show to a quasi-experimental study where they implemented a first aid course in Nigeria by teaching commercial drivers first aid(34). A significant increase in the intervention drivers' mean score compared to those that received training in HIV/AIDS confirmed the fact that the training was effective. Boeck et al. reports on improved post-test scores for the participants in their pilot study that aimed to make a trauma first aid course for laypeople(35). The participants in Kosoko et al.'s study improved both written and simulation practical testing post-training and reported improved self-efficacy in the topics covered(36).

The second subgroup concerns different methods to facilitate learning. Three of the included articles explore the usage of video in teaching skills. Capone et al. successfully taught factory workers in Brazil basic first aid skills (apart from CPR) by exposing them to short TV clips of 8 first aid skills being performed(37). Bobrow et al. explored the use of chest compression-only CPR, and found that watching ultrabrief videos would make bystanders more likely to take action in an acute myocardial infarction(52). Another way to make use of video is shown in the study that Oseni et al. did on the Thailand-Myanmar border and in Papua New Guinea where they used video to give culturally sensitive feedback to the participants(38). The next article in this subgroup looks at something called the "testing effect". Kovács et al. explored whether the timing of testing influences skill retention after BLS training and found that testing skills 3 months after a BLS course increased skill retention compared to not testing at all or testing immediately after the course(39). The last article in this subgroup takes a closer look at what effect the duration of theory and training can have. Méndez-Martinéz et al. made a BLS course for students in Spain. They saw significant knowledge improvement after only 15 minutes of CPR theory but were dissatisfied with the level of the practical skills after the educational session that lasted 20 minutes, which implies that 15 minutes of theory and a longer period of practical training would have been better.

In the third subgroup there are three articles that support the assumption that when trained, laypeople can teach first aid skills to other laypeople, and that the very participation in said teaching can increase ownership of the course and contribute to community resilience(25).

Castrén et al. showed that there was no difference in knowledge retention when comparing being taught by laypeople or health professionals, implying that laypeople can be a resource when it comes to teaching(42). Veloso et al. in Brazil showed that knowledge retention was better for those students that constructed and held a first aid course compared to those that had the same curriculum but who didn't go through with making a course until after the assessment test(43). Orlas et al. explored whether the course instructor background would affect learning acquisition in health students, and had therefore either surgeons or medical students to hold the course(21). They saw no difference in effect. 98% of participants felt that they would be comfortable and feel competent in giving aid to a bleeding victim.

The last subgroup concerns the implementation or improvement of prehospital systems. Mock et al. made a course tailored for commercial drivers in Ghana to improve the already existing prehospital service there(44). Jayaraman et al. made a prehospital trauma course in Kampala for police, taxi drivers and community leaders(46). They too deemed their course practical and effective and urged policy makers in Uganda to scale up the course. The prehospital system that Geduld et al. tried to implement in Madagascar by teaching taxi drivers had no pre- or post-testing but the collaborators and participants were satisfied. They have also heard reports of taxi drivers taking patients to the hospital more confidently. The last article that looks at training drivers is the one from Delaney et al., set in Uganda. They trained "boda-boda" drivers (a type of local taxi) and in the follow-up 9 months after they saw that most of the drivers had used the skills they learned confidently. Husum et al.(45) show that it is possible to implement a low-cost rural trauma system and thus decrease patient mortality in countries afflicted by war and trauma. In Rørtveits article(48) they explored the possibilities of organizing teams of lay first responders in remote areas without direct access to trained health personnel and found that it is possible but that the team leader should give team members more opportunities to address the project. Kinsman et al.(50) made a first aid course meant for trekking guides in the Himalayas where there are no prehospital service and great difficulties to get injured people down.

4.2 Recurrent themes

I am not the first one to produce an overview of literature about first aid courses in rural and underserved areas. Callese et al. made two systematic reviews in 2014 concerning trauma system development and layperson trauma training in LMICs'. In the second review

concerning layperson trauma training they identified four themes with some overlap with the first review: the importance of needs assessment with involvement of local stakeholders, the fact that curriculum development should rely on existing infrastructure, adjusting the training to fit populations with little formal education, and program evaluation to assess the effectiveness of the training(53). These are recurrent themes in the articles concerning the making of courses or systems that were successful and are each described below. I have in addition identified other important themes that I want to address.

NEEDS ASSESSMENTS AND LOCAL INPUT HELP PROVIDE RELEVANCE AND OWNERSHIP TO COURSE

Many have built their curriculum on the handbooks *When someone is hurt*(54) and *Where there is no doctor*(55) . These are general books set in the setting of LMICs', that has to be adapted to the study setting of a would-be course. The best way to know just how to adjust, is by conducting a needs assessment. Only two of the selected articles had performed a formal needs assessment before making their course. Kosoko et al. had a formal needs assessment made together with the Botswana Ministry of Health and the EMS system that helped them to identify knowledge gaps and opportunities for resuscitative interventions before they set out to make their prehospital course(56). Looking back at the EMS logbook and getting provider feedback gave them an overview of the leading causes of EMS transport in the city. They ranked the most common response call types and the self-perceived educational needs by using informal focus groups and surveys. Jayaraman et al. also took use of a formal needs assessment to get an overview of staffing and resources available in their study setting(47). A cross-sectional survey was given to the current prehospital care providers (police, commercial drivers, community leaders) to find out what types of emergencies they had witnessed, and at what frequency. Together with local stakeholders they made a context-appropriate course and found that they effectively retained their knowledge after 6 months, and that the drivers were confident in using their new skills.

Although there were only two articles identified with a formal needs assessment before making a program, almost all of the included articles relied on some local input. In Kinsman et al.'s study in the Himalayas there was no needs assessment before the course construction. Instead, they used input from the Nepal Mountaineering Association along with several articles concerning wilderness and altitude medicine as a basis for the course(50). They also used preexisting first responder courses made by a local university to make sure that it would

fit the intended population but affirm that a better scenario would have been to send out surveys to the participants to discover what they deem important before making the course. Oseni et al. used focus group discussions (FGD) facilitated by using a semi-structured interview during the training period to find out if the participants benefited from the training, what part of the training they felt contributed the most to their development, and to hear the participants viewpoints on the training(38). In the study conducted by Geduld et al., key stakeholders identified birth asphyxia as a common mechanism of injury in Madagascar (49). Maternal care and delivery were therefore added to their curriculum. However, the perspective of the lay public is just as important as the decisions of the local leadership. They are most likely the ones who face situations where first aid is needed. Surveys, interviews, or FGDs' are some methods to get a hold of what community members regard as most important for the improvement of health in their community(53). It might be that Rørtveit et al.'s project in Austevoll, Norway would have had more success if they during the study period had invited the participants to partake in FGD or other forums where they could have voiced their opinions of the project(48). In the beforementioned SLWEREI the authors had this focus(25). They made sure to have several opportunities for debrief, open Q&A sessions, and discussions about local challenges and experiences, and they had 8 focus groups as well as a sharing circle. Insights from community members is important to ensure that course design and materials are relevant and sensitive to context.

RELIANCE ON EXISTING INFRASTRUCTURE FACILITATE IMPLEMENTATION OF PREHOSPITAL SYSTEMS AND INCREASE THE LIKELIHOOD FOR SUSTENANCE

7 of the included articles explore the possibilities to train the populations that already partake in the transport of patients. 5 of these articles are based in Africa and have commercial- and taxi drivers as their study group(34, 44, 46, 49, 51). One article looks at the implementation of a first aid course for mountain trekkers in the Himalayas(50), another looks at training village inhabitants in an area with high mine density(45). This is in accordance with WHO´s proposal: to utilize the existing medical service systems, although they may be informal(1). In areas without a functioning prehospital trauma system, most patients are transported to hospitals in bus, private cars, or taxis. Drivers are by profession usually at the scene of traffic injury and probably already have assisted in patient handling, so in lack of formal prehospital services it has shown feasible to teach drivers to provide first aid. Building on an existing informal prehospital system can decrease patient mortality: Mock et al. describe how teaching a prehospital trauma course to commercial drivers could lead to an increased use of first aid

skills subsequently, and calculate that an upscale of their course could lead to such an improvement in prehospital care that trauma mortality in the region could get reduced by 30%(44). Husum et al. have data from their study in North Iraq and Cambodia that supports this notion. A follow up-study in 2010 by the same authors concludes that training trauma system paramedics who subsequently trained laypeople in the different villages resulted in reduced trauma mortality, even in those patients with severe damages(57). They advocate that when implementing a prehospital system in a low-income country, one should ensure that the system is low-cost and that it relies on the existing infrastructure. It should therefore be invested in training rather than expensive equipment(45). If the only thing that the course relies on is someone to teach it, it can be sustained as long as there are local instructors willing to do so. Not only did the articles mentioned in this paragraph try to use existing infrastructure when implementing these courses and systems, they also tried to make the curriculum and training culturally relevant by getting local input. This holds great importance, as discussed in the previous section. Involving community members early and throughout the process makes it more likely that the training will fit the area and the population it is intended for and increases the likelihood that the system will be sustained over time.

UTILIZATION OF EASILY AVAILABLE AND CHEAP TOOLS CAN INCREASE SUSTAINABILITY OF FIRST AID COURSES

The provision of first aid often requires equipment. When making a course in a LMIC or other underserviced areas, should first aid kits or other types of equipment be included? In three of the included articles, they administered first aid kits to the participants after the end of the course. In the Ugandan course made by Jayaraman et al. they gave each participant a first aid kit along with information about how to contact the study team if the kit should run out(47). They identified what the kit should contain based on perceived utility and the experiences from stakeholders, and they used the kit actively in the training to familiarize the participants with the equipment. Delaney et al. tried to source cheap and local tools to keep in the kit they gave the drivers after the completion of the course. This was to make sure that they could refill them themselves if they should run out(51). The feedback the authors got after 9 months did among other things concern the need for refills in the kit, which may imply that they didn’t have the resources to do so themselves. Husum et al. provided the paramedics in their study with quite a sophisticated first aid kit that they filled up every annual training session. The village first responders did not receive anything upon finishing their 2-day course and still they contributed to the effect seen on patient mortality in the area(45). Data

from their study support their claim that early and simple first aid performed by laypeople is more important to survival than advanced life support and fancy equipment. Others have also agreed that surprisingly little equipment is required to improve patient outcome in traumatic situations(58). Maybe a standardized kit is not the way to go. If the ones in charge of refilling the first aid kit should suddenly cease to do so, what would the first responders or prehospital providers do? In the project conducted by Mock et al. in Ghana, they instructed the drivers in putting together a first aid kit at their own expense after the course(44). Included items were low cost and easy to obtain locally. The prehospital courses made in Madagascar and Nepal took use of items they knew the first responders would have access to(49, 50). During the STB-course Boeck et al. conducted in Bolivia, they used bottles, sheets, sticks and other easily accessible things(35). There was no need for a manikin as the skills presented were practiced on other participants. First aid courses can be very expensive in terms of equipment, so this could be a good way to cut down on costs. Plus, practicing on actual people and not a lifeless doll may increase the possibility of action if the participants were to encounter a real person in need. Learning how to use what you have at hand will likely make you more resource oriented, and though it has not been studied specifically it probably aided the sustainability of the courses where this was included in the curriculum.

SIMULATION TRAINING CAN INCREASE CONFIDENCE AND WILL TO ACT

One thing that recurred in almost all studies was simulation training. Simulations of common scenarios enables people to practice in a safe learning environment and are known to help advance clinical knowledge, procedural skills, confidence, teamwork, and communication(59). In Kosoko et al.'s study in Botswana they made simulations that represented the most common calls to the Botswanian prehospital system to increase relevance, and chose rapid-cycle, deliberate practice (RCDP) as their format(36). It is a technique that involves the participants repetitiously performing a simulation, only interrupted by feedback from the instructors(60). This allows for continuous improvement upon each iterative cycle as the learners are presented with multiple opportunities to practice the right way. A review aimed at exploring what uses of simulations led to effective learning found that two of the key conditions for learning were educational feedback and repetitive practice(61), which supports the effect shown by using RCDP as it encompasses both. In Oseni et al.'s study the participants reported increased confidence to perform the skills they had learned after having gone through it in a simulation first(38). Several studies have shown that self-confidence can positively influence performance(62, 63), so to facilitate better

patient care it is essential to use training strategies that facilitate a feeling of mastery when handling patients. Simulation training seems like a good strategy to achieve this.

REFRESHER TRAINING IS ESSENTIAL TO SUSTAIN KNOWLEDGE

Acquired knowledge and skills are known to deteriorate after just a few months' time, which can be seen in two of the articles included(34, 37). These two, plus a few others highlight the need for refresher courses: Wiese et al. found that the participants who had previous experience with BLS training performed better and advocate the use of refresher courses. They even go as far as saying that it should be mandatory(33). Olumide et al. also see the need for refresher courses based on the small reduction in the first aid skills detected in the third post-intervention phase. In the concluding parts of the articles of Boeck et al.(35), Kosoko et al.(36), and Mendéz-Martinéz et al.(40) the authors indicate that they are planning refresher courses in the future. Although refresher courses are widely regarded as effective, some of the included studies show close to no effect of subsequent training in the short run. Jayaraman et al.(46) had a half-a-day refresher course 3 months after the training intervention, but saw no difference in effect between those that had taken the refresher course, and those that hadn't, on the 6 month assessment test. At the clinics at the Thailand-Myanmar border in Oseni et al.'s study they wanted to see how many training sessions were needed to maintain the knowledge at the 6 weeks assessment test (one group with one session, one with an additional 45 min session, and the last group with two additional 45 min sessions) and found that all of the participants scored higher than their post-training score irrespective of how many sessions they had had after their first training. It is impossible to say that these results are based solely on the refresher test. Maybe there were individual differences in the groups, or maybe they were treated differently in some way. The literature suggest that rehearsal trainings every 3-6 months should be performed to prevent the deterioration of the skills and knowledge(64), so it might be that 6 weeks and 3 months is too short a timespan to evaluate this adequately. In the study conducted by Husum et al. they had arranged it so that the paramedics were consecutively trained over the 3-year period, and that they should provide the village first responders with a 1-day rehearsal course 6-12 month after their initial 2-day course(45). During follow up they saw a lowered mortality rate in the areas with these village first responders. It was also noted that the patients handled by the more experienced paramedics had a lower mortality rate, which emphasizes that exercise is important.

USE OF SMALL GROUPS CAN INCREASE PARTICIPATION

Smaller groups have shown to increase participation(65), and can thus be thought to increase learning acquisition of the participants. Most of the courses presented in the selected articles had training groups consisting of around 10 people for each instructor. Olumide et al.. chose their group to consist of 8 people during their training sessions to make the actual training and the assessment of the participants manageable for trainer and assessors. With such a low number of participants the group work as a team, and each participant is thus allowed to contribute to the team management of the clinical scenario. Working in teams is also regarded as an important factor for high quality patient care(66). A study conducted by Brandstorp et al. indicate that working in teams can lead to many types of learning if facilitated by in situ simulation team training and focus group discussions, and propose a wider dissemination of local interaction trainings to promote a sustainable culture of patient safety(27). Based on these different findings it seems that the trainer-participant ratio should be as low as possible. However, in the course made by Jayaraman et al. they had the participant number up in 50-100, and they too deemed their course successful. The courses that were centered around video education (37, 52) did not mention the number of participants in each group but considering that the intervention was video education only, the amount of participants in each group probably would not have affected the outcome. In the end it all comes down to what kind of course it is, and for whom it is for.

TEACH THE TEACHER IS AN EFFECTIVE WAY TO INCREASE THE FEELING OF OWNERSHIP AND SUSTAINABILITY

Train the trainer or teach the teacher (TTT) is a well-known educational model where an organizing institution with content-area knowledge find potential trainers in the community targeted for training and provide them with education, tools and guidelines so that they in turn can teach others in the target community. It initially relies upon the resources of the organizing institution, but can subsequently be sustained in the long-term by trainers in the community(67). What Castrén et al. and Veloso et al. found in their articles can substantiate that not only is it good for sustenance, but learning might also be improved. In Veloso et al.'s study the participants that taught a course had higher confidence in regard to performing the different actions compared to the participants that only studied. In light of this, one can assume that to improve knowledge retention, one should explore the possibility to place the knowledge and responsibility with those the training is intended for. As stated above, confidence is important for good patient care. Husum et al.(57) also used this method in their article with great success. The 22 paramedics that initially were trained by the authors, trained

other paramedics and laypeople. This resulted in a rural prehospital trauma system consisting of 135 paramedics and 7000 laypeople, which in turn improved patient outcome in the area. In Geduld et al.'s project in Madagascar they also involved local course instructors to develop a basis for continuity, so that they themselves could continue to teach what they had learned during the course. Kosoko et al. and Orlas et al. had not explored the use of TTT at the time of their studies but were planning to do so in the future. In doing so, they would be leaving the knowledge with the population that are to benefit from the education, making them independent of foreign researchers. In Mock et al.'s article, there was an informal TTT in which the participants had taught other people some of the skills that they had learned. This was however regarded as a problem by the authors. When the skills were taught by someone without a certification in, they perceived that they had no control on what were being taught, and they feared that this could lead to improper handling of patients. An article conducted in the USA wanted to investigate how the instructor role was executed(68) and found that in a standardized CPR course with clearly defined curricula, instructors scored the participants performances as acceptable when in fact it were inaccurately according to checklist. They thus propose that poor retention is not because of the learner or the curriculum, but the instructor. The main lesson is that it seems like any person can teach a course regardless of their background, as long as they are properly trained.

EVALUATION IS IMPORTANT FOR FURTHER COURSE DEVELOPMENT

To make sure that a course is appropriate and effective in the target setting, it is important to evaluate it in some way. This can be done before, during and/or after. Orienting oneself about the baseline first aid knowledge is a good way to cater the curriculum to the target group, but it might also be useful for evaluating the learning effect after the course(53). This can be done by performing pre- and post-testing. In the last subgroup concerning improvement or establishment of a prehospital service all of the 7 selected articles show to success, although not all of them operated with a pre- and post-test system that can measure the objective effect of the interventions. Mock et al. (among others) used surveys post-training to assess effectiveness and points out that assessing self-reported behavior change is widely used as evaluation in programs to improve performance of health care providers in injury control research(44). Geduld et al.'s article had no post-training assessment apart from verbal communication from collaborators and participants who said that they were satisfied with the course(49). The authors from the SLWEREI refined their course curriculum for their subsequent refresher course on the basis of the feedback they got from instructors and

participants on the first course(41). During the first course they distinguished the need for a module on mental health, which was added in the curriculum. Without evaluation this priority topic may not have been addressed.

CREATIVE SOLUTIONS CAN BE FOUND IN ANY SETTING

In this thesis there is a wide variety of creative methods used to facilitate learning, many of them catered to a specific population group. One of these methods is the use of video. Capone et al. found in their study that the workers that had watched the 8 videos improved their performance rate of most first aid skills post-testing, CPR being the only skill they didn't improve. CPR is a difficult skill to master without thorough training and regular practice, so it has been explored whether it is possible to make it easier to learn. Hands-only CPR is an initiative for that, where the ventilation step is left out. It has been shown that adults with cardiac arrest that were treated with compression-only CPR had similar survival rates compared to those that received conventional CPR(69). It has been indicated that one of the barriers to perform CPR is the ventilation step, either because of fear of disease or because one wouldn't know what to do. Panic has also been mentioned as an obstacle. Learning a simpler technique for live saving in situations with cardiac arrest might help overcome all of the above mentioned obstacles. Bobrow et al. show that to disseminate potential life-saving knowledge among the public it can be effective to use ultrabrief hands-only CPR videos(52). Being very short, the videos have a big potential to reach large amounts of the public through conventional media and social networks. This could be used in smaller populations as well, for those that may not have the time to take a 1- or 2-day course. The authors also propose that it can be used in addition to other forms of practical training to enhance retention by reinforcing the skills through multiple viewings. As stated in one of the sections above, the key to successful retention by simulation training is repetitive practice(61). Another creative way to use video can be seen in the study conducted by Oseni et al.: they used video-assisted feedback to bypass a known cultural phenomenon in some Asian countries called "loss of face", which means that feedback can be perceived as criticism(38). The participants were videoed when they performed the simulations and could thus point out their errors themselves. The practical training and the video-assisted feedback led to increased confidence, which in turn can lead to improved patient outcome as mentioned above. Video-assisted feedback has been shown to speed up learning(70), which also suggests that one should use this in further course material. Another way to enhance learning could be to use the testing effect described in the study conducted by Kovács et al.(39). This was done in a

mandatory course for medical students. It is probably not conventional to use testing for regular first aid courses for laypeople, but that doesn't mean that it couldn't prove effective. When participants have to retrieve memories repeatedly during testing, they enhance knowledge retention even more than repeated studying would have done(71). And so, testing participants some time after a would-be course might be an easy and cheap way to achieve better retention.

4.3 Transferability

In quantitative research the authors often seek to attain generalizability. This means that one should be able to apply the findings in a study to a broader group of people or situations, and the results are usually not regarded as very useful if they have poor generalizability. However, in qualitative research, attaining generalizability is in the large not a relevant or achievable goal. Instead, authors typically seek out transferability, which means that the findings and the context of the study can be used as inspiration and a mirror to understand the field they want to explore. Thus, the purpose is not that 'data' should be generalizable, but that analysis should be transferable. The results of the analysis (found in the subheadings in 4.2) is therefore what needs to be explored in the local context to estimate transferability. This makes local context, and the researcher's sensibility for context, very important.

The articles included in this thesis were selected because they are thought to be able to inform the making of a first aid course by using CBPR in a rural village in Colombia. To be able to do so, one would have to assume that the findings in each article can be applied to the inhabitants in El Triunfo. In this section I will compare the context in which the different studies were done with El Triunfo and consider whether the framework conditions for a first aid course are similar or different, and what differences may be significant.

There is a wide variety of study settings and study populations included in this thesis. 6 of the included articles report on studies set in urban cities in Africa, one of them with prehospital providers as the study population(36), and taxi or commercial drivers in the other five(34, 36, 44, 46, 49, 51). The study participants of the study conducted by Bobrow et al. were selected from a church in the USA(52). Boeck and Orlas looked at the implementation of a program in big cities in Bolivia and Colombia, respectively(21, 35). I included 5 studies from Europe, 4 of them based in big cities(33, 39, 40, 42). The last study is set in more rural surroundings, the islands of Austevoll in Norway(48). The articles selected from Asia also differ a lot from the

target population in this thesis: Kinsman et al. report on a course for mountain trekkers and tourists set in the Himalayas(50). Oseni et al. report on a course for health personnel on the borders of Thailand-Myanmar and Cambodia and in the highlands of Papua New Guinea(38). Husum et al. report on a study conducted in mine infested Kurdistan and Cambodia(45). As mentioned in the introduction, Colombia is an upper-middle-income country(72) with universal health care. However, because of the conflict many of the rural areas in the country have little or no access to this. My assessment is therefore that even though many of the studies presented are on different continents, some in wildly different settings to what one can expect from a rural village in Colombia, and all of them with populations that differ from the one this thesis is intended for, each of them holds potential to inform the making of a course.

Many courses were set in settings where there is a hospital nearby. For example, in Castrén et al.'s study in Helsinki, each pair of participants were given five minutes at the examination station to do an assessment of the patient and give CPR if necessary, because this is how long it usually takes before professional help arrives. The same is probably also true for the studies conducted in the bigger cities of countries that have a functioning prehospital emergency system. In the article by Wiese et al. the group that was taught was deemed representative for the overall population, but considering that their study setting is in Germany, a high income country where prehospital times usually are just above an hour and on-scene treatment are received in about half an hour(73), it is difficult to say that this can apply to rural populations in countries with lower incomes.

The educational level of the population in each study differs a lot. As mentioned above, 5 articles look at the improvement of prehospital care by teaching taxi or commercial drivers first aid. In many of the included studies, target population have a high education rate: allied health students, medics, police, firemen, and doctors are some of the selected participants. This means that the curriculum used for many of these courses might be very specialized, maybe too specialized for village inhabitants with no formal health education. In the study conducted by Boeck et al. the study population was health professionals where most of them had had earlier training in first aid(35). Their intended target group is laypeople, but it might be difficult to transfer what they found to such a different group without changing the curriculum. This was set in a big city with hospitals nearby, so if the intended population have no access to specialized help it might be most important to learn the most basic skills. Husum et al. conclude in their study in Kurdistan and Cambodia that the BLS procedures should be

the foundation of effective trauma care based on the finding that advanced interventions were performed in less than 3% of the study patients(45). The most important part is actually doing something, so a course that can increase confidence in some key skills is probably the most prudent way to improve the effectiveness of target populations with no or low first aid knowledge. An interviewee from Søndenås' study in El Triunfo reported that there was an occurrence of a cardiac arrest where multiple bystanders watched and did nothing. They could have started CPR themselves, but instead they sent a child to fetch a person that knew CPR. Luckily this case ended well, but this substantiates the need to increase knowledge and confidence among the village inhabitants when it comes to basic first aid. Although this was not one of the study outcomes, Mock et al. also showed that there was no difference in the quality of first aid provided by drivers with different levels of education(44), so anyone could and should be able to learn the most important skills. Through a needs assessment it should be possible to map the educational level of the target group, and thus make the course as appropriate as it can be in terms of background knowledge. For example, in the course made by Jayaraman et al. they knew that some in the target population were illiterate and therefore made a course where this was taken into account(46). There are many ways to surpass illiteracy if one should encounter it: courses can be pictographic, be interactive with simulations, and/or consist of instructional videos. As discussed in one of the sections above, simulation practice has proven to be an effective way to acquire skills and knowledge.

Some studies focus on the use of automated external defibrillation (AED) device. Many victims of acute myocardial infarction die from primary ventricular fibrillation (PVF) but can be saved if defibrillation is performed immediately(74). Rørtveit et al. made laypeople teams and taught them how to operate an AED in the hopes of saving lives, though no incident of PVF occurred during the study period. Without a needs assessment we have no way to tell whether an AED device is needed in El Triunfo. Considering that ischemic heart disease is the leading cause of death worldwide, including Latin American countries, there is a big chance that it might be useful(4). Maybe it might be possible to buy an AED to keep in El Triunfo, or to keep an AED between El Triunfo and other neighboring villages. If there is a case of PVF, only rapid electroconversion of the patient can save him or her. Many of the courses identified in the literature search didn't include CPR because it was deemed useless in the setting the courses were set in. E.g., in the Himalayas in Nepal where there is no AED and where you would have to get the patient down from the mountain to provide sufficient health care(50).

This is one thing that we will have to consider – where there is no AED or no prehospital transport, one can wonder whether using a lot of time to learn CPR would do any good.

Many of the included articles about program implementation focus on trauma, either in regard to traffic accidents(34, 36, 44, 46, 49, 51) or to living in an area with minefields(45). The village El Triunfo is in a country with civil unrest but reports from Søndenås' research imply that although trauma occur (as it does in every corner of the world), the village have other more common health issues that should be addressed, e.g., prehospital management of dengue fever, acute pesticide intoxications, or other farming related accidents. One of the interviewees reported that knowing what to do if someone should get pesticide in their eyes would be helpful, as this is something that can happen in a village where many of the workers are farmers. This again highlights the importance of a needs assessment – what are the most pressing needs of the inhabitants in the village? What are their challenges? We need to know this before we even think about making a course. Based on the verbal reports from Søndenå, there is a high likelihood that many of the problems addressed in the articles included in this thesis will not be directly relevant for El Triunfo. However, there are already several guidelines and instruments that can be helpful if that should be the case. The International Federation of the Red Cross and Red Crescent (IFRC) have addressed mother, newborn and child health, noncommunicable diseases and other common health problems found in areas with limited resources to make some tools to empower the people in those areas and to strengthen their resilience(75). One of the tools that can be used (and that probably already is in use in Colombia) is the community-based health and first aid (CBHFA) approach. By using simple tools adapted to the local context of each respective area, volunteers and communities are empowered to take charge of their own health. They report that 30,384 volunteers reached over 2.8 million people in 2012 by using this approach(76).

As stated in the introduction, using CBPR appear to be the most prudent way to strengthen this project in quality and relevance and to ensure its utility for the inhabitants of El Triunfo. Health interventions have traditionally been promoted and enhanced through a top-down, expert driven approach, but should instead be a process of enabling people and communities to take control over their own health and those factors that can affect it(77). Such responsibility can be empowering, and communities should therefore be invited into participating in the organization of health, especially in underserved areas where there might be no formal health system. CPBR is not a novel method to aid health projects in Colombia.

Hernández-Rincón et al. carried out an intervention to build community capacity in eight Colombian communities (The Citizenship for Healthy Environments) and found that developing community-based health initiatives is not only possible, but it can also lead to greater sustainability and sense of ownership(17). By linking together all the actors in communities and empowering them to take control, they strengthened the primary health care initiative to meet the population's health needs. Empowerment was also a significant theme in the SLWEREI: their participants expressed a strong sense of empowerment from the knowledge they gained from the course, which contrasted with the feelings they had related to the challenges they had experienced in accessing health services where they live(78). Another project from Canada highlight four principles as components for an implementation model of community programs: the community people and researchers should be integrated as equal partners in every phase of the project, structural and functional integration of the chosen intervention and evaluation of it, ensuring that the research agenda is flexible so it can respond to demands from the broader environment, and that the creation of such a project should represent learning opportunities for everyone involved(79). These are important points to bring along in the further plan of creating a course.

4.4 Limitations

This study has several limitations. First, the ongoing Covid pandemic led me to change my study design late in the master thesis process, which meant that I was going to have time limitations. To make sure that I found as much relevant literature as possible I initially wanted to do the literature search in at least two databases (MEDLINE and Embase), but because of the short amount of time I had at hand I decided to focus the search in MEDLINE. This is because I assumed that I would have the most relevant hits there. Second, the inclusion criteria "relevance to a would-be first aid course in rural Colombia" is quite subjective. There has been no initial assessment or focus group discussion with the inhabitants of the village, so the relevance is based directly on interviews that Søndenå did in El Triunfo during his research year and my own assumptions from what I've read and heard from other group members. It is impossible to make correct assumptions about a place you haven't visited. Third, the literature search focused on acquisition and retention of knowledge after undergoing first aid courses. The search did not target patient outcome although some of the included articles did so. The main reason for implementing laypeople first aid courses is to improve the patient outcome, so assessing this point is maybe more important than the assessment of effectiveness in learning or retention of knowledge. And finally: there is also a

high possibility for publication bias. There are probably many activities around the world that concern first aid training that are never converted into research articles. Those experiences are thus invisible in the literature. Maybe only courses where there was a strong research institution behind the development led to published articles? Or courses that were successful? Of all the articles included in this thesis, only Wiese(33) and Rørtveit(48) reported that the program in their studies were ineffective. If these assumptions are true, then it might be harder to achieve the goals for this thesis than foreshadowed by the literature search conducted.

4.5 Implications

The main goal for this thesis is to make a basis for what should be included in a first aid course in the rural village El Triunfo. To achieve the goal of making a first aid course by using CBPR, the next step would be to establish a research agreement between RHfP and community leaders in the village to ensure an equitable and reciprocal partnership – the community should be integrated in every phase of development, execution, and evaluation of the project(25). There is a requirement for a needs assessment in the village and there should be a plan for focus group meetings to be able to discuss the potential curriculum. From this, we will hopefully be able to make a relevant and sustainable course that can empower the community. In the long run I hope that this would-be course can be held in the nearby villages as well, and maybe have high transferability to other communities devoid of state funded health care. There has been a wish to make the would-be course official, so that the participants could get a valid certificate upon completion. Regardless of the implications of this thesis I know that the inhabitants in El Triunfo have the motivation to learn more and the will to empower themselves. An appointed health committee exist, and they have already established some kind of micro-health care to cater to the needs of the inhabitants.

5 Conclusion

This narrative review identified many important aspects to consider when constructing a first aid course. Some general findings (subheadings 4.2) have been made which are in all probability also relevant in rural Colombia. How and to what extent is something that must be investigated in the interaction with those who will participate in the course. By using CBPR we aim to allow for community participation in every stage, which means that the course will be strengthened in terms of quality and relevance and at the same time increase its utility for the inhabitants in El Triunfo. The goal of this thesis is that the insights from this review can

inform the making of a course when such a collaboration has been established. This is a future oriented perspective – it is unlikely that villages like the ones RHfP have visited will have a fully functioning primary health care in the coming years based on the difficulty of the Colombian situation now and in the future. This give rise to another important question: will the combined political and pandemic conditions of Colombia allow for learning such as suggested in this thesis? The potential is obviously there, but there are significant challenges to be met for Rural Health for Peace and the extended network of this collaboration.

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Figures and Tables

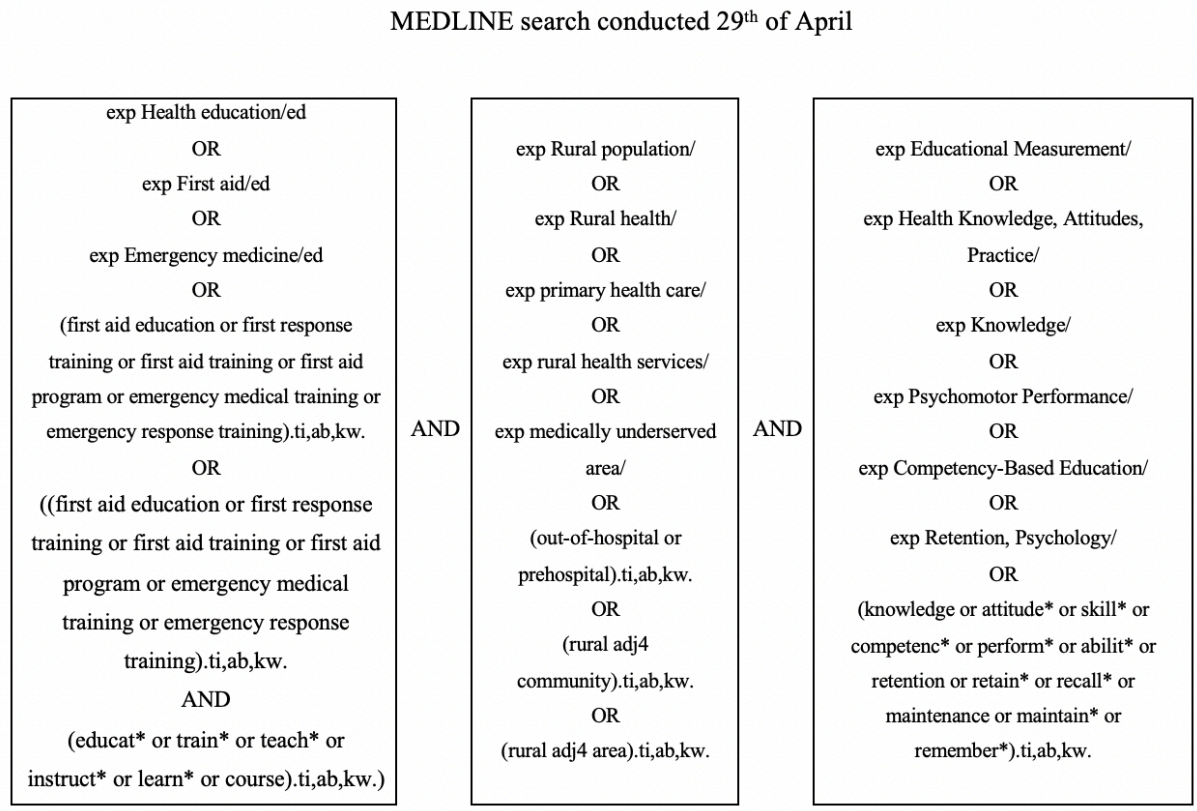

Figure 1: search terms used for the literature search conducted on the 29th of April

MEDLINE search conducted 9th of May

exp Health education/ed OR exp First aid/ed OR exp Emergency medicine/ed OR (first aid education or first response training or first aid training or first aid program or emergency medical training or emergency response training).ti,ab,kw. OR (first aid education or first response training or first aid training or first aid program or emergency medical training or emergency response training).ti,ab,kw. AND (educat* or train* or teach* or instruct* or learn* or course).ti,ab,kw	AND	exp Colombia/ OR exp Latin America/

Figure 2: search terms used for the literature search conducted on the 9th of May

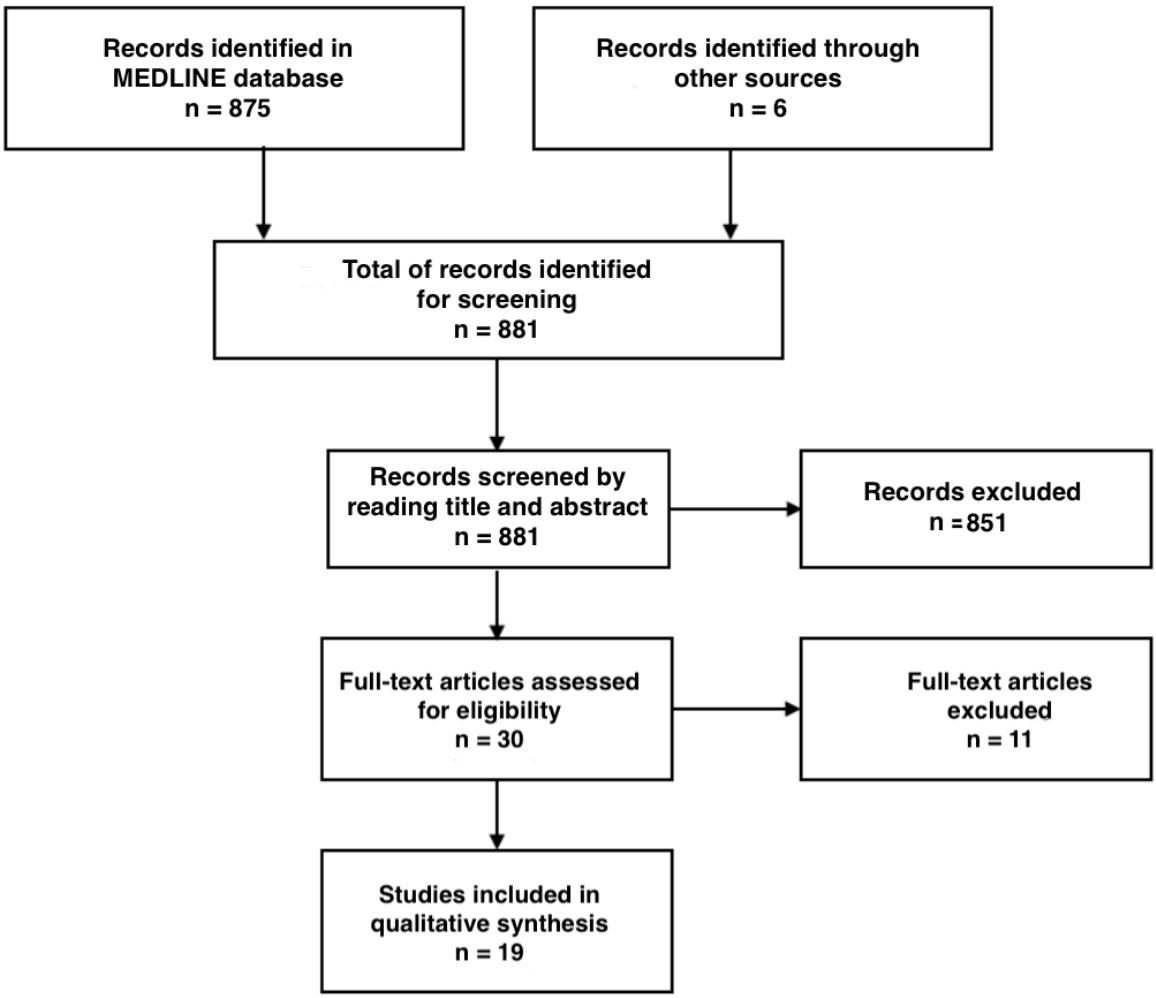

Figure 3: flow diagram showing the process of the literature search.

Table 1: identified articles in "effects of first aid education" subgroup.

First Author	Year	Article name	Country	Study design	Study aim	Population
Wiese	2008	*Practical examination of bystanders performing Basic Life Support in Germany: a prospective manikin study*	Germany	Prospective case control	Assess BLS-skills after a BLS course	Urban laypeople
Olumide	2015	*Effect on first aid education on first aid knowledge and skills of commercial drivers in South West Nigeria*	Nigeria	Quasi-experimental	Determine effect of first aid training on knowledge and skills	Commercial drivers
Boeck	2017	*The development and implementation of a layperson trauma first responder course in La Paz, Bolivia: a pilot study*	Bolivia	Prospective cohort (Pilot)	Development of layperson trauma first responder course	Urban health workers
Kosoko	2019	*Evaluating a novel simulation course for prehospital provider resuscitation training in Botswana*	Botswana	Prospective cohort	Evaluation of an educational program	Prehospital providers

Table 2: identified articles in the "methods to acquire and retain knowledge" subgroup.

First Author	Year	Article name	Country	Study design	Study aim	Population
Capone	2000	*Life supporting first aid (LSFA) teaching to Brazilians by television spots*	Brazil	Experimental	Explore whether exposure to TV spots would lead to increased performance in LSFA	Industry workers
Bobrow	2011	*The Effectiveness of Ultrabrief and Brief Educational Videos for Training Lay Responders in Hands-Only Cardiopulmonary Resuscitation: implications for the Future of Citizen Cardiopulmonary Resuscitation Training*	USA	Experimental	Assess whether watching a Hands-Only CPR video on 60 s would increase the likelihood of laypeople attempting CPR	Churchgoers
Oseni	2017	*Video-based feedback as a method for training rural healthcare workers to manage medical emergencies: a pilot study*	Thailand, Papua New Guinea	Prospective cohort Pilot	Determine if the use of video-assisted feedback is an effective means of training	Health workers
Kovács	2019	*The timing of testing influences skill retention after basic life support training: a prospective quasi-experimental study*	Hungary	Quasi-experimental	Investigate whether testing or the timing of testing after a BLS course can influence skill retention	Medical students
Méndez-Martínez	2019	*Acquisition of knowledge and practical skills after a brief course of BLS-AED in first-year students in nursing and physiotherapy at a Spanish university*	Spain	Quasi-experimental	Evaluate effect of CPR- and AED defibrillator training	Nursing- and physiotherapy students

Table 3: identified articles in the "inhabitants as course instructors" subgroup.

First Author	Year	Article name	Country	Study design	Study aim	Population
Castrén	2004	*Teaching public access defibrillation to lay volunteers – a professional health care provider is not a more effective instructor than a trained lay person*	Finland	Experimental	Comparation of skills between two groups, one trained by laypersons, and one trained by health professionals	Health professionals and volunteers
Veloso	2019	*Learning by teaching basic life support: a non-randomized controlled trial with medical students*	Brazil	Quasi-experimental	Evaluate whether teaching CPR to others would improve own performance	Medical students
Orlas	2020	*The challenge of implementing the "stop the bleed" campaign in Latin America*	Colombia	Quasi-experimental	Assess if implementation of STB-campaign is successful and whether quality is influenced by those who direct the training	Students

Table 4: identified articles in the "improving prehospital care: experiences" subgroup.

First Author	Year	Article name	Country	Study design	Study aim	Population
Mock	2002	*Improvements in Prehospital Trauma Care in an African Country with No Formal Emergency Medical Services*	Ghana	Prospective cohort (Pilot)	Evaluate effect of a prehospital program that build on the existing informal system	Urban and rural commercial drivers
Husum	2003	*Rural Prehospital Trauma Systems Improve Trauma Outcome in Low-Income Countries: A Prospective Study from North Iraq and Cambodia*	North Iraq and Cambodia	Prospective cohort	Testing a model for rural pre- hospital trauma systems in low-income countries	Rural health care workers and laypeople
Jayamaran	2009	*First things first: effectiveness and scalability of a basic prehospital trauma care program for lay first-responders in Kampala, Uganda*	Uganda	Prospective cohort	Assess effectiveness and scalability of prehospital trauma care program	Urban police, taxi drivers and community leaders
Rørtveit	2010	*First responder resuscitation teams in a rural Norwegian community: sustainability and self-reports of meaningfulness, stress and mastering*	Norway	Prospective cohort	Assess whether the teams would be sustained during the study period, and examine whether lives could be saved	Rural laypeople
Geduld	2011	*Taxi driver training in Madagascar: the first step in developing a functioning prehospital emergency care system*	Madagascar	Prospective cohort	Description of layperson first responder training program	Urban taxi drivers
Kinsman	2015	*Prehospital care education for the Nepal Mountaineering Association*	Nepal	Prospective cohort	Implementation and evaluation of a geographic-specific prehospital emergency care program	Rural trekking guides, police and students
Delaney	2018	*Lay first responder training in Eastern Uganda: leveraging transportation infrastructure to build an effective prehospital emergency care training program*	Uganda	Prospective cohort	Creation of a sustainable and efficient prehospital lay responder program	Rural taxi drivers

Appendix

Project description Rural Health for Peace

NASJONALT SENTER FOR DISTRIKTS MEDISIN

PROJECT COLOMBIA

COL-1801 STRENGTHENING PRIMARY HEALTH SERVICES IN

RURAL AND SPARSELY POPULATED AREAS IN COLOMBIA

Nasjonalt senter for distriktsmedisin /
Boaittobealmedisiinna našunála guovddáš
UiT Norges arktiske universitet

Norwegian Centre of Rural Medicine

2019

UiT / THE ARCTIC UNIVERSITY OF NORWAY

TABLE OF CONTENT

1 INTRODUCTION

This project proposal will outline Norwegian Centre for Rural Medicine's (NCRM) plans for building up a collaboration between Colombian and Norwegian partners, with the goal of strengthening primary health services in rural and sparsely populated areas in Colombia.

Our plan is organized in two steps and include a focus on knowledge development and exchange between the two countries where all partners can learn from each other, an e-health part and a focus on recruiting and retaining young doctors in rural areas through training.

The background section will sketch out the political and social premises for the project, before we outline NCRM's role. In the second section of this project proposal we outline how we plan to fulfil our role in STEP 1 and the funding needed for STEP 2.

2 BACKGROUND

2.1 Background information on the Norway-Colombia health agreement

Norway has been working closely with Colombia for several years in connection with Norway's role as facilitator of the peace agreement, signed between FARC and the Colombian Government in Colombia in 2016. In continuation of this cooperation, Norway is committed to assist in the further reconstruction of Colombia.

One of the points in the peace agreement is the development and improvement of primary health care in the country. *"As for social development, plans will be undertaken to* **improve healthcare**, *education, housing, and drinking water services, with all of the aim of improving opportunities for rural people*."
(General Agreement for Ending Conflict and Building a Stable and Long Lasting Peace).

Colombia has nearly universal health coverage where approximately 98% of the population has health insurance (integrated between the subsidized and contributory regimes). At the same time, there are large regional differences in the quality of available health services and it is particularly low in rural and sparsely populated areas. As such, there are persistent inequalities in health outcomes in the different population groups and regions.

In December 2017, a Memorandum of Understanding on health cooperation between the Ministry of Health and Care Services in Norway and the Ministry of Health and Social Protection in Colombia was signed by State Secretary Maria Bjerke and General Secretary Burgos Berna. Among the issues to be developed are primary health and health in rural and sparsely populated areas. Through a health cooperation Norway wish to contribute to improvements in the health system as an important part of the reconstruction of the country and to strengthen the bilateral relations between Norway and Colombia.

Much have happened since the 2016 peace agreement was signed. Our collaborator in Colombia, Dr. Francisco Lamus, comments on these changes as following:

"Since the peace agreement signature in 2016, there has been intense political debate and social turmoil in Colombia, currently with the voting population almost evenly divided, where near half the population supporting the peace agreement as it was signed, and the other half demanding amendments, in particular a demand for punishment of the guerrilla leaders charged with crimes against humanity. In this scenario it is believed that a primary health initiative can offer a positive alternative to respond to the complexity of the social and political current situation, as the country moves forward with institutional, demographic and epidemiologic transition. "

The expected results of the cooperation are as follows:

The 2017 Memorandum outlines the planned effects on society (Impact), which are:

Health cooperation between the Norwegian Ministry of Health and Care Services and the Colombian Ministry of Health and Social Protection will be strengthened.

The cooperation will have a positive effect on the quality of the health services to the population, in line with the peace agreement.

Likewise, the planned effects for the target group of the project (outcome) are expected to be:

1. Increased competence on drug prevention
2. **Strengthened primary health service, especially in rural and sparsely populated areas**
3. Rational use of medicines and medical devises

2.2 Norwegian Centre of Rural Medicine's role

Norwegian Centre of Rural Medicine (NCRM) at UiT-The Arctic University of Norway is responsible for the part of the cooperation that deals with strengthening of primary health service in rural and sparsely populated areas, including improving knowledge of what strengthens recruitment to rural areas, with a strong focus on reciprocity between the partners and facilitation of knowledge sharing both ways.

NCRM is situated in Tromsø, at the Department of Community Medicine, UiT-The Arctic University of Norway. NSDM aims to promote research, professional development projects, education and networks. The vision is to bridge praxis, academia and responsible authorities, to contribute to quality improvement, recruitment and retaining of health professionals in rural and remote areas.

NCRM wishes to help strengthen primary health services in rural and sparsely populated areas in Colombia through various initiatives in line with the agreement on health cooperation concluded between the Ministry of Health and Care Services in Norway and the Ministry of Health and Social Development in Colombia.

3 PROJECT PLAN

A fundamental principle of the various initiatives is that they are aligned and in accordance with local authorities' (both national and regional) own strategies and plans.

Another principle of the various initiatives is reciprocity between the partners and facilitation of knowledge sharing both ways.

Due to the evolving nature of this early collaboration project, NCRM are ready to adjust plans and want to secure flexibility and realism through dialogue with all partners.

NCRM intend to:

1. Use own professional resources and other professional resources in the university environment to develop the cooperation project with Colombian partners.

2. Create a multidisciplinary project team among these resources, with members associated with UiT – The Arctic University of Norway. (See below for current member details)
3. Identify and establish contact with professionals and institutions in Colombia and other international contacts for a joint exploration and planning of projects. (See below for established contacts.)

4. Plan and implement various measures for knowledge sharing with Colombian and international partners: including video conferences, reciprocal visits to Colombia and Norway, exchange of professionals and more.
5. Build expertise through thematic seminars and workshops on health systems, education, recruitment to rural areas and relevant IT solutions.
6. Explore possibilities for research projects – preferably both Norwegian and Colombian students/researchers.
7. Explore possibilities for an E-health project: "*Comunidad* and *Samfunn*" (COSA). Understanding local communities as health and care systems and how to empower these systems through use of e-health technologies.

8. Together with our local partners get an overview of the health related issues in the area: what kind of health service / health professionals are present in the current area, what is the disease panorama? Community engagement is a key factor for rural remote development.
9. Together with our local partners establish an interprofessional working group including doctors, nurses and midwifes for joint exploration and planning of projects
10. Explore the possibilities for developing a mentor program or exchange program using internet-based communication for young doctors and nurses ? in Colombia and Norway, and in connection with their duty service "social services" for competence and capacity building and international network.
11. Establish contact with the WHO and other national and international organizations in the field of global health for networking and potential cooperation.
12. Explore possibilities for collaborations/partnership with relevant organizations working on health/peace/Latin America, for example the Peace Research Institute Oslo – PRIO (area mapping: social conditions, education, health, safety), Doctors without Borders, Red Cross, Caritas, Norwegian Refugee Council etc.

4 NCRM INTERDISCIPLINARY PROJECT TEAM

Project management:

- Helen Brandstorp (Director NSDM, Medical Doctor and PhD)
- Ingvill Konradsen Ceide (Senior Advisor & Project Coordinator for the Colombia project).

NCRM Director Helen Brandstorp is a specialist in general practice, has a PhD and is currently specializing in public health. Her research is mainly based on participatory research, aiming at both developing health services and documenting the process. Larger state funded projects regarding new education positions in general practice is developed largely under the lead of Brandstorp. Her professional background is as a rural remote GP in Finnmark, the northern most county of Norway, and is an awarded physician based on her management of projects in the field of primary care emergency medicine and general practice. She is Cand.Med from Bergen in 1996, and has studied and worked for periods at universities and institutions in Germany, England, France, Burkina Faso, and Canada. She also has a competence in indigenous medicine.

Ingvill K. Ceide is Co-Founder and General Manager of the Haitian/Norwegian non-profit Prosjekt Haiti, established in October 2000. Prosjekt Haiti runs several educational programs for children and women in Haiti including health education and a free health clinic for youth. Ceide has a Master of Human Rights from the School of Advanced Study, University of London and additional training in project management, social entrepreneurship, health and human rights, amongst others. Her professional background includes working as an advisor to the Mayor of the municipality of Saint Louis du Sud in Haiti, Project Manager at the Centre for International Health (UiT- The Arctic University of Norway/University Hospital North Norway), and two periods working at the UN in Ecuador and Haiti.

From NCRM:

- Kristine Andreassen (Medical Doctor & PhD candidate)
- Birgit Abelsen (Research Manager and Associate Professor) will be an advisor.

From the Center for Arctic and Global Health:

- Mona Kiil (Senior advisor & Phd Candidate)
- Turid Austin Wæhler (Advisor).

From the General Practice Research Unit:

- Juan Carlos Aviles Solis (Mexican Medical Doctor and PhD Candidate).

From the Norwegian Centre for E-health Research:

- Torsten Risør (Family Physician and Medical Anthropologist. Associate Professor in family medicine at UiT the Arctic University of Norway, and Senior Researcher at the Norwegian Centre for E-health Research.) For bio , see Attachment 2

From the UiT Medical Student Research School,

- Håvard Søndenå (Spanish speaking PhD Candidate and Medical student).

Professor in Rural Health Roger Strasser.

- Professor in Rural Health, Roger Strasser has agreed to join our team as an advisor. Professor Strasser is already connected to UiT-The Arctic University of Norway and has agreed to expand the connection with funding from this project.

Professor Strasser will be a valuable academic link between the global health discipline and the Colombian and Norwegian project partners in the collaboration.

Professor Strasser is Global Head of District Medicine at the Northern Ontario School of Medicine (NOSM) in Canada and a leader in the global reform of health professional education. Recognizing the importance of context and community in medical education and research, Professor Strasser has gained an international reputation for developing and refining novel strategies to train health professionals in and for rural communities. As a result of his formative work in his field, Professor Strasser has become one of the world's foremost authorities in rural, socially accountable medical education, as well as a sought-after speaker and advisor. In addition to his role as Dean and CEO at NOSM, Professor Strasser is one of the few Professors of Rural Health in the world. He is leading a growing body of research relating to socially accountable health professional education, recruitment and retention of health professionals, and rural health service delivery models.

5 COLOMBIAN PROJECT PARTNER

As advised by Professor Strasser, NCRM has established contact with Dr. Francisco Lamus, Associate Professor at the Center for Community Health Studies, University of La Sabana in Bogota, who will be one of the main partners on the development and planning of the health cooperation project.

Associate Professor Lamus has extensive experience in the field of public health and education in Colombia: Master's in Public Health and in Applied Development, Director until 2018 of the research group Family Medicine and Population Health. Coordinator of

the Master of Public Health, developer of the specialty in Family and Community Medicine and Associate Professor of the Faculty of Medicine at University of La Sabana. Advisor of different international initiatives in Education in Health Professions. Director of different research and development projects in Public Health, Primary Care, Maternal and Child Health and Education in Health Professions. He is the main author and co-author of different articles and chapters in Primary Care, Medical Education and Maternal and Child Health.

Attachment 1 is Dr Francisco Lamus reflections regarding the project.


Dr Francisco Lamus at work.

6 PLANNED ACTIVITIES 2019

6.1 STEP 1: in Colombia 24th February – 2nd March 2019

We plan to travel to Colombia at the end of February 2019 to get to know our project partners better and to visit one or more of the geographic areas where we can assist with the development of primary health care and start to develop a model/ pilot project for the cooperation.

We plan to meet representatives for the health authorities in Colombia both to have the opportunity to inform about the project, to discuss the proposals from the health authorities and to ensure that we are aligned with their own plans and priorities.

We will conduct workshops in Colombia for mutual knowledge exchange and for further joint planning of the health cooperation and meet representatives from the Norwegian

Embassy, as well as relevant professionals in the primary health field, including doctors, nurses and midwives.

The district/s we will visit depends on the advice and priorities of the Colombian National authorities. Potential areas to visit are (to be decided upon and confirmed):

- "Choco" at the Pacific Coast /rainforest, indigenous/African population, historically underserved communities.
- South of Cartagena, under-served communities that suffered a lot from violence during the war.
- Border to Venezuela, high immigrant/refugee population.

It must be noted that the Norwegian Health Department is currently working to establish the needed contact with the Colombian Ministry of Health and Social Protection. If this contact is not yet established during our travels in February, we will meet with all our partners outside the government and postpone our visit to a rural area, primarily for security reasons.

The delegation from Norway consists of Helen Brandstorp, Ingvill K. Ceide and Mona Kiil.

In addition, we will be joined by Professor Roger Strasser travelling from Canada. The visit is coordinated in collaboration with Dr. Francisco Lamus.

Seminar and Workshop-plans in Colombia

The following sketches plans for knowledge exchange while in Colombia. The plans are flexible and meant to be planned in further details as a part of the preparation for our travels.

1. Seminar in Bogota:

Insights from Colombia (Associate Professor Francisco Lemus)

- Colombian health system's structure, main emphasis on primary health care
- "Recruit & retain" what works in Colombia
- Medical education in rural areas - experiences from Colombia

Insights from Norway (NCRM Director Helen Brandstorp)

- Norwegian health system's structure, main emphasis on primary health care
- "Recruit and retain" what works in Norway

- Medical education in / Recruitment to rural areas - experiences from Norway

Insights from a global perspective (Professor in Rural Health Roger Strasser):

- "Recruit and retain" what works?
- Medical education in / Recruitment to rural areas

Organized joint discussion: Find common subject areas i.e. where is the working group's expertise.

2. Field visit:

We expect the field visit to be exploratory and an opportunity to acknowledge the gap of what is already in place and what the health authorities (national, regional and local) want to achieve.

Together with our local partners we will get an overview of the health related issues in the area: what kind of health service / health professionals are present in the current area, what is the disease panorama? Natural medicine versus Western medicine? Special focus on minorities like indigenous peoples and immigrants.

Workshop 1. *Community engagement.* Open community meeting in the district we visit. Objective: to gain some understanding of health care supply in rural Colombia.

Workshop 2. *Realistic collaboration.* Only for those involved in the project development: us and our local partners + local authorities / health leaders. Evaluate findings from Workshop 1 and formulate priority areas to work on, based on own competence and what we already see as possible themes for collaboration.

3. Summary meeting in Bogota:

Closing meeting when we are back in Bogota.

- Setting the ground for a partnership/ collaboration agenda.
- Identifying key stakeholders and interacting partners from Norwegian and Colombian side.
- Identifying the singular and shared interests of those involved, and ideas for further collaboration.
- Agreeing how to get communication flowing – by which IT-systems and so on.

- Acknowledging what would be a set of ground rules to set up a collaborative project.
- Identifying desirable goals that a partnership/collaborative project will pursue in the project period.
- Discuss opportunities for financing.

6.2 Norwegian working-group meetings "at home"

The Norwegian working group will meet regularly via video conference (vc) and face-to-face during the project period to adjust the work and efforts as the project develops.

As the project coordinator, Ingvill K. Ceide, will be responsible for communication work in the network and beyond, arrange meeting places and serve as the contact person.

Furthermore, she will arrange regular vc-meetings with the project partners in Colombia and Canada for follow up and continued planning.

Professor Strasser will participate in both the Norwegian working group meetings and the trans national meetings via video conference, in his role as an advisor.

6.3 STEP 2: Networking and developing the project further

NCRM are aiming for developing the project in two steps, since further planning will depend on the success of the first trip to Colombia. Information exchange and networking between Norway and Colombia should be developed by the use of modern technology in the second step. Based on achievements in STEP 1, including the first trip to Colombia, STEP 2 will evolve in more detail.

A second trip to Colombia would probably be necessary to follow up and form more targeted parts of the collaboration project. Details will be described in an updated project plan for second half of 2019. But three themes are already developing:

1. Rural remote young doctors

Supporting young rural remote doctors in both countries could be a focus for the second phase and step. Building network amongst young doctors across continents using modern technology, could be fruitful on both sides. Other professionals, like nurses, should be included eventually as interprofessional team work is highly relevant in both countries.

Dr Juan Carlos Aviles Solis has participated in a project developed to support young doctors in rural remote Mexico[1], educating them at the same time in global health, developed by Harvard T. H. Chan School of Public Health, Partners In Health and others.[2]

Suggested heading for the second trip "Family medicine in Norway & Colombia, challenges and good practices":

- Learning clinical skills and how to handle patient in two very different contexts
- Work and private life as a young doctor in rural remote areas
- Decentralized medical education, rural practice and training
- Emergencies..? interprofessional work?..

2. Health system development

NCRM has developed large state funded projects regarding recruitment and retention of young GPs (ALIS-Vest[3] and ALIS-Nord) on the basis of a 7 year EU project Recruit & Retain – Making it Work[4]. Professor Roger Strasser was the key person in this last project internationally.

Collaboration regarding health system development and research would be of interest for both countries. Details will be elaborated after the first visit described in Step 1. Participants from Norway will be the project team, including professor in Rural Health, Roger Strasser, and other internal academic resources from NSDM and UiT. In Colombia, Dr Francisco participates with his students and other relevant collaborators and project partners.

3. E-health project

Proposal from Associate Professor Dr Torsten Risør at the Norwegian Centre for e-health research: Comunidad and Samfunn" (COSA). Understanding local communities as health and care systems and how to empower these systems through use of e-health technologies and to strengthen primary health care in rural communities in Colombia as part of a larger search for local solutions that can be transferred or even developed to regional or national PHC initiatives. This will include both social technologies and e-health technologies and methods. See Attachment 2.

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[1]Palazuelos D, Palazuelos L, Elliot PF et al. Revitalizing physician social service to unlock universal health coverage: First report from partners in health – Mexico. February 2015 Annals of Global Health 81(1):46-47
[2] Palazuelos D et al. Training Toward a Movement: Career Development Insights From the First 7 Years of a Global Health Equity Residency.2018 , Journal of Graduate Medical Education 509-516
[3] Seppola-Edvarsen T, Brandstorp H. Utdanningsstillinger i allmennpraksis. NSDM-rapport 2018
[4] Abelsen B, Brandstorp H. Recruit & Retain – Making it Work. Den norske case studien. NSDM-rapport 2019

7 CONCLUSIONS

We recognize the challenges we are facing as we move forward with our planning and development of the health collaboration in a country undergoing difficult changes as it is trying to move towards a more sustainable peace. The two years since the peace agreement was signed has not been without its problems and the peace is constantly challenged by different groups.

However, we believe the collaboration may contribute to positive changes and we are excited to be working closely with dedicated health professionals in Colombia and Norway, with support from one of the few professors in Rural Health, to bring the project forward as a potential model on how to strengthen primary health service in rural and sparsely populated areas.

ATTACHMENTS

1. Report from Dr Francisco Lamus, January 2019

The following is a short summary of a larger report from Dr. Lamus.

1. Brief history of the Colombian conflict.

Colombia has had an armed confrontation for more than 50 years (1964 - 2016). "The conflict" has been an irregular war fought between the FARC guerrilla (Revolutionary armed forces of Colombia) and State armed forces. An irregular war, because it was an ongoing violent struggle between state and non-state armed groups, the latter, fighting for legitimacy and influence over peasant population groups around the country.

Drug cartels and state forces were also involved in different forms of confrontation across most of the 32 departments with 1103 municipalities that constitute the nation (Ramírez, 2001). The conflict degraded in its forms of violent confrontation generating a displacement of 6 million people from their places of origin, 220,000 deaths, 160,000 missing individuals and 30,000 kidnappings and 1982 massacres in the 52 years of conflict.

The talks that started in 2012 led to the signature of the peace agreement in November 2016, where the government and the FARC guerrilla group commit to 5 agenda items: a comprehensive rural reform, democratic opportunity to build peace, transitional justice and end of conflict, solution of the problem of illicit drugs, agreement to repair the victims of the conflict all of them open to the implementation of verification mechanisms (Santos, Jiménez, 2016).

2. **The time and the challenge for primary health care in Colombia**
    - Describes how the system requires a primary approach to reach and respond to the health needs of the population across different territories and subcultures
    - Describes how a primary health initiative can provide tracks to deliver models of community development that respond to the current needs of population health and social wellbeing.

Advances:

- Nearly universal coverage in health insurance with an amplified and unified health coverage plan (integrated between the subsidized and contributory regimes).
- Better access to health services with growth in health services supply
- Improved patient security and strengthened pharmaceutical policy
- Decrease in pocket money expenditure by patients and improvements in norms and regulations of the health system payment mechanisms
- Orientation of the system towards the achievement of the "Decennial Country Health Plan" by 2021
- Decrease in urban-rural and rich-poor inequalities.

Difficulties:

- The health system is a disease and illness focused
- The system focuses on the health providers
- There is a high burden of disease
- There is low resolution of health services at the first level of complexity
- There is little development of health services at the second level of complexity
- There is very high demand and concentration of health delivery at the third level of complexity
- There is fragmentation and disintegration in health care delivery
- There are persistent inequalities in health outcomes in different population groups and regions
- Problems of decentralization of health care
- A weak or lack or managerial articulation of health care delivery by health care providers
- Weak community participation in the health system organization
- Negative incentives amongst healthcare providers
- Failure in market driven regulatory mechanisms
- Failures in health authorities' regulations
- Challenges for financial sustainability of the system

- Distrust and lack of transparency between institutional health agents (insurers and health providers)

3. **Proposal for a strategic primary health approach for the achievement of sustainable peace.**
    - Suggests possible sites to agree with the Colombian National authorities for the development of the primary health initiative, considering advances of the peace process according to regions.
    - Provides alternative frameworks about how to proceed to agree with Colombian national authorities within political neutrality.

Different priorities may guide Colombian national authorities and the Norwegian collaboration proposal, upon a site where to start a pioneer project where national health guidelines align with international collaboration provided by the Norwegian government to provide capacity building competencies to improve health conditions in a selected population group, through the development and implementation of the PAIS Policy.

A. A first recommendation would be to focus on one of the rural and disperse areas defined by the Ministry of Health and Social Protection where the major health inequities concentrate and where the need for innovation to arrive with institutional capacity from the National Colombian government could be more relevant.

B. A second recommendation would be to focus on any of the 16 sub regions (170 municipalities) where the peace agreements have committed to advance in an agenda that improves development conditions and other determinants of health in what has been defined as "Development Programs with Territorial Focus (Planes de Desarrollo con Enfoque Territorial-PDET) (Domínguez, 2016).

   Three extra conditions for the location of this type of project contemplating both suggestions or recommendations (the Ministry of health selection of a rural and disperse region and/or the PDET) or a combination of them would be:

   a. The guarantee of **safety conditions** for the visit and maintenance of external aid and advisors.
   b. A **neutral political approach** to improve health and development of the population of such areas. Political neutrality understood as an impartial stance toward warring or opposing parties that becomes permanent over time, nevertheless, a position that is not indifferent to conflict and can provide humanitarian aid and social assistance to the population. Within the purpose

of these project a means to organize institutionally for better health care and improved health outcomes.

c. The purpose to support the **development of institutions** according to the Ministry of Health guidelines and primary health strategy approaches by strengthening:
    a. Human resources for health with the PAIS approach
    b. Community health projects that target social determinants of health and intersectoral action
    c. Health service delivery posts at the first level where the PAIS approach is exemplified
    d. The development of a Primary Health Model that exemplifies how the Primary Health Care Strategy and the implementation of the PAIS Health policy contributes through the implementation of the Integrated Management of Health Strategy (MIAS) to improve health and development in the selected site or sites, for later replication and adaptation into some other sites.

2. E-health project proposal, Comunidad and Samfunn (COSA)

Understanding local communities as health and care systems and how to empower these systems through use of e-health technologies.

Purpose: to strengthen primary health care in rural communities in Colombia as part of a larger search for local solutions that can be transferred or even developed to regional or national PHC initiatives. This will include both social technologies and e-health technologies and methods

Background: Colombia and Norway are both countries dominated by rural areas and with the shared challenge of providing health care to dispersed rural populations. Local creativity in how to meet this challenge exist in both countries, including development of e-health solutions to facilitate communication and information-sharing between patient and health professionals. Fortunate conditions in Norway has allowed national research initiatives and networks regarding community health care and e-health. The experience from these projects should be shared and developed, and used – in this project - to facilitate development of local initiatives and new community-based solutions in Colombia.

Design: The primary methodological approach will be ethnographic fieldwork in at least two rural communities in Colombia. The communities should be strategically selected so that 1) they share socio-economic features and infrastructure with many other communities in the country and 2) local initiatives in primary care and/or e-health exist and can be used as foundation for further development of systems, models and collaborations applicable to comparable communities. Fieldwork should, if possible, be conducted by researchers from Colombia and in collaboration with representatives from the communities in question. Researchers from Norway will act as partners in developing projects, create connections to international networks and analyzing and publishing results.

Project stages: The project is planned to develop in three partly overlapping stages. Initially, networks between researchers in the two countries – and between researchers and local communities – must be established and developed. Success will depend on the ability of the team to facilitate dialogue locally to map needs and resources for primary health care. This stage will also include the development of literature search strategies and project databases for the project.

The next stage will search for possible tools and actions that can be relevant to meet local needs and make optimal use of local resources. Examples of e-health initiatives that can be relevant and to which the Norwegian Centre for E-health Research have access are distance learning programs for rural medicine clinical teachers (developed at McGill University, Canada) and a practical handbook on how to develop telemedicine infrastructure in a country (based on a World Bank project in Ukraine).

The third stage will be a process of prototyping: Tools, models and actions that have been found useful in other contexts, and that the local research team find potentially helpful, will be tested out in small scale in collaboration with the communities. This should primarily be done to strengthen or connect initiatives and ideas already active in the community. If for instance, there is a local initiative to educate families in how to manage pediatric infectious diseases and provide access to relevant diagnostic and therapeutic modalities, the research team can look for primary healthcare and e-health solutions that may strengthen this work with families rather than introduce entirely new themes. The core idea is to facilitate local solutions that can become robust, so that the experience can be replicated in comparable communities elsewhere.

Cautionary note: with e-health it is easy to be fascinated with the technology itself rather than the effects and the applications for people in need. For this project, we are not primarily interested in what technology can do. We are interested in what people can do – with each other and with technology.

Torsten Risør

January 2019

Bio:

Torsten Risør (48y) is a Danish family physician and medical anthropologist. Living in northern Norway since 2010, he is now associate professor in family medicine at UiT the Arctic University of Norway, and senior researcher at the Norwegian Centre for E-health Research. From 2012-2018 he was director of undergraduate medical education in northern Norway and especially worked to promote rural medical education and patient-centered medicine. In 2017-2018 he was a visiting professor at McGill University, Montreal. His research focus on the socialization of medical students and medicine as a cultural system. This includes ethnographic fieldwork with young doctors, and how they learn to make clinical decisions in the practice of everyday work.

Memorandum between Colombia and Norway

OMFORENT MEMORANDUM
MELLOM
REPUBLIKKEN COLOMBIAS HELSE- OG SOSIALDEPARTEMENT
OG
DET KONGELIGE NORSKE HELSE- OG OMSORGSDEPARTEMENT

OM SAMARBEID INNEN HELSE

Republikken Colombias helse- og sosialdepartement og Det kongelige norske helse- og omsorgsdepartement, heretter kalt «partene»:

Som erkjenner betydningen av å fremme helse og livskvalitet i sine respektive land,

Som ønsker å styrke det bilaterale samarbeidet mellom partene innen helse og medisinsk forskning,

er blitt enige om følgende:

Artikkel 1

Dette omforente memorandum har som formål å fremme og styrke samarbeidsforholdet mellom partene for å bidra til utvikling av strategier og tiltak i hvert av landene.

Artikkel 2

Partene vil fremme gjensidig samarbeid innen følgende områder av felles interesse:

- Primærhelsetjenester og helse i rurale og tynt befolkede områder;
- Helselovgivning;
- Menneskelige ressurser, utdanning og opplæring;
- Mekanismer for vurdering og beslutningsstøtte i spørsmål om hvorvidt ny teknologi skal innføres;
- Psykisk helsevern og posttraumatisk stress;
- Alkohol- og narkotikapolitikk;
- Andre områder av felles interesse som partene utpeker og blir enige om;

Artikkel 3

Samarbeidstiltak i henhold til dette omforente memorandum kan omfatte følgende:

- Informasjonsutveksling;
- Utveksling av offisielle delegasjoner og fagfolk;
- Konferanser, seminarer og workshops;
- Prosjekter som gjennomføres i fellesskap;
- Opplæring innen helse og medisinsk forskning;
- Andre former for samarbeid som det er gjensidig enighet om;

Artikkel 4

Partene skal på forespørsel utveksle informasjon om sin respektive helselovgivning, samt informasjon og erfaringer innen helse og medisinsk forskning. Partene vil bestrebe seg på å fremme direkte samarbeid innen områder av felles interesse.

Artikkel 5

Partene vil bli enige om en plan for gjennomføring og løpende oppfølging av dette omforente memorandum. Partene kan involvere andre institusjoner i helsesektoren med henblikk på planlegging og utførelse i samsvar med denne handlingsplanen.

Partene utpeker følgende kontaktpunkt for å sikre en effektiv gjennomføring av dette omforente memorandum:

(A) For den colombianske parten: Gruppe for internasjonale relasjoner og samarbeid

(B) For den norske parten: Seksjon for internasjonalt samarbeid.

Artikkel 6

Alle aktiviteter som er omtalt i dette omforente memorandum er underlagt lover og budsjetter i hvert land. Kostnadene for samarbeidsaktivitetene i henhold til dette omforente memorandum vil dekkes etter nærmere overenskomst mellom partene.

Artikkel 7

Enhver uenighet med hensyn til tolking, anvendelse eller gjennomføring av dette omforente memorandum skal løses gjennom konsultasjoner mellom partene.

Artikkel 8

Dette omforente memorandum trer i kraft fra den dag det undertegnes av partene og vil være i kraft i fem år. Etter fem år kan partene inngå skriftlig avtale om å forlenge avtalen for ytterligere fem år.

Dette omforente memorandum kan endres etter skriftlig og gjensidig samtykke fra begge parter.

Dette omforente memorandum skal ikke gi opphav til rettslig bindende rettigheter og forpliktelser.

Undertegnet i to eksemplarer, i Bogota den 5. desember 2017, på spansk, norsk og engelsk, der alle tekstene er like autentiske. Ved ulik fortolkning skal den engelske teksten være avgjørende.

PÅ VEGNE AV REPUBLIKKEN COLOMBIAS HELSE- OG SOSIALDEPARTEMENT

GERARDO BURGOS BERNAL
generalsekretær

PÅ VEGNE AV DET KONGELIGE NORSKE HELSE- OG OMSORGSDEPARTEMENT

MARIA BJERKE
statssekretær

References: Oseni Z, Than HH, Kolakowska E, Chalmers L, Hanboonkunupakarn B, McGready R. Video-based feedback as a method for training rural healthcare workers to manage medical emergencies: a pilot study. BMC Med Educ. 2017;17(1):149.

Study design: Prospective Cohort

Grade - quality: Moderate

Aim	Aim	Results	Discussion/comments
To determine if the use of video-assisted feedback is an effective means of training rural healthcare workers in Thailand and Papua New Guinea (PNG) to manage medical emergencies effectively. **Conclusion** Video-assisted feedback resulted in an improvement in clinical knowledge, confidence and quality of teamwork for managing medical emergencies in two low resource medical facilities in South-East Asia and the South Pacific. **Country** Thailand and Papua New Guinea **Year of data collection** 2016	**Data material:** Twenty-four study participants were recruited from three Shoklo Malaria Research Unit clinics along the Thailand-Myanmar border and eight participants from Kudjip Nazarene Hospital, PNG. The teams were recorded on video managing a simulated medical emergency scenario and the video was used to aid feedback and assess performance using Observed Structured Clinical Examination (OSCE) scoring and Team Emergency Assessment Measure (TEAM) questionnaire. The process was repeated post-feedback at both sites and at 6 weeks at the Thailand-Myanmar border site. Thailand-Myanmar border participants' individual confidence levels and baseline knowledge (using OSCE scoring) were assessed before team assessment and feedback at week 1 and repeated post-feedback and at 6 weeks. Focus group discussions (FGD) were held at each Thailand-Myanmar border clinic at week 1 (8 participants at each clinic). **Exclusions:** not applicable **Statistical methods:** SPSS version 23 for Windows was used to compare the results of proportions using the Chi-squared test and the t-test and Mann–Whitney-U test for comparing para- metric and non-parametric data, respectively. For staff with paired data from consecutive assessments the Wilcoxon signed rank test was used to compare the OSCE and confidence scores.	Individual paired tests of OSCE scores showed significant improvement post-feedback at week 1 ($p < 0.001$) and week 6 ($p < 0.001$) compared to baseline OSCE scores. There was a trend for increased team OSCE scores compared to baseline at week 1 ($p = 0.068$) and week 6 ($p = 0.109$) although not significant. Thailand-Myanmar border TEAM scores demonstrated improvement post-feedback mainly in leadership, teamwork and task management which was sustained up to week 6. PNG showed an improvement mainly in teamwork and task management. The global rating of the teams' non-technical performance at both sites improved post feedback and at week 6 on the Thailand-Myanmar border site. Self-rated confidence scores by Thailand-Myanmar border participants increased significantly from baseline following training at week 1 ($p = 0.020$), and while higher at 6 weeks follow up than at baseline, this was not significant ($p = 0.471$). The FGD revealed majority of participants felt that watching the video recording of their performance and the video-based feedback contributed most to their learning.	• **Is the purpose of the study clearly formulated?** Yes • **Were the groups recruited from the same population?** Partly: • **Were the groups comparable with respect to underlying factors?** • **Were exposures and outcomes measured equally and in a reliable manner In all groups?** • **Were those who evaluated outcomes blinded?** No • **Was the study prospective?** Yes • **Were a sufficient amount of participants followed up?** Yes • **Was the follow-up period sufficient to measure significant results?** Yes, but there could have been another assessment after a longer time interval to make sure that the skills were retained. • **Attrition bias accounted for?** Yes • **Were confounding factors adjusted for?** No • **Can these results be transferred to the general population?** No • **Do you believe in the results?** Yes • **Does the literature support the results?** Yes • **Do these results have any clinical implication?** Yes, further use of video assisted feedback when training health providers in South-East Asia. • **Limitations** • The authors did not include a control group who did not receive video-based feedback. • Some of the improvement in week 1 immediately following training could have been partly due to content specificity as participants were assessed using the same scenario used for training. • They should have included a longer assessment interval to ascertain if skills are retained over a longer period.

Reference: Castren M, Nurmi J, Laakso JP, Kinnunen A, Backman R, Niemi-Murola L. Teaching public access defibrillation to lay volunteers--a professional health care provider is not a more effective instructor than a trained lay person. Resuscitation. 2004;63(3):305-10.

Study design: RCT

Grade - quality Moderate

Aim	Material and methods	Results	Discussion/comments
To compare the resuscitation skills of two groups of lay volunteers, one trained by a newly trained lay person and the other by a health care professional, in two different scenarios.	Both the instructors and the study subjects were selected among employees from several organizations with plans to implement a public access defibrillation program. All subjects had prior BLS training but no experience with an AED. First aid personnel from the Red Cross were used as a reference group. Eight instructors, including four lay persons and four health care professionals, were given a four-hour course in BLS/AED by the same instructor, who was a nurse and trainer with 20 years experience in training at the Finnish Red Cross. Two weeks later they were given a four-hour instructor course. The newly trained instructors then trained a total of 38 lay volunteers (19 pairs) with no previous experience in the use of a defibrillator. Of the 19 pairs, 9 were trained by health care providers and 10 by lay persons. The OSCE setting comprised two scenarios, and the test took place 2–3 weeks after the initial training. The subjects were tested in pairs, each pair alone. Just before the OSCE, they were informed that they would be evaluated during the performance **Statistics:** The OSCE scores of the study groups with a professional or a non-professional instructor, as well as scores of the study group and the control group were compared using unpaired t-test. Paired t-test was used to compare the performance of trained lay volunteers in two different scenarios. Performances of different tasks were compared between groups and scenarios using Fisher's exact test.	Data were collected with a check-list with a total score range from 0 to 49. The mean score of all participants in both scenarios was 35 (range 21–44, standard deviation 6.3). No statistical difference was present in performance levels of lay volunteers trained by a health care professional and those trained by a non-professional instructor All were able to use the AED and follow instructions. They identified patients with ventricular fibrillation and cardiac arrest, but had difficulties identifying cases with imminent cardiac arrest. The control group of trained first aiders performed significantly more effectively than the newly trained lay persons.	• **Is the aim of the study clearly formulated?** Yes • **Who is included/excluded?** employees from several organizations with plans to implement a public access defibrillation program • **Were the groups equal at the beginning?** Yes • **Randomization?** Yes, but not stated how • **Were the participants/study personnel blinded to study objective?** Yes. No information about the OSCE beyond the initial training was given to the participants. The assessors were blinded to the identity of the trainers. • **Were the groups treated equally apart from the intervention?** Yes • **Primary endpoints - validated?** Yes • **Were all participants given account for at the end of the trial?** Yes • **What are the results? Precision?** No statistical difference was present between the two groups of lay volunteers in the OSCE. • **Are the results generalizable?** Yes • **Were all outcome measures assessed?** Yes • **Are the advantages worth the cost/disadvantages?** Yes • **Limitations:** None stated • **Other literature that discuss strengths/weaknesses?** No **Do the results have plausible explanations?** Yes
Conclusion No significant benefit exists in the trainer being a health care professional, but thorough training and subsequent rehearsing of the skills learned are crucial.			
Country Finland			
Year of data collection Not stated. Manuscript received 13th of October 2003, so probably between 2002-2003.			

Reference: Veloso SG, Pereira GS, Vasconcelos NN, Senger MH, de Faria RMD. Learning by teaching basic life support: a non-randomized controlled trial with medical students. BMC Med Educ. 2019;19(1):67.

Study design: Quasi-Experimental Trial

Grade - quality Moderate

Aim

To use the methodology of learning by teaching in cardiopulmonary resuscitation and assess whether the students' performance (knowledge and skills) would increase after going through the activity of teaching others, and at the same time, assess if those skills could be disseminated within the community.

Conclusion

The students who passed through the teaching activity had a theoretical and practical performance superior to that of the control group. The community was able to learn from the students. The study demonstrated that the didactic activity can be an effective methodology of learning, besides allowing the dissemination of knowledge. The University, going beyond its academic boundaries, performs its social responsibility.

Country

Brazil

Year of data collection

Not stated. The project took 2 and a half years and the article was submitted 24th of august 2018, so maybe during 2014-2017.

Material and methods

A non-randomized controlled trial was designed to assess whether teaching Basic Life Support would increase students' learning. Socially engaged, seeking to disseminate knowledge, 92 medical students were trained in Basic Life Support and who subsequently trained 240 community health professionals. The students performed theoretical and practical pre- and post-tests whereas the health professionals performed theoretical pre- and post- tests and one practical test. In order to assess the impact of teaching on students' learning, they were divided into two groups: a case group, with 53 students, reassessed after teaching health professionals, and a control group, with 39 students, reassessed before teaching. As the students' activities were part of the curriculum, it was not possible to randomize the students into case and control in the same class because it could generate different conditions among learners

Statistics: Data were analyzed using IBM SPSS Statistic version 20. All variables were tested for normality using the Shapiro-Wilk test, which is considered a robust test to determine whether the data are parametric or not. Parametric independent variables were compared by the Stu- dent's T test (comparing the means of the independent groups) and the independent nonparametric variables by the Mann-Whitney test (comparing the medians of the independent groups). In the parametric paired variables, the paired Student's T test was used (comparing the means of the dependent groups) and for the nonparametric related variables, the Wilcoxon signed-rank test was used (comparing the medians of the dependent groups). Statistically significant difference was considered when $p < 0.05$.

Results

The practical students' performance of the case group went from 13.3 ± 2.1 to 15.3 ± 1.2 (maximum = 17, $p < 0.001$) and theoretical from 10.1 ± 3.0 to 16.4 ± 1.7 (maximum = 20, $p < 0.001$) while the performance of the control group went from 14.4 ± 1.6 to 14.4 ± 1.4 ($p = 0.877$) and from 11.2 ± 2.6 to 15.0 ± 2.3 ($p < 0.001$), respectively.

Of the 240 people in the community, 155 performed both the theoretical pre- and post-tests, with a mean of 7.9 ± 3.6 and 13.3 ± 3.2(maximum = 20), respectively ($p < 0.001$). There was no difference in the theoretical per- formance of the community that was taught by the case or control group ($p = 0.113$). The same occurred in the practical assessment ($p = 0.833$).

Discussion/comments

- **Is the aim of the study clearly formulated?** Yes
- **Who is included/excluded?**
  Inclusion: students in the second term of the medical course. For the members of the community it was to work in the places where the students usually practice and to volunteer to participate.
  Exclusion: less than 18 years of age, physical weakness that compromised the performance of resuscitation maneuvers and illiteracy.
- **Were the groups equal at the beginning?** Yes
- **Randomization?** Not possible, activities were part of the student's curriculum in school. Randomization might have affected learning conditions
- **Were the participants/study personnel blinded to study objective?** No. All participants were made aware of the research objectives and their stages. Students and observer teachers were unaware of the case or control status of the classes
- **Were the groups treated equally apart from the intervention?** Yes, apart from the fact that they were in different classes and that the number of individuals varied in the different stages and assessments performed which occurred on different days.
- **Primary endpoints - validated?** Yes
- **Were all participants given account for at the end of the trial?** Yes. Personal factors related to work and holidays prevented the maintenance of the same number of individuals at all stages in the community group.
- **What are the results?** The students in the case group obtained cognitive and skills performance superior to that of the control group, measured by the theoretical and practical pre- and post-tests The theoretical performance of the community increased after the course, demonstrating that students were efficient in the teaching task.
- **Are the results generalizable?** Yes
- **Were all outcome measures assessed?** Yes
- **Are the advantages worth the cost/disadvantages** Yes

- **Limitations:**
- Loss of participants in the community group
- Theoretical and practical re-assessments did not occur in an equal period of days among the five participating classes.

- **Other literature that discuss strengths/weaknesses?** Yes
- **Do the results have plausible explanations?** Yes

References: Husum H, Gilbert M, Wisborg T, Van Heng Y, Murad M. Rural Prehospital Trauma Systems Improve Trauma Outcome in Low-Income Countries: A Prospective Study from North Iraq and Cambodia. Journal of Trauma and Acute Care Surgery. 2003;54(6).

Study design: Prospective Cohort

Grade - quality: Moderate

Aim	Aim	Results	Discussion/comments
To examined the effects on trauma outcome of prehospital trauma life support provided by trained paramedics and lay Village First Responders.	**Data material:** A five-year prospective study was conducted in North Iraq and Cambodia to test a model for rural pre- hospital trauma systems in low-income countries. A core group of 22 health care workers were selected from each target area for a three-year training program. training consisted of three 150 hours of intensive courses at makeshift training camps at villages inside the catchment area (Village Universities) with working periods of 6 to 12 months in-between. During their working periods between each training course the students themselves should train at least 50 Village First Responders during 2-days village courses in their home area. The outcome indicators were: (1) effect of treatment on prehospital physiologic severity levels; (2) trauma mortality; and (3) infectious complications. **Exclusions:** Not applicable **Statistical methods:** Epi Info and CIA were used for analysis of the data. The null-hypothesis (no difference in outcome) was rejected if the 95 percent confidence interval (95% CI) for differences did not include zero. We used MedCalc for analysis of Receiver Operating Characteristics plots. Indicators for severity scoring is said to have high accuracy if the area under the ROC plot (AUC) is 0.9 or larger; AUC = 0.5 signifies a useless indicator.	From 1997 to 2001, 135 local paramedics and 5,200 lay First Responders were trained to provide in-field trauma care. The study population comprised 1,061 trauma victims with mean evacuation time 5.7 hours. The trauma mortality rate was reduced from pre-intervention level at 40% to 14.9% over the study period (95% CI for difference 17.2– 33.0%). There was a reduction in trauma deaths from 23.9% in 1997 to 8.8% in 2001 (95% CI for difference 7.8–22.4%), and a corresponding significant improvement of treatment effect by year. The rate of infectious complications remained at 21.5 percent throughout the study period.	• **Is the purpose of the study clearly formulated?** Yes • **Were the groups recruited from the same population?** Yes • **Were the groups comparable with respect to underlying factors?** Yes • **Were exposures and outcomes measured equally and in a reliable manner In all groups?** Yes • **Were those who evaluated outcomes blinded?** No • **Was the study prospective?** Yes • **Were a sufficient amount of participants followed up?** Yes • **Was the follow-up period sufficient to measure significant results?** Yes • **Attrition bias accounted for?** Not mentioned • **Were confounding factors adjusted for?** Not mentioned • **Can these results be transferred to the general population?** Yes • **Do you believe in the results?** Yes • **Does the literature support the results?** Yes • **Do these results have any clinical implication?** Yes • **Limitations** • There may be unreported prehospital fatalities. • There may be unregistered post-hospital fatalities • Estimates of pre-intervention trauma mortality may be incorrect • In several victims who were found dead at the scene without autopsy being performed, they had insufficient data for correct grading of anatomic injury severity • They used a simplified version of the Revised Trauma Score (RTS) for severity grading • other factors than effects of medical interventions may affect vital signs • there may be significant inter-observer variability in measurements of vital signs • **Do the results have plausible explanations?** Yes
Conclusion Low-cost rural trauma systems have a significant impact on trauma mortality in low-income countries. To be sustainable, trauma systems in low-income countries should be low-cost and rely on the existing infrastructure.			
Country North Iraq and Cambodia			
Year of data collection 1997-2001			

Reference: Kovacs E, Jenei ZM, Csordas K, Frituz G, Hauser B, Gyarmathy VA, et al. The timing of testing influences skill retention after basic life support training: a prospective quasi-experimental study. BMC Med Educ. 2019;19(1):452.

Study design: Prospective quasi-experimental trial

Grade - quality Moderate

Aim	Material and methods	Results	Discussion/comments
To investigate whether either testing or the timing of such testing after BLS training have any influence on skill retention.	This was a post-test only, partial coverage, prospective quasi-experimental study designed to evaluate a BLS training course among 464 fifth year medical students at Semmelweis University in the first semester of 2013/ 2014. Groups were systematically but non-randomly assigned to either a control group that took no exam or one of two experimental groups that took an exam (N = 179, NoExam group; N = 165, EndExam group – exam at the end of the BLS training; N = 120, 3mExam group – exam 3 months after the BLS training). The ability to perform ten prescribed essential BLS steps was evaluated during a skill retention assessment 2 months after the course in the NoExam, 2 months after the course (and the exam) in the EndExam and 5 months after the course (2 months after the exam) in the 3mExam group to measure skill retention and the effect of our intervention. Scores were calculated for each BLS step, and also summed up as a total score. We used Kruskal-Wallis test to assess differences in skill retention. **Statistics:** A summary score was calculated by adding up the individual BLS scores in the SRA. The distribution of the average scores for each BLS step and for the total score was com- pared across the three groups using the Kruskal-Wallis test overall and the Dunn post-hoc test across groups. The level of significance was set at $p < 0.05$. Statistical analysis was performed using SPSS v13.0 (SPSS Inc., Chicago, IL). Figures were created using GraphPad Prism version 8.1.1. (GraphPad Software, La Jolla, CA).	The skill retention assessment 2 months after the training in the NoExam, 2 months after the training and the exam in the EndExam, and 2 months after the exam in the 3mExam group showed significantly different scores across the groups regarding shouting for help, testing vital signs, position of hands, rate of chest compression, consistency of chest compression, 30:2 ratio, duty cycle, and total score. There was no significant difference in examining consciousness, calling for ALS team, and depth of chest compression. Students in the 3mExam group performed significantly better than students in either the NoExam or the EndExam groups in shouting for help, testing vital signs, positioning of hands, and consistency of chest compression. The 3mExam group had a significantly better performance in rate of chest compression compared to the EndExam group (which had significantly lower scores for this step than the NoExam group), as well as in keeping the 30:2 ratio. Duty cycle was retained significantly better in the 3mExam group compared to the NoExam group. The NoExam group had a higher mean score in rate and consistency of chest compressions than the EndExam group, however the EndExam group's skill retention was significantly better in duty cycle compared to the NoExam group. Overall, the NoExam and the EndExam groups showed similar skill retention. The mean total score of students was significantly higher in the 3mExam group compared to both the NoExam and the EndExam groups, and there was no difference in the total score of the latter two groups. The 3mExam group had less variability in total scores (and many of the sub-scores) than the other two groups, and the minimum total score for the 3mExam group was only 1 point lower than the average of the other two groups.	• **Is the aim of the study clearly formulated?** Yes • **Who is included/excluded?** fifth year medical students at Semmelweis University in the first semester of academic year 2013/2014**.** Exclusion criteria not applicable (part of their academic year) • **Were the groups equal at the beginning?** Yes • **Randomization?** No. Groups were systematically but non-randomly assigned to either a control group or one of two experimental groups based on consecutive sampling according to their date of participation in the BLS practice session • **Were the participants/study personnel blinded to study objective?** Yes. Participation in the groups was blinded in a way that all participants at the beginning of the course thought they were not going to have an exam, and those who were taking exams were told during their training session. • **Were the groups treated equally apart from the intervention?** Yes • **Primary endpoints - validated?** Yes • **Were all participants given account for at the end of the trial?** Yes • **What are the results?** NoExam and EndExam groups showed similar skill retention. The mean total score (and many of the sub-scores) of students was significantly higher in the 3mExam group compared to both the NoExam and the EndExam groups, and there was no difference in the total score (and many of the sub-scores) of the latter two groups. The 3mExam group had less variability in total scores (and many of the sub-scores) than the other two groups. • **Are the results generalizable?** Yes • **Were all outcome measures assessed?** Yes • **Are the advantages worth the cost/disadvantages:** Yes • **Limitations:** • instructors received the same training in teaching BLS and performed the same quality teaching based on the standard ERC instructors' guidelines, but it would have been preferable if the same instructor had taught all the students. The exams were also administered by multiple instructors. • They tried to evaluate the students' performances using standard guidelines but cannot rule out teacher-related differences. • lack of information about the preparation of the 3mExam group for their exam. They did not have an organized opportunity to practice after the course, but we cannot rule out that some might have practiced their skills in some other training format. • **Other literature that discuss strengths/weaknesses?** Yes **Do the results have plausible explanations?** Yes
Conclusion Our study provides evidence that testing these skills 3 months after BLS training may be more effective than either testing immediately at the end of the course or no testing at all.			
Country Hungary			
Year of data collection 2013			