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THE ARCTIC UNIVERSITY OF NORWAY

Faculty of Health Science

Norwegian General Practitioners Contribution and Participation in Emergency Medicine

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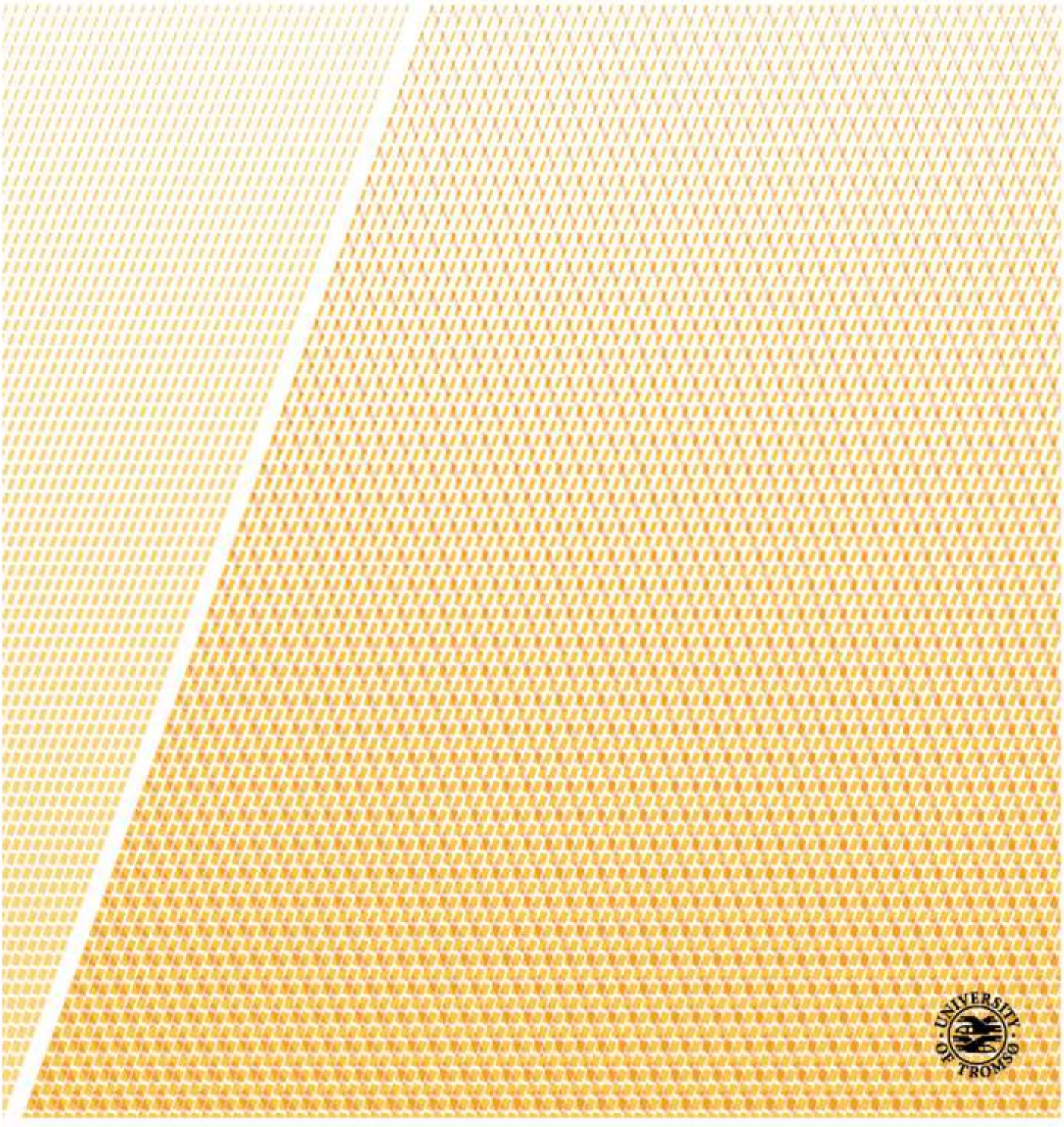
A dissertation for the degree of Philosophiae Doctor – May 2018



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Acknowledgments

I would like to start by thanking all EMTs and GPs that have participated in different parts of the project. It would not have been possible without your cooperation.

I have been lucky to work along skilled and knowledgeable colleagues in the Oslo ambulance service, at the Oslo Accident and Emergency Outpatient Clinic, in Alta and in Lyngen. You have been generous and taught me the important basics of emergency medicine and family practice.

I am grateful to the different funds and organizations that have funded the different parts of my project, the National Centre for Emergency Primary Health Care, the Norwegian Committee on Research in General Practice, the Norwegian Research Fund for General Practice and the Norwegian Centre of Rural Medicine

I have had great support from my employer Hasse Melbye and General Practice Research Unit in Tromsø, UiT The Arctic University of Norway. Thank you Hasse for always backing me, finding practical solutions when needed. I have also appreciated the feedback and enthusiasm from Helen Brandstorp. Torben Wisborg got me into research when I was a student, and has been a role model ever since. I would also thank The Norwegian Research School in General Practice for creating a supportive community for me to develop my scientific skills.

I have been privileged to work with a team of knowledgeable and caring supervisors. Erik Zakariassen became a part of the project at the start. You have contributed with in-depth knowledge about pre-hospital emergency medicine in Norway and been a great travel companion, of which I am thankful. Mette Bech Risør provided valuable insight into medical anthropology and qualitative methods. Thank you Mette, for your patients and guidance. My main supervisor Peder Halvorsen have been my most important supporter throughout the project. Peder, you have always been available, letting me learn from your experience and knowledge. Thank you for being my supervisor and mentor.

Finally I would like to thank my incredible family for all their support. Mom and dad, you have helped out in every way possible. Ida and Truls, you always make me remember the important things in life. Above all, I want to thank my best friend, Karianne. You are always positive, backing my creative ideas and you are the first to tell me to stop whining if I start to feel sorry for myself. You are right Karianne, I am privileged to be able to spend so much time to study a field I find interesting and important.

Summary

The utility of general practitioner (GP) participation is a current issue in emergency medicine. The aim of this thesis is to examine Norwegian GPs' contribution and participation in emergency medicine.

We started by conducting qualitative focus group interviews with emergency medical technicians (EMTs) at four, mainly rural, ambulance stations and GPs working at rural casualty clinics. They were then followed by a survey sent to all regular GPs in Norway (n=4701). In this web-based questionnaire, that 1002 GPs answered, we examined GP participation in emergency medicine and factors associated with participation.

The participants in our interviews and survey found that GPs play an important part in pre-hospital emergency medicine, and that GP participation improves the quality of the health care. They thought that the GPs were better at diagnosing and making clinical decisions concerning treatment and hospital admittance. Findings indicate that the GPs participate in emergency medicine on several arenas, in casualty clinics, by phone and on ambulance call-outs. The GPs have different knowledge and skills than the EMTs, and the two professions complement each other during medical emergencies, according to both EMTs and GPs. They suggested interdisciplinary team training as an important way to improve this teamwork. In the survey, self-reported participation in emergency medicine was strongly associated with working at a casualty clinic that regularly conducted interdisciplinary team training. Participation was also associated with working at a casualty clinic without extra staff.

These findings may serve as a point of departure for future studies of the utility of GP participation. Until further data becomes available, I believe that measures to facilitate continued GP participation in pre hospital emergencies and further implementation of team training are warranted.

Sammendrag

Nytten av allmennlegen er et aktuelt tema innen akuttmedisin. Hensikten med denne avhandlingen er å bidra med kunnskap om norske allmennlegens deltakelse og bidrag i akuttmedisin.

Vi startet med kvalitative fokusgruppe intervjuer med ambulansearbeiderene ved fire ambulansestasjoner, hvorav tre var i distrikt og allmennleger som jobbet på legevakter i distrikt. De kvalitative studiene ble fulgt av et spørreskjema som ble sendt til alle norske fastleger (n=4701). I dette webbaserte spørreskjemaet, som 1002 allmennleger besvarte, undersøkte vi legenes deltakelse i legevakt og forhold som var assosiert med deltakelse.

Deltakerne i fokusgruppeintervjuene og spørresundersøkelse opplevde at allmennlegen spiller en viktig rolle i prehospital akuttmedisin, og at legens deltakelse øker kvaliteten på helsetjenesten. De mente at allmennlegen var bedre til å diagnostisere og å fatte kliniske beslutninger om behandling og sykehusinnleggelse. Funnene våre indikerer at allmennlegene deltar på forskjellige arenaer, på legekontoret, på legevakt, over telefon og på ambulanse uttrykning. Allmennlegen har annen kunnskap og andre ferdigheter enn ambulansearbeiderene og de to profesjonene komplementerer hverandre på akuttmedisinske oppdrag, i følge deltakerne. De foreslo tverrfaglig team trening som en viktig måte å forbedre dette samarbeidet. I spørreundersøkelsen var selvrapportert deltakelse i akuttmedisin sterkt assosiert med å jobbe på en legevakt som regelmessig gjennomførte tverrfaglig team trening. Det var også assosiert med å jobbe alene på legevakt, uten sykepleier eller ande allmennleger.

Disse funnene kan være et grunnlag for videre studier av allmennlegens nytte. Jeg mener at man bør tilrettelegge for allmennlegens deltakelse i akuttmedisin og implementere tverrfaglig teamtrening i påvente av ny kunnskap.

Abbreviations

Norwegian translation in brackets.

EMCC	Emergency Medical Communication Center	(AMK, akuttmedisinsk kommunikasjonssentral)
ED	Emergency Department	(akuttmottak)
EMS	Emergency medicine services	(akuttmedisinske tjenester)
EMT	Emergency Medical Technician	(ambulansefagarbeider)
GP	General Practitioner	(allmennlege)
HEMS	Helicopter Emergency Medical Service	(luftambulansetjenesten)
Regular GP		(fastlege)
QUALYs	quality-adjusted life years	(kvalitetsjusterte leveår)

In the thesis I have used the term “casualty clinic” to describe the out-of-hours emergency primary health care system in Norway that is called “legevakt”.

List of papers

Paper I:

Hjortdahl, Magnus; Zakariassen, Erik; Wisborg, Torben. The role of general practitioners in the pre hospital setting, as experienced by emergency medicine technicians: a qualitative study. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine 2014; Volum 22:47.

Paper II:

Hjortdahl, Magnus; Halvorsen, Peder Andreas; Risør, Mette Bech. Rural GPs' attitudes toward participating in emergency medicine: a qualitative study. Scandinavian Journal of Primary Health Care 2016; Volum 34 :4.

Paper III:

Magnus Hjortdahl, Erik Zakariassen ; Peder A. Halvorsen. Self reported involvement in emergency medicine among GPs in Norway, Scandinavian Journal of Primary Health Care 2018; Volum 36:2.

1 Introduction

1.1 Why examine GP participation and contribution in emergency medicine?

When I started working as a GP in 2010, on duty at the local out-of-hours casualty clinic, I was regularly asked by the Emergency Medicine Communication Center (EMCC) to participate in medical emergencies along with the local ambulance. That I, as a GP, was expected to participate in emergency medicine was different from my previous experiences. I was therefore unsure if I should participate in these emergencies, or if I would be of more use at the casualty clinic. I also wondered what my contribution should be, if I decided to take part in these out-of-office emergencies. I looked to colleagues and guidelines for advice, but I found few firm answers. My search for answers to these questions led to a research project about GP participation and contribution in emergency medicine, finally resulting in this thesis.

By the time I started examining GP contribution in emergency medicine, a national expert panel was reviewing the entire prehospital emergency medical services in Norway [1]. The expert panel claimed that GP-run casualty clinics were of poor quality, and that the GP was underutilized in pre-hospital emergency medicine. They concluded in 2015, that there is little knowledge about the benefit of pre-hospital treatment and how best to organize the services, and recommended that more research should be conducted in this field. This lack of knowledge was also evident when the Norwegian Knowledge Centre for the Health Services was unable to conclude in a systematic review of the effect of GPs in pre-hospital trauma treatment in 2017, as they could not identify any studies to include in the review [2].

The use of GPs and GP-run casualty clinics in emergency medicine have been debated in Norway. A group of healthcare personnel argued, in 2013, that GPs are pulling out of emergency medicine, by not doing their casualty clinic duty, and not taking part in ambulance

call-outs [3]. They based this on their own experience of working in the ambulance service in one of Norway's main cities, and on their medical student thesis. They suggested that paramedics should treat medical emergencies outside hospitals and casualty clinics by themselves, without the assistance of GPs. In 2015, the president of the Norwegian Medical Association claimed that GP-run casualty clinics are the weakest link of the health care services [4]. She referred to a report made by the medical association that states that casualty clinics are troubled by recruitment difficulties, lack of organization and poor quality. The medical association's solution was, according to the president, to staff the casualty clinics with more doctors, and that the authorities must be aware that the casualty clinics are struggling [4]. Hospital anesthesiologists argue in The Journal of the Norwegian Medical Association, in 2016, that GP-run casualty clinics are an efficient way of letting many patients be examined by a physician outside hospitals, relieving the hospital emergency departments (EDs). The success of gatekeeping and triage in GP-run casualty clinics is used as an argument for why a separate emergency medicine specialty in hospitals is not needed in Norway [5]. The Norwegian Directorate of Health claimed, at the national conference for casualty clinic leaders in 2018, that GPs are not attending to their duty in emergency medicine. The Directorate of Health is therefore piloting a new way of organizing pre-hospital care in Norway, with less GP participation [6]. It is a paradox that different stakeholders have strong opinions about the GP-run casualty clinics' place in pre-hospital EMS, and how to best organize them, while they have little knowledge to back these opinions with. Empirical and systematic knowledge on the subject is apparently absent [1,2]. In this thesis, I will try to address some of these issues and offer research-based knowledge that may be helpful when organizing the emergency medical services in Norway in the future.

1.2 What is emergency medicine?

Emergency medical services that are provided by the municipalities' and the hospitals' pre-hospital emergency services in Norway, are regulated in the "emergency medicine regulations" of 2015 [7]. The regulations outline the municipalities' responsibility for providing immediate health care to its inhabitants, qualification requirements for the healthcare personnel, and equipment requirements in the municipal emergency services. The regulations also describe the hospitals' responsibility for the ambulance services, and the qualification requirements for ambulance personnel. Finally, the regulations list the requirements for the emergency communication center and municipalities' immediate help phone services. According to the regulations, "emergency medicine is diagnostics, counseling, treatment and/or monitoring of acute onset or deterioration of disease or injury where prompt medical help can be decisive for the patient's life and health" [7].

Emergency medicine is regarded a medical specialty in some countries. The American College of Emergency Physicians defines emergency medicine as the medical specialty dedicated to the diagnosis and treatment of unforeseen illness or injury. "The practice of emergency medicine includes the initial evaluation, diagnosis, treatment and coordination of care among multiple providers, and disposition of any patient requiring expeditious medical, surgical, or psychiatric care" [8].

Emergency medicine is practiced by emergency medicine services (EMS), and can be divided into in-hospital service and out-of-hospital EMS. The out-of-hospital EMS, also known as pre-hospital EMS, includes emergency medical call centers (EMCC), ambulance services, and primary care personnel and facilities [9].

Another way of describing emergency medicine is to look at the panorama of diseases that make up medical emergencies. Between 2005 and 2007, all medical emergencies in the

municipality of Austevoll were recorded [10]. A medical emergency was defined as an event for which the GP, based on the first notification, prioritized to see the patient without any delay. This data describes the occurrence of disease and injury in a Norwegian municipality. The study found that disease (84% of all cases) was far more common than injuries (16%). The patients suffered from a great variety of conditions, 62 diagnoses in total, i.e. they were not limited to a few core conditions. In contrast, EMS research, organization, training and guidelines often focus on detecting and treating a few potentially deadly conditions. These conditions, often referred to as the first hour quintet, consist of cardiac arrest, chest pain, stroke, breathing difficulties and severe trauma [11].

1.3 Out-of-hours care in Western countries

The organization of pre-hospital EMS differs from country to country and within countries. In most western countries, the patients visit the hospital's Emergency Departments (ED) directly, without a referral, when they have an urgent illness or injury [12,13]. Most countries also have a primary care service that is available for emergencies during out-of-office hours, instead of EDs, for non-life-threatening conditions [12].

The organization of these primary healthcare resources varies greatly between countries, and a survey of out-of-hours care in western countries identified nine different organizational models currently used across the world. These models differ in a number of aspects such as patients treated, availability, staffing and size [12,13].

As a result of a growing problem of overcrowded EDs, several countries are exploring the possibility of letting the primary healthcare system take care of more medical emergencies. Studies from the UK [14] and Sweden [15], have shown that involvement by GPs in the pre-hospital EMS can reduce the number of patients brought to EDs. In the US, Urgent Care

Centers run by GPs are also suggested as a solution to relieve the EDs [16]. GPs are also largely responsible for delivering emergency medical services in rural areas, for instance in the UK, USA, and Australia [17,18,19]. GPs working in metropolitan areas may also encounter emergency medicine as part of their ordinary office day, since their regular patients sometimes present with severe symptoms [20,21].

The great variation between and within countries indicates that the "optimal" role for GPs in emergency medicine may depend on context [12]. For example, rural GPs are found to play a greater role in EMS, but the difference in organization might also be a result of history and culture [12]. This variation in organizing, and difference in nomenclature of EMS makes it challenging to compare the use of GPs in emergency medicine between countries.

1.4 Organization of pre-hospital emergency medicine in Norway

Pre-hospital emergency medicine in Norway is, in principal, made up of general practitioners (GPs), GP-run casualty clinics, the emergency communication center (EMCC), the ambulance service, and the National Air Ambulance Services.

1.4.1 Non-life-threatening medical emergencies

If you are acutely ill or injured in Norway, you are expected to visit your regular GP for examination and treatment. All Norwegians have the right to be registered on the list of a regular GP. The regular GP system is popular in the population, and is an important part of a strong primary health care system, delivering efficient health care of good quality to all Norwegians [22]. It is mandatory for regular GPs to offer their list patients immediate appointments when needed. These appointments cover a broad range of acute illnesses and

injuries of varying severity that require examination within reasonable time. Altogether, Norwegian GPs carry out about 4 million of these immediate appointments each year [23]. In some cases, the patient will be referred by the GP to a hospital for further treatment. Although we do not have exact numbers for how many of the immediate appointments that lead to hospital appointments, we do know that Norwegian GPs handled about 90 percent of the patient contacts without involvement of secondary care [24].

If acutely ill or injured outside of office hours, patients are supposed to contact the local, GP staffed, out-of-hours medical center, preferably by phone (phone number 116 117). The intention is that a portion of the patients will manage with advice given by phone, whereas others receive a doctor's appointment at their local out-of-hours medical center. These medical centers, also named casualty clinics, are available 24/7. All areas of Norway have a designated casualty clinic, but due to centralization, the patient might have to travel some distance to his closest casualty clinic. Most patients are treated at the casualty clinic, but about 20 percent of the patients that are seen by casualty clinic GPs are admitted to hospital for treatment [1].

1.4.2 Life-threatening medical emergencies

In the event of a possible life-threatening disease or accident, the public is advised to call the EMCC (phone number 113). The EMCC will then decide, based on information from the caller, whether to dispatch an ambulance (an ambulance call-out) or not. If the EMCC operator suspects a life-threatening situation (also called a "red response") he will also alert the GP on duty at the local casualty clinic. The GP on call is obliged to always carry a handheld radio to be able to receive these alerts. The GP then has to decide if he will leave what he is currently doing, usually tending to patients at the casualty clinic, to attend the

patient on site (i.e. take part in the ambulance call-out) or not. According to regulations from 2015, the GP has to take part in the ambulance call-out whenever necessary [7]. The regulation does not explain any further what is implied by "necessary," which is left to the GPs' discretion. In some cases, an ambulance may not be available, and the GP then has to attend to the patient on his own. After initial assessment, the patient will either be driven to the local casualty clinic for further examination, be admitted to hospital or discharged at the scene. The initial assessment will be done by a GP, the ambulance services or both, depending on the resources present on scene. The EMCC will in selected cases dispatch an ambulance helicopter. In an observational study from 2010, they found that the ambulance helicopter was dispatched in eight percent of the red responses [25]. The incidence of emergency ambulance call-outs is estimated to be around 20-25 per 1000 inhabitants per year [1]. There are national guidelines recommending pre-hospital treatment and fast track delivery to an appropriate treatment facility for selected medical emergencies like stroke, suspected myocardial infarction, cardiac arrest and major trauma. The GP and casualty clinic involvement in these emergencies varies from case to case, and according to localization.

1.4.3 Casualty clinics

The municipalities are responsible for providing emergency medical services to all people staying in the municipality through the regular GP system and casualty clinics. Norway consists of 422 municipalities of varying size (from 6 km2 to 9700 km2) and population (from 200 inhabitants in the smallest to 660 000 in the largest), and the organization and structure of the casualty clinics in Norway is heterogeneous [26]. The casualty clinic might serve a single municipality or several municipalities. The clinic is usually a dedicated building, but in some municipalities the different GP offices will take turns being a casualty clinic during office hours. It can be staffed by a single GP or several GPs working at the same

time. Some clinics also have on-call GPs at home, to be called in if needed. It is mandatory for regular GPs in Norway to work at their local casualty clinic, and this work is in addition to their regular work as a GP. How often they have to work at the casualty clinic varies from municipality to municipality, and is largely influenced by how many GPs that work in the municipality. As a consequence, GPs working in sparsely populated municipalities might have to be on call every third or fourth day.

The National Centre for Emergency Primary Health Care was concerned that some of the casualty clinics were too small to be able to give adequate service over time, and recommended fewer and more robust EMS units [27]. Many municipalities, therefore, reorganized their EMS from separate small municipality clinics to fewer inter-municipality casualty clinics responsible for larger geographical areas. In 2016, 101 of the 182 casualty clinics in Norway were inter-municipal casualty clinics [26]. This reorganization has led to longer distances for the patients [23]. A study has shown that patients that have a long distance to travel will less often use the casualty clinic. This is also the case when the patient is at risk of severe illness [28]. There is now a concern that this centralization of casualty clinics will lead to less involvement of the casualty clinic GP in pre-hospital EMS [1,11].

Even though casualty clinic work has been defined as general practice, there is a long-standing tradition for doctors with other specialties to work at these clinics, at least in urban areas. According to "emergency medicine regulations" from 2015, the GP must have a minimum of experience and training in emergency medicine in order to work at a casualty clinic [7]. The new legislation is stricter in the sense that the doctors have to be GP specialists or in training to become a GP specialist, with minimum three years' experience, in order to be an "experienced GP" and allowed to work independently at the casualty clinic. If these criteria are not met, the doctor is not an "experienced GP" and has to work under the supervision of an "experienced GP".

The clinic may be staffed with nursing personnel. Thirty-nine percent of the clinics have dedicated cars for the GP to use, with or without a driver [26]. In some cases, the casualty clinic is co-located with the ambulance station (10 %) or the local hospital (19%) [26]. The municipality's responsibility to provide care for its inhabitants at all hours was also mandated in a previous regulation, in effect from 2005. This responsibility has been expanded in the new regulation, with the addition of the rule that the GP on duty must participate on ambulance call-outs when required. The legislation also states that all EMS personnel, for instance EMTs and casualty clinic personnel, must participate in training exercises, i.e. multidisciplinary team training, focusing on interaction and teamwork with other healthcare personnel [7].

1.4.4 The ambulance service

The hospital trusts are responsible for in-hospital EMS, ambulance services and the EMCC. The ambulance service in Norway consists of mobile medical care units: cars, motorbikes, boats, airplanes and helicopters. The ambulance services are organized as a part of the secondary health care system, i.e. they are part of the hospitals' pre-hospital unit. The helicopters are staffed with anesthesiologists, and the airplanes are staffed with specially trained nurses. The regular ambulances, that carry out the majority of the ambulance assignments, are usually staffed with emergency medical technicians (EMTs). It is a minimum requirement that the ambulance is staffed with at least one EMT, and that the other staff member is a health care professional with sufficient competence in emergency medicine. The EMTs have 2 years of upper secondary school and 2 years apprenticeship training and certification as health personnel. Some EMTs with additional, advanced pre-hospital training are called paramedics. It is optional to staff the ambulances with paramedics, according to regulations.

1.5 Knowledge about GPs and emergency medicine in Norway

Norwegian GPs encounter medical emergencies, to a varying degree, in most of their work. They will encounter this in their regular GP office, while on call at the casualty clinic, and when participating in ambulance call-outs. The few studies on GPs and emergencies in Norway are mostly focused on the work at casualty clinics, especially examining GP work when participating on call-outs. Studies have shown that the EMCC does not always alert the GPs about emergencies in their area. In 2010, GP participation in more than 5000 ambulance call-outs from three different EMCCs were examined, in order to find out how the EMCC administrated the red response situations (ambulance call-outs in suspected medical emergencies). In only half of these was the GP on call alerted as well, and the proportion of GPs alerted varied greatly between the EMCCs. The GP then took part in the ambulance call-out in about half of these cases, resulting in GP participation on a quarter of ambulance call-outs [25]. Another study, from 2015, aimed to assess how the casualty clinic physician decides whether to take part in an ambulance call-out. In this study, GPs that had been alerted by the EMCC in Bergen (western part of Norway) during a period of 108 days, filled out a questionnaire. They found that 65% of the GPs that were alerted took part in the call-out, but this study does not report whether there were many ambulance call-outs where the GP on call was not alerted. They also found that information about the patients' medical condition was important when the doctor decided to participate. Practical circumstances, such as other patients waiting or distance to the emergency event, were important when they decided not to participate [29].

An important argument for GP participation in emergency medicine is that the patient can be triaged on site by a physician. In 2009, Rørtveit et al. found that the GPs downgraded the severity of the patients' condition after examination in 43 percent of the cases, whereas they upgraded it in 11 percent of the cases. They also found that the emergency procedures done

by the GPs were basic practical procedures like venous cannulation, airway measures, including administration of O_2, ECG recording and monitoring of cardiac rhythm, and parenteral administration of drugs. This study suggests that the ambulance personnel and GPs have complementary roles during medical emergencies, and that GPs should participate in medical emergencies since they have the ability to obtain an overall view of the patient's condition, that the ambulance personnel does not have. An important limitation to this study is that it is based on data from a rural island of the coast of Norway, so care must be taken when generalizing the results [10].

In 2015, a government-appointed expert panel published an official Norwegian report (white paper) describing the pre-hospital emergency medicine system in Norway [1]. The report establishes that the pre-hospital theatre is expanding, and that more examination and treatment is now done outside hospitals. The GP-run casualty clinics were considered a weak part of the pre-hospital emergency system. The report suggested that the GP as a resource should generally be focused on the most severely ill patients, and that the GP should participate more often on ambulance call-outs and house calls. The expert panel stated that even if EMTs have become more skilled, they cannot serve as a substitute for GPs, especially when it comes to assessment of elderly and multi-morbid patients. They also hypothesized that more involvement by GPs in emergency medicine might lead to fewer hospital admissions. The report recognized that GPs and EMTs can form a good team to deal with pre-hospital emergencies, but that there is a need to develop their collaboration further. The report stated that there is too little knowledge about pre-hospital medicine in Norway in general, and on GP participation in emergency medicine in particular. The expert panel concluded that more publicly funded research is needed for quality to improve.

In February of 2018, the National Centre for Emergency Primary Health Care and the Norwegian Centre of Rural Medicine separately published reports describing the competence at the casualty clinics [30,31] in order to evaluate the effect of the EMS regulation that was introduced in 2015. As outlined above, only physicians that are GP specialists or in training to become a GP with a specified experience are "experienced GPs" and allowed to work without supervision. The centers were tasked with finding out how many of the casualty clinics actually managed to fulfill these requirements. These up-to-date reports show that casualty clinic work in Norway is usually carried out by local GPs, that the GP's experience varies and that several municipalities are struggling to implement supervision and team training, even though both are required by regulations [30,31].

1.6 Summary of knowledge and need for further research

We know how often GPs participate on call-outs, and we have some knowledge about rural doctors' contribution when they participate [10,25,29]. We also have some information about the doctors that work at the casualty clinics and what kind of medical emergencies they may encounter [10,30,31]. However, there is still a lack of knowledge about GP contribution and participation in pre-hospital emergency medicine [1,2]. In order to examine the utility of GPs in emergency medicine, we need to have a hypothesis about how and where the GPs contribute. Explorative studies, producing knowledge based on the perspective of the stakeholders, are a first step in this process, laying the ground for future observational or experimental studies.

2 Objectives

Overall aim and objective, to:

- examine GP participation and contribution in pre-hospital emergency medicine.

Sub research questions, to:

- explore EMTs' experiences with GPs in pre-hospital emergency medicine (Study I)

- explore GPs' experience of working in pre-hospital emergency medicine (Study II)

- examine GP participation in pre-hospital emergency medicine (Study III)

- examine factors associated with GP participation in emergency medicine (Study III)

3 Materials and Methods

3.1 How the project evolved

The project started by examining EMTs' experiences with GPs in emergency medicine. This was chosen because there was limited knowledge about GPs' participation in emergency medicine, EMTs often work together with GPs in this field, and because the EMTs' perspective on this had not been previously examined. A qualitative method was chosen since the objective was to study the EMTs' experience and perspectives, exploring an area with limited previous knowledge. Focus group interviewing is suitable because it is a pragmatic and still systematic way of gaining insights from different people, and suitable when wanting to explore common experiences, attitudes or views in an environment where people interact. The EMTs could then develop a group discussion mobilizing associations resulting in new reflections [32].

As the project evolved, it became evident that the issue of GP participation in emergency medicine was not sufficiently covered by Study I. Feedback from participants in Study I, colleagues and the scientific community made it evident that there was a need and interest for further knowledge, justifying turning it into a Ph.D. project. The benefit of further exploration of GP contribution and participation in emergencies was reinforced as the project coincided with the national expert panel working on the pre-hospital emergency medicine white paper, and the development of a new regulation of pre-hospital EMS.

The second study in the Ph.D. project examined the GPs own experiences with emergency medicine, to succeed the study of EMTs' experiences. This was also a qualitative study, based on focus group interviews. Rural GPs were included in this part of the project as a way to increase the probability of talking to GPs with experience from medical emergencies, as participation in ambulance call-outs was thought to be mostly a rural phenomenon.

The final study in the Ph.D. project, Study III, was chosen in order to examine GP involvement from another angel. The objective was to examine the total GP population in Norway and their experiences with participation in emergency medicine, and by doing so, complementing the knowledge from Study I and II. The GP perspective was still the objective, as the limited research in this field is largely based on data from EMCCs [25,29]. A survey was developed to map Norwegian GPs' participation in emergency medicine. Using a survey made it possible to study whether some of the results from examining EMTs and rural GPs in paper I and II were applicable to the general GP population. It was also an opportunity to test for associations between self-reported participation and characteristics of the GPs, and casualty clinics.

The project resulted in three papers; two qualitative studies based on interviews with EMTs and GPs, respectively, and a quantitative study based on a national survey of GPs. These papers have made up the basis for analysis and discussion in this thesis.

3.2 Study I

Participants:

In Study I, in-depth knowledge from EMTs working in rural areas with different levels of experience of working with GPs in pre-hospital emergency medicine, was of great interest. This was solved by using a homogeneous sampling strategy. This is a strategy where the purpose is to describe some particular subgroup in depth, which is well suited when sampling for focus groups [33]. In the paper from Study I, we have not described this strategy in detail but add it here for further information. I contacted the head of the four different ambulance stations by email. Three of the stations were located more than two hours' drive from the nearest hospital. One station that was closer to a hospital was also included, in order to see if they had different experiences there. All four stations accepted the invitation, resulting in four focus group discussions. The interviews were carried out in the fall of 2012, during working hours at the ambulance station. This strategy was chosen because it would be the most convenient for the EMTs, thereby improving attendance, resulting in a higher possibility of reaching EMTs with different levels of experience. Between five and seven participants was the aim when recruiting, as recommended in literature [32]; but all personnel at the station were invited to take part. The focus groups ended up having between five and nine participants, and their work experience varied from less than one year to more than 10 years. Some of the participants were actually on duty while participating, while others were not. On-

duty personnel was included to ensure enough participants. Although this resulted in some minor interruptions and disturbances, the interviews went according to plan.

Data collection:

The research group had developed an interview guide based on clinical experience, discussion with EMTs and GP colleagues, and relevant literature [34]. The interview guide was adjusted after each interview based on the new information, in accordance with the tradition of qualitative research [35]. I, Magnus Hjortdahl, did the interviewing, while co-supervisor Erik Zakariassen observed, took notes and had the opportunity to pose follow-up questions. In the first interview, Professor Torben Wisborg also observed, in order to give feedback on interviewing technique. Torben Wisborg is a professor of emergency medicine with previous experience with focus group interviews. The interviews were tape recorded, transcribed by a secretary, and finally Magnus Hjortdahl proofread them. Data collection ended after four interviews, as preliminary analysis indicated that there were sufficient data to answer our research question, and similar patterns started to emerge.

Analyses:

The transcribed interviews and notes taken during and after the interviews were analyzed using systematic text condensation, as described by Malterud [35]. This method of analysis was chosen because it is a straight forward, systematic, and a step-by-step way to create categories of knowledge from data. The method aims to elicit meaning-based units, i.e. what interviewees express as significant and meaningful. It was also chosen because the research group had previous training and expertise in using the method. First, the transcripts were read through to get an overall impression. Then meaning units, text that contained information about EMT experiences with GPs in emergency medicine, were identified and sorted. For example, this could be an EMT describing why he thinks it is reassuring when the GP

participates on a call-out, or when the EMT tells us a story about when he had to give medications that he was not allowed to give, since a GP was not present on a call-out. The units were then coded, given a name, and the codes were grouped. The content of each group of codes was then condensed, giving us generalized descriptions about the EMTs' experiences. Finally, the contents of each group were summarized into generalized descriptions of different aspects concerning GPs in emergency medicine, as experienced by EMTs. Each step of the analysis was discussed in the research group. During this process, the group repeatedly went back to the transcribed interviews and field notes to make sure that the interpretations were consistent with the views of the informants.

3.3 Study II

Participants:

In Paper II, the goal was to gain insight into GPs' experiences with emergency medicine - a perspective that has not been explored previously. Focus groups were again chosen as a method as it is suitable when common experiences and attitudes in an environment where people interact is explored, and since group dynamics can led to extra information [32]. Homogeneous sampling strategy was used to recruit GPs with experience from emergency medicine. In the paper from Study II we have not described this strategy in detail, but add it here for further information. The research group had a hypothesis, that rural GPs are more often involved in medical emergencies that GPs in urban areas. GPs from rural areas in different parts of Norway were therefore invited to participate in the focus group interviews, as a strategy to increase the likelihood that the GPs interviewed actually had experience with medical emergencies. As in the previous study, the aim was to recruit between five and seven participants in each group as this is recommended in the literature. Four focus group

interviews were conducted during the winter of 2015. Recruiting GPs with different levels of experience was done in order to get diversity in the groups, resulting in richer data [32]. The first group consisted of young GPs that met regularly as a part of their specialist training. The other three groups were made up of doctors working at three different casualty clinics in Norway. Contact was established through the GP in charge of the casualty clinics.

Data collection:

An interview guide was developed based on clinical experience, information from Paper I, discussions with colleagues, and relevant literature [1]. The interview guide was revised after each interview, in light of the new information obtained during the interviews. Magnus Hjortdahl conducted the interview, while supervisor Peder Halvorsen observed, took notes and had the possibility to pose follow-up questions at the end. Professor Mette Bech Risør observed the first interview, giving feedback on how the interview was conducted. Mette Bech Risør is a professor of medical anthropology, with extensive experience from qualitative research. The interviews were tape recorded and transcribed verbatim by Magnus Hjortdahl. The research group discussed the contents of each interview after it was completed. Gradually the same themes appeared in the GPs' experiences, and we sensed that there was sufficient data to answer the research question. As a result, we concluded the data collection after four interviews.

Analyses:

The transcribed interviews, supported by field notes taken during the interviews, were analyzed using thematic analysis [37]. This approach was chosen as it produces both themes and links between themes, often resulting in a coherent story. Connections in the way the GPs thought about participation could be pursued, not merely single-standing categories. The

approach is also flexible as it can be tailored to e.g. a theoretical or inductive approach during analysis, and the data can be analyzed at different levels [37].

The analysis follows a number of steps. Step one was to get familiarized with the data. This process started during interviews, continued by transcribing the data, and finally by reading through the data several times. Codes that identify interesting features in the data were then inductively identified. The coding was also theory driven to some extent, as the research group already was familiar with this field. After the data was coded and collated, themes were developed according to dominant patterns. The codes were then sorted into the different themes and the themes were reviewed. In this process some themes were merged, and others were no longer themes. In this process the research group read through all the collated extracts for each theme to see if they formed a coherent pattern. The entire data set was then re-read to see if the themes agreed with the data and to recode additional data that was missed earlier in the process. The themes were then defined and named, writing a detailed analysis for each theme. Finally, the paper was written, using the themes, subthemes, analysis and data extracts. Peder A. Halvorsen, Mette Bech Risør and Magnus Hjortdahl, all took part in all the stages of analysis.

3.4 Study III

Survey:

The aim of Study III was to examine GP participation in emergency medicine, and to examine the characteristics of the GPs and casualty clinics associated with the GPs' involvement in emergency medicine. To reach this aim we developed a survey, based on the information in Paper I and II, literature and on the research group and colleagues' experiences. We then discussed the questionnaire with Dorte Gyrd-Hansen, professor of health economics,

Department of Public Health at the University of Southern Denmark. The survey was piloted on a group of GPs in the town of Alta.

Participants:

All the GPs that were registered as regular GPs by Norwegian Health Economics Administration (HELFO database) (n=4701) were invited to participate in an online survey. The GPs were invited by mail in August 2016. They also got two reminders by mail. To further boost recruitment, the Norwegian Center of Rural Medicine provided news coverage of the study, which was posted twice on a Facebook group for Norwegian GPs with more than 3000 members, and on their homepage. Response rates increased considerably in the days following the Facebook posts.

Data collection:

In an online questionnaire (Appendix 1), GPs were asked to report their perceived role in emergency medicine, frequency of on-call duty and participation in call-outs, as well as sociodemographic data and characteristics of the casualty clinics. The GPs were invited by mail, and were given a link which could be used to log on to the web-based questionnaire. We used Questback to provide the web-based questionnaire. Questback is a Norwegian company that has designed a web service where you make a survey online, invite people to participate by going to a webpage, and then get the results as an SPSS file afterwards.

Outcome measures:

”Participation” was measured in terms of three items regarding perceived role in emergency medicine (measured on a Likert scale anchored at 1 (small degree) and 6 (large degree)), frequency of on-call duty (response options: weekly (1), monthly (2), twice a year (3), once a

year (4), and not at all (5)) and frequency of participation in ambulance call-outs (response options: “not relevant” (1), “never” (2), “25%” (3), “50%” (4), “75%” (5), and “always” (6))

Independent variables:

GP characteristics included; age, gender, specialist status and number of patients listed. Attributes of the casualty clinic included; distance to nearest hospital (more or less than an hour), type of casualty clinic (large city casualty clinic, intermunicipality clinic or in a casualty clinic serving only one municipality), staffing at the casualty clinic (whether there was more than one GP working at the same time, whether there was an extra GP at home on standby, and whether there was nursing staff present at the clinic), whether the GP had a dedicated emergency vehicle when working at the casualty clinic, whether the clinic was co-localized with the ambulance service, and whether the casualty clinic held training exercises with other emergency personnel.

Analyses:

Descriptive data of the GPs was presented in terms of means and percentages. Multivariable logistic regression was used to explore possible associations between the independent variables and our primary outcome measures. The outcome variables were dichotomized for these analyses. For frequency of on-call duty, “weekly” and “monthly” were counted as “regularly” whereas “twice a year”, “once a year” and “not at all” were counted as “not regularly”. Taking part in ambulance call-outs was dichotomized into “usually taking part in call-outs” and “usually not taking part in call-outs”. Taking part in “75 percent” or “always taking part” was counted as “usually taking part in call-outs”, whereas “not relevant”, “never”, “25 percent” and “50 percent” were counted as usually not taking part in call-outs. Finally, perceived role in emergency medicine was dichotomized into “playing a large role” and “not playing a large role.” Answering 1, 2, 3 and 4 on the Likert scale was counted as

"not playing a large role". Answering 5 or 6 on the same scale was counted as "playing a large role". Analyses was carried out using IBM SPSS Statistics 23. P values <0.05 were considered statically significant. Magnus Hjortdahl and Peder Halvorsen analyzed the data independently.

3.5 Ethics and Approvals

Study I was presented to NSD - Norwegian Centre for Research Data, they decided that the study was not to be subject to notification (Appendix 2: letter dated 02.08.12). Study I was also presented to REC North (Regional committee for medical and health research ethics, North). They decided that the study did not require approval from REC (Appendix 3: letter dated 29.06.12). As Study II was designed similar to Study I, we concluded that Study II did not need approval from NSD or REC. Study III was subjected to notification at NSD (Appendix 4: letter dated 22.06.16). Study III was not presented to REC, as these types of projects are not required to be assessed by REC.

4 Results

4.1 Study I

In Study I, we examined EMTs' experiences with GPs in emergency medicine. Our analysis produced four major analytical categories : an important supplement, suboptimal care, dysfunctional GPs and perfecting cooperation.

An important supplement

The EMTs told us that they had evolved as a profession over the last years and could now manage a variety of medical emergencies. Despite this, they had experienced the need for GP participation. Important GP contributions were clinical judgment and decision making regarding diagnoses, treatment and whether to admit the patient. GP presence was felt to be of special importance when the patients were children or had psychiatric conditions. The EMTs found that their practical skills complemented the GPs' knowledge and leadership. Bringing the GP to the patient was also thought to improve the quality of healthcare given, since treatment could be given right away and patients could be driven directly to hospitals when needed, without a time-consuming detour to the casualty clinic.

Suboptimal care

There were several examples of how the absence of GPs on call-outs had led to delay in diagnosis and treatment. Tending to critically injured patients on their own was described as stressful, resulting in discomfort for the EMTs. In other examples, waiting on the GP before driving to the patient was seen as annoying because they would get to the patient later than necessary.

Dysfunctional GPs

Sometimes the EMTs perceived the GPs as being a burden on ambulance call-outs due to limited knowledge or interest in emergency medicine. The EMTs also described problems with GPs that did not know the geography, or had difficulties communicating with the patients and the EMTs.

Perfecting cooperation

The EMTs thought that the GPs who worked in casualty clinics and participated in ambulance call-outs should have knowledge and experience with pre-hospital EMS. The EMTs wanted

GPs on one side to be humble and open to the EMT's input, and on the other side, be able to sit down and explain complicated theory to the EMTs when needed. They believed that GPs and EMTs should take part in regular interdisciplinary training, since they had found that this led to better cooperation. They were dissatisfied that not all GPs took part in this training, and that these training schemes often had terminated over time.

4.2 Study II

In Study II we explore GPs' experience of working in pre-hospital emergency medicine. Our analysis produced the following themes: a) Emergency medicine is now dominated by other professions, b) GPs are still an important part of local emergency medicine and c) The decision whether to leave the casualty clinic is difficult.

Emergency medicine is now dominated by other professions

The GPs had experienced that EMS organization had changed, and that the GP now played a less important part. Salient reasons were better trained and equipped EMTs, the increased availability of HEMS and new guidelines. Furthermore, some municipalities had chosen to organize the casualty clinics in a way where the EMTs were left to handle all emergencies by themselves. These changes resulted in less experience and in turn less confidence in emergency medicine for the GPs. That EMTs tend to medical emergencies on their own was thought to be safe by the GPs, but they also thought that treatment improved when EMTs and GPs tended to patients together. Interdisciplinary training, together with EMTs, was suggested as a solution to the problem of diminishing experience.

GPs are still an important part of local emergency medicine

The GPs described taking part in emergencies as an innate and interesting part of being a rural GP. They also had the sense that the local community expected and appreciated that they participated in emergencies. The GPs thought that the quality of emergency medicine improved when they participated as they were better at diagnosing, medication could be given earlier, patients could be admitted directly to the hospital if needed, or else allowed to stay home when admission was not needed. The GPs emphasized that they participated in emergencies in several ways apart from attending ambulance call-outs, e.g. by advising EMTs and others by phone, and seeing patients at the casualty clinic.

The decision whether to leave the casualty clinic is difficult

The GPs told us that they thought it was difficult to decide when to participate on ambulance call-outs. They also had different opinions about when to participate. Some reasoned that the patient in the call-out might be the sickest, and therefore warranted GP participation. Others argued that EMTs handle most cases well by themselves, and that casualty clinics need the GP in order to be functional. The GP told us that they wanted more information from the EMCC before deciding whether to participate, but in the end they had difficulties specifying what kind of information they would want. However, they usually participated when the EMCC information had dramatic content. The GPs often disagreed with the EMCC triage, and argued that the local GP should decide whether to participate on ambulance call-outs.

4.3 Study III

Characteristics of respondents

1002 GPs returned our questionnaire, resulting in a response rate of 21%. Our respondents were fairly representative of Norwegian GPs in general, but differed slightly in some ways:

The mean age was somewhat lower (45 vs 48 years), the proportion of females was slightly higher (44 vs 41 percent), the mean GP patient list was slightly shorter (1044 vs 1128), the proportion of GP specialists was slightly higher (57 vs 53%). 26% of our respondents worked more than an hour by car from their local hospital, which means that rural GPs probably were somewhat overrepresented.

GP participation in emergency medicine

Forty-six percent of our respondents perceived that they had a large role in emergency medicine (5 or 6 on a scale from 1=very low to 6=very high). Sixty-three percent of the GPs reported that they were on call regularly (weekly or monthly) whereas 28 percent usually participated in ambulance call-outs when alerted by the EMCC (75 and 100 percent of the time).

Associations between GP's participation in emergency medicine and casualty clinic characteristics

Working at a casualty clinic that held multidisciplinary team training was strongly associated with all of our outcome measures. The perception of playing a large role in emergency medicine was also associated with working a long distance from the hospital, and working with no nursing staff. Being on call regularly was also associated with working at a casualty clinic staffed with only one full or part-time physician, and with working at a casualty clinic with no nursing staff. Taking part in ambulance call-outs when alerted by the EMCC was also associated with working in a municipal casualty clinic, working without a GP on standby, and working with no nursing staff.

5 Discussion

5.1 Summary of main results

According to our informants, pre-hospital emergency medicine in Norway has evolved, and now consists of several professions in addition to the GPs. In spite of this, EMTs and GPs find that GPs play an important role in emergency medicine, and that patient treatment improves with GP participation. GPs and EMTs are believed to have different and complementary skills, and participating in call-outs is also seen as an important learning arena for GPs. Our findings indicate that GPs participate on several different arenas, in the GP office, casualty clinic duty and on ambulance call-outs. The EMTs and GPs recommend participation in multidisciplinary team training, and this type of training is strongly associated with GP participation in emergency medicine.

5.2 Discussion of results

In the following section, I will discuss my results in light of current events, relevant theory and empirical studies. Instead of doing a point-by-point discussion of my results, as done in the articles, I have chosen to expand the discussions in the articles by focusing on the two aims of the thesis, contribution and participation. In part one of the discussion, I argue that expected utility theory can be used when deciding how to utilize resources in healthcare, in this case GPs in emergency medicine. In order to use this theory, one needs knowledge about contribution. I then discuss how my results are relevant when exploring contribution, and share my opinion on how further research into GP contribution could be performed. In the second part of the discussion, I focus on team work. I have chosen this perspective because team training was found to be strongly associated with participation in the survey, and teamwork was a recurring theme in the focus group discussions. I argue that GPs are part of

teams in the different specters of emergency care, and that training in teamwork is shown to improve healthcare. Finally, I speculate how the size and localization of casualty clinics may affect GP participation.

5.2.1 GP contribution in light of expected utility theory

Current issues concerning GP contribution in emergency medicine

GP contribution to emergency medicine is currently an issue in Norway and in other western countries. The Norwegian government recently announced that they will pilot a new way of organizing local emergency medicine in rural areas [2]. In the new system, GPs will be replaced by other health care professionals, such as nurses or EMTs already present in the community, as the first point of contact. The argument for introducing this new level of healthcare is, according to the Norwegian Directorate of Health, that it is difficult to recruit GPs in general, and GPs with formal qualifications to do unsupervised duty at casualty clinics in particular, that GPs do not participate enough in emergency medicine, and that casualty clinics are centralizing. This new organization may result in an emergency medicine service without GPs in rural areas. A similar example of task shifting has been introduced in the UK, where a new law in 2018 allows specially trained paramedics to prescribe medications such as painkillers to patients with lower back pain, and antibiotics for urinary tract infection [38]. This is done in an effort to unburden hospital emergency departments, but will probably also be used as a substitute for GP appointments. The Norwegian pilot is in contrast to how western countries, including Norway, have previously introduced GPs into emergency medicine, in order to relieve other parts of the emergency medical services [14,15]. Based on these current issues it is relevant to discuss GP contribution, as this knowledge is vital in order to make the right decisions on the use of GPs in emergency medicine.

The use of GPs in emergency medicine in light of expected utility theory

The decision of whether inhabitants should be served by local emergency medicine service staffed with GPs or not, or whether GPs should allocate time to work in casualty clinics or take part in ambulance call-outs, can be analyzed using expected utility theory. This is a theory of how we should make decisions under uncertainty. The theory assumes that individuals and society aim to maximize good outcomes (wellbeing, welfare), i.e. utility in economic terms [39]. In order to calculate the expected utility, we need to know the available options (for example using a GP or not using a GP), the outcomes that may follow form each option, the probabilities of these outcomes, and finally the value (utility) of each outcome. The value of health outcomes is often measured in terms of quality-adjusted life year (QALYs) [40]. QUALYs are based on the assumption that number of years alive and quality of life are core values in society, and they are fundamental in health economics. Once we know the probability and the value of the outcomes, we can calculate the expected utility of each option and choose a course of action accordingly. Expected utility theory is a normative decision theory, as it prescribes how we should act. This is in contrast to descriptive theories, which aim to explain what we actually do.

Arguably, GP time is limited and the health authorities have to decide to what extent they want GPs to participate in medical emergencies. The following analysis, albeit crude, may serve as an example of how expected utility theory could inform this decision: When the emergency medical communication center (EMCC) suspects a potentially life-threatening situation, they have two different courses of action. They can include the local GP in the call-out, alternative 1, or they do not include the GP, alternative 2. In both alternatives, the patient can either live without sequela, live with sequela, or die. If we know the probabilities and QALYs associated with the different outcomes, both with and without a GP present, and summarize all ambulance call-outs over a given time, we may calculate the QUALYs gained

by GP participation. Next, we calculate the extra cost of GP participation, and consequently the cost per QUALY gained. This can then be compared to QUALYs gained using GP time for other purposes; GP time spent on call-outs has opportunity costs, ie. the alternative activities foregone when GPs spend their time on call-outs. A similar analysis could be used to examine whether the GP, as a health care resource in the local community, would on average do more good spending time in her regular daily practice, rather than in emergency clinics. In principle, the theory could even guide the individual GP's decision whether to participate in call-outs when alerted. Due to time constraints it would be impracticable for the GP in each particular case, but such analyses might inform the development of guidelines.

The findings presented in this thesis are of course insufficient to inform an expected utility theory based analysis. However, we encountered in the interviews that the GPs argued in terms of opportunity costs when considering whether they should stay at the casualty clinic or participate on call-outs. They argued that they contributed more by seeing patients at the casualty clinic than on call-outs since the casualty clinic could not function without a GP. Other GPs, however, argued that they contributed more by taking part in call-outs, as it was more likely that these patients were ill and in need of a doctor.

Furthermore, my thesis (and previous studies) may suggest a good starting point for systematic, large-scale assessment of the utility of using GPs in emergency medicine, as this was a recurring theme in both the EMT and GP focus group discussions. The participants told us that health care improved with GP participation, as he/she could contribute with a more specific diagnosis, and better decision making concerning potential hospital admittance and treatment. However, we also encountered GPs at different casualty clinics that argued that many of the patients could be safely seen by EMTs alone on call-outs. On the other hand, the EMTs told us that they wanted the presence of a GP when responding to children and psychiatric patients, and also when the patients did not respond to their standard treatment

regime. My interpretation of the information from the GPs and EMTs is that they believe that EMTs are capable of handling most life-threatening cases without GPs, by complying with their guidelines. But, they also believed that treatment improves with GP participation, which might be explained by the fact that most medical emergencies are not life threatening, and in these cases, the GP's skills complement EMT guidelines. However, this is explorative data, so we cannot draw inferences on GP utility based on my studies. Yet, my results could be useful when designing further studies. If, for instance, Norway considers allowing paramedics to prescribe drugs like antibiotics and painkillers, it could be relevant to let expected utility inform the decision. However, in order to do this we need data that proves that GP participation leads to better (or worse) treatment, for instance appropriate hospital admittance, adherence to guidelines, on-scene times or patient satisfaction, and ultimately, gains in quality and length of life.

There are, however, limitations to using expected utility theory as in these examples. First, it can be seen as an oversimplification of a complex reality. It is seldom that one course of action is the only reason for an outcome, and the causes can be causally connected in complex ways. If it is too theoretical and removed from context, one could argue that it is of little practical use. Another dilemma is that in order to use the theory you have to use outcomes that can be measured, and there might be several positive (or negative) effects of GP participation that are difficult or impossible to measure in terms of QUALYs.

For instance, some might argue that it is difficult to measure whether GP participation in emergency medicine in rural area gives the inhabitants a sense of security. The fact that local health care resources give a sense of security valued by the community, is a recurring theme when health care services are centralized. This sense, that local resources provide safe care, is often at odds with recommendations from the government and experts, who say that

centralization results in better and safer services. This suggests that the feeling of safety in the community is poorly accounted for by the expert definition of utility.

Another perspective that has gotten little attention in this field, is the perspective of the patient. The GPs we interviewed suggested that the patients appreciated that they participated in emergency medicine. One could speculate, like the GPs in Study II did, that bringing the GP home to the patient might be gentler for the patient. However, we do not really know what the patients think. Does it matter to the patient whether a GP participates in emergency care? To what extent does it actually matter to a father whether a nurse, an EMT or a GP, examines his child? It is a paradox that we do not have the answer to these questions while the patients' values and preferences are in focus, nationally and internationally.

Empirical studies relevant for GP participation in emergency medicine.

It is often difficult to assess the severity of the patient's condition in pre-hospital emergency medicine. This is often the case if you examine or get information concerning the patient early on during the course of the disease or injury, since many cases are similar at the onset. To determine whether the patient will become critically ill or not, is indeed a judgment made under uncertainty. An example of this, is the study from an island in western Norway where emergency calls were reassessed by the local GP. The GP downgraded 43 percent and upgraded 11 percent of the patients after examination [41]. This study suggests that it is difficult to triage patients, especially by phone. A study on pre-hospital management of stroke in Norway from 2017, found that healthcare personnel answering the phone at doctors' offices had difficulties identifying stroke, when the symptoms were not clear cut. The stroke study is another example of challenges assessing patients in pre-hospital emergency medicine [42]. Finally, a recent study of pre-hospital trauma care in Norway showed that only 50 percent of

severely injured patients were offered advanced pre-hospital care by HEMS, and problems with precision in dispatch was thought to be one of the main reasons for this. This indicates that in trauma, as well as in medical emergencies, it is difficult to determine the severity of the patients early on [43]. When we interviewed the GPs, we heard that they thought it was difficult to decide when to participate on call-outs based on limited information from the EMCC. The GPs also struggled to identify what information that would simplify this decision. I speculate that this can be another example of how difficult it is to assess patients based on limited information. The difficulty of assessing patients in emergency medicine can be used as an argument to include local GPs in emergency medicine as they are, according to our informants, better at diagnosing patients.

In most emergency alerts, the patient turns out to be in a non-life-threatening situation with no need for advanced medical procedures. For example, in a large epidemiologic study of red responses, 90 percent of the problems were medical, and 70 percent of the patients were in a non-life-threatening situation [44]. A similar picture was found in a study of patients treated by anesthesiologist-manned helicopters and rapid-response car service in the western part of Norway, where only 7% of the patients were in need of advanced medical procedures [45]. GPs are trained in treating general, unselected and non-life-threatening conditions, while EMTs are largely trained to focus on a few life-threatening conditions. It is also relevant that GPs see far more patients every day than EMTs, and therefore have greater experience with patient examination. The fact that most emergency situations are not life threatening, may explain why the EMTs and GPs we interviewed argued that GP involvement improves patient care by complementing EMT skills.

Even though most medical emergencies are not life threatening, others may argue that life-threatening medical problems should be the basis for organizing emergency medicine. As the treatment of life-threatening conditions often follows pre-planned treatment algorithms, one

could argue that there is less need for doctors in emergency medicine. This argument rests on the assumption that the patients will be treated by highly trained EMTs. Yet, the GPs we interviewed found that they played an important role in life-threatening situations as well. This experience may be influenced by the fact that we interviewed rural doctors. For example, the GPs argued that they played an important part in local emergency medicine since they occasionally were the only emergency resource available in the community. They also experienced having patients with life-threatening conditions turn up, directly at the casualty clinic. This was seen, by the GPs, as another example of why rural doctors cannot be excluded from emergency medicine. The GPs also told us that as there are limited pre-hospital resources in rural areas, they might also contribute with an extra pair of hands, in for example cardiac arrests. As medical emergencies are rare, and few people live in rural areas, the EMTs as well as GPs, will have limited experience treating these patients. As an example, ambulance personnel in the northern counties of Norway will on average participate in one ambulance call-out every sixth day of working [46]. Therefore, I argue that all local resources, including GPs and EMTs, should be utilized in life-threatening situations, to compensate for the limited experience of the individual professional. According to the GPs we interviewed, GPs in rural areas play an important part in life-threatening situations as well, contributing with experience and extra hands.

Another GP contribution in emergency medicine, is the role of the gate keeper. In this system, the patient has to see a GP first. The GP will treat most patients by himself, and refer only the patients that need to see a specialist. An example of this in our study, was that EMTs and GPs described how patient treatment improved with GP participation on call-outs, since hospital admittance was avoided in selected cases. The system of gate keeping is thought to be a more efficient use of resources, letting the specialist focus of the more complex cases [47]. According to expected utility theory, this could be an example of maximizing the utility by

being cost effective. In Norway, the casualty clinic GPs will treat and discharge most of their patients, leaving the hospital EMS to take care of the potentially life-threatened situations [1]. This has been one of the main arguments for GP-run casualty clinics in Norway, and is now also being tested in several other countries. It is possible that a new system, with emergency medicine delivered by non-physicians, might lead to more patients being admitted to hospitals, crowding of the EDs, costing more money, and resulting in poorer health care. On the other hand, the gatekeeping system is controversial as it is claimed to delay diagnosis and be a hindrance to shared decision making [47]. It is therefore possible that too few patients are admitted to hospitals, and that removing the gate keeper function would actually improve the healthcare. However, it is shown that countries that have strong primary healthcare services also have the best health among inhabitants, and a strong equity of healthcare [48].

It is also relevant to examine emergency medicines' place in general practice. Although the GPs we interviewed, and 46 percent of the GPs that participated in the survey, experience playing a large role in emergency medicine, this contribution comes at a price. It is currently a growing concern that GP are exhausted by too many responsibilities. Consequently, experienced GPs quit the profession, while young doctors are reluctant to become GPs. This is a cause for concern, since a failing primary healthcare system can topple the healthcare system as a whole [48]. Taking part in medical emergencies and working at casualty clinics on top of working as regular GPs, are some of the strains that GPs face [49]. A survey of Norwegian GPs from 2012 found that most Norwegian GPs find emergency medicine meaningful, but they want to spend less time on it [50]. It is, therefore, relevant to examine GP contribution in emergency medicine further, and then discuss if this contribution is so important that it justifies the extra workload.

A challenge when examining utilization of GPs in light of empirical studies, is the lack of evidence in this area. This lack of evidence, as reported by the Norwegian expert panel and

the Norwegian Knowledge Centre for the Health Services, is not only a national problem [1,2]. Several systematic reviews of organization and utilization of physicians in emergency medicine could not conclude because of lack of studies. In 2017, a Cochrane review aimed to assess the quality of care and patient satisfaction in walk-in clinics [51]. This was because of a growing concern of the clinical efficacy of these, often nurse run, clinics compared to primary care practices or emergency rooms. This review, which is relevant when considering the new non-physician based emergency medicine providers in rural Norway, could not identify any articles that fit the study criteria. A similar Cochrane review from 2018, examined the safety and efficiency of using primary care providers (GPs and nurse practitioners) in emergency rooms [52]. This study was conducted because several hospitals are introducing primary care providers in emergency rooms to mitigate problems with overcrowding. The study could not conclude either, because of lack of studies. Finally, there has been a long-lasting international discussion about the use and utility of emergency physicians, including the use of HEMS versus EMTs and ground-based services in pre-hospital emergency medicine. These discussions, which can be viewed as an equivalent of the national discussion about utility of GPs in emergency medicine, have not reached a clear conclusion [53,54]. The authors point out several challenges when designing these types of studies. Since few patients actually are in a life-threatening situation, it will be difficult to design studies with sufficient power to detect differences in terms of mortality or quality of life. As there are several different units that take part in the treatment, it is difficult to pinpoint how a single part of the chain affects the outcome. Furthermore, the difference in organizing EMS systems makes it difficult to compare, and ethical considerations can make it difficult to do randomized controlled trials [54]. Although these reviews do not explore the utility of GPs in pre-hospital emergency directly, they illustrate how the heterogeneity and complexity of EMS systems make it difficult to obtain the data we need to make good decisions [55].

5.2.2 GP participation, with emphasis on team work and interdisciplinary training

The official policy in Norway, is that GPs are an important part of pre-hospital emergency medicine, that casualty clinics should be run by GPs, and that GPs should participate in ambulance call-outs when on casualty clinic duty. Given this perspective, and in light of the results in Study I and II suggesting that GP participation improves patients' treatment, according to EMTs and GPs, it is relevant to explore which factors that may be associated with GP participation. We explored these factors in the survey in Study III. As we found a strong association between interdisciplinary team training and GP participation, I have chosen to discuss the GP's role as a team player and the rationale for interdisciplinary team training. Finally, I will briefly present the possible association between GP participation, and casualty clinic size and location.

Current trends related to teamwork and interdisciplinary team training

Pre-hospital and in-hospital emergency medicine has evolved over the last decades. Diseases where only symptoms used to be treated, like cardiac infarction or stroke, are now cured by giving advanced treatment, both pre-hospital and in-hospital. There has also been a change in who delivers the advanced pre-hospital care. A number of different professionals with different expertise work together as a team in order to give the patient optimal treatment. This may include EMCC, GPs, casualty clinic nurses, EMTs, helicopter personnel and other healthcare and emergency personnel [1]. The GPs that participated in our interviews described this evolution. They told us how their role in emergency medicine had changed over the last decades, from being the single provider of emergency care to now having to cooperate with a number of different professions. The EMTs also described a change, from only transportation of patients to now being an important resource in emergency medicine. Increasingly, team work is becoming the norm in hospitals as well as primary healthcare. In

Norway, new kinds of teams are being introduced in primary healthcare, outside of emergency medicine, such as “primary health teams” and “follow-up teams”. Since pre-hospital EMS has evolved into an interdisciplinary field, it is now required by law that the professionals working together in pre-hospital emergencies also have to train together. The training will usually involve casualty clinic personnel and EMTs, but other professionals can also participate when relevant. About half of Norwegian casualty clinics reported that they carried out interdisciplinary team training in 2016 [31].

Teamwork in healthcare

A team can be defined as two or more people working together to reach a common goal. They have task-specific competencies, specialized work roles and shared resources. The members in a team have to communicate with each other in order to coordinate and adapt to change. Medical teams, especially in dynamic domains such as emergency medicine, often work under changing conditions, may be assembled ad hoc, have changing team membership, and often only work together for a short time. These teams often consist of several specialist crews, and have to integrate different professional cultures. These kinds of teams are often called action teams [56,57]. The EMTs and GPs we interviewed described how they, as different professions with different and complementing knowledge and skills, worked together when they treated patients that were in potentially life-threatening situations, and by doing so, working as an action team. They believed that the quality of healthcare improved when the patients were seen by both professions. They also commented that it was important to know each other in order to work well together.

One can argue that most emergency medicine cases are not life threatening, and that the GP then works by himself and not as part of a team. Even though the GP often sees the patient by himself, in these non-life-threatening emergency situations, there are usually a number of

other people involved. The patient or relatives might have talked to nurses or other staff before seeing the GP. The GP may need assistance from other healthcare personnel while examining and treating the patient. Sometimes, the GP has consulted a specialist at the hospital. Other times, homecare or nursing home personnel get involved in the treatment and follow up. EMTs are sometimes included in these non- life-threatening situations as well, as they assist with transportation. One could also argue that relatives, and the patients themselves, are members of the team [58]. All these people, with different competencies, work together in order to achieve a common goal – i.e. the best possible treatment. This team also has several of the characteristics of an action team, as it is made up ad hoc, and might only work together for a short time.

Empirical studies about teamwork and team training.

There is growing evidence of the positive relationship between teamwork and quality of healthcare. A review of research on teamwork in highly dynamic domains of healthcare found a relationship between teamwork and patient safety [57]. Teamwork was found to play an important role in the causation and prevention of adverse events, and staff's perceptions of teamwork and attitudes toward safety-relevant team behavior were related to the quality and safety of patient care [57]. The relationship between teamwork and quality of healthcare was also present in our interviews, as the EMTs and GPs found that they contributed with different and complementary skills and knowledge, resulting in better treatment when both professions participated.

Recent research has demonstrated the relationship between team training and improved patient outcomes. A study from Scotland, found that regular in-situ training of pediatric medical emergency teams leads to improved response to deteriorating patients by healthcare providers, improved outcomes in intensive care, and financial savings [59]. In another study,

implementation of team training was associated with fewer serious complications and lower mortality in critically ill patients [60]. Similar results are emerging in Norway. A study of interdisciplinary team training of pre-hospital emergency teams in northern Norway, consisting of casualty clinic nurses, GPs and EMT personnel, found that this way of training is a good arena for learning, resulting in social and structural improvements [61]. A survey of team training participants in the same area, reported a significantly improved confidence in their own role and the correct order of necessary procedures [62]. Furthermore, taking part in simulation-based training was found to be an important success factor when analyzing the pre-hospital and intra-hospital response to the grave terror incident in Norway, July 22nd, 2011 [63,64]. The usefulness of interdisciplinary team training also emerged as a theme when we interviewed the EMTs and GPs. Taking part in interdisciplinary team training was put forward as a way to improve cooperation and teamwork. Some of the GPs explained how training was an important arena for getting acquainted with the EMTs. There were GPs that felt that medical emergencies were rare, and that their limited experience made it uncomfortable to participate in emergency situations. Taking part in team training was seen as a solution to this problem, reducing the anxiety of participating in ambulance call-outs. When interviewing EMTs, team training was suggested by several EMTs as an important way of improving patient treatment, since it would let the different professions learn and respect each other's knowledge and capabilities. Many of the ambulance stations and casualty clinics had participated in this type of training, but several of them had phased it out over time. This fits with our findings that only 28% of the GPs in our survey reported that their local casualty clinic arranges this type of training annually.

Interdisciplinary training was also the strongest predictor of participation in emergency medicine among the GP respondents in the survey. This is an important new finding, as it indicates that team training might influence the quality of healthcare by affecting the

resources that respond to medical emergencies. However, given the study design, I cannot prove that team training leads to increased GP participation. But given the strong association and known positive effects of team training, it appears reasonable to investigate this link further.

The EMTs and GPs we interviewed told us about the evolution of pre-hospital healthcare and how they now often worked as a team in the life-treating situations. Arguably, GPs take part in several different teams when they participate in emergency medicine, not just in the life-threatening situations. Team work is increasingly the norm in healthcare in general, and as team training is not only mandatory by regulations, but also associated with better patient care and involvement, more pre-hospital EMS personnel should participate.

Increased participation at smaller casualty clinics

GP participation in emergency medicine, defined by us as frequent casualty clinic duty, participating on ambulance call-outs, and perceiving to play a large role in emergency medicine, was also associated with working at a casualty clinic without other healthcare personnel. A possible explanation for this association is that it is the absence of other healthcare personnel that leads to increased GP participation; when you are the only healthcare personnel present, you may feel that you are a vital part of local emergency medicine.

Another explanation might be that casualty clinics without allied health care professionals are smaller, and that this, rather than the absence of other professionals per se, explains the association with participation in emergency medicine. However since we did not ask about number of inhabitants served by the clinic, or the population of the municipality, it is not

possible adjust for this. In areas with small populations, there will be fewer GPs to share the casualty clinic duty, resulting in more frequent casualty duty for the individual GP. Casualty clinics in areas with small populations also often have limited personnel present at the clinic. This could explain an association between working alone and frequent casualty clinic duty. Interestingly, in the multivariable regression models, working at a distance from the nearest hospital was associated with perceiving to play a large role in emergency medicine, but not with doing casualty clinic duty or participating on call-outs.

The GPs we interviewed told us that they had experienced that the local community appreciated that they participated on ambulance call-outs. They also reported that it was natural that they participated in emergency medicine when working as a GP, as they cared for their patients in non-emergencies, and would continue to care for them after the emergencies. Taking part in emergencies was also described as a natural part of being a rural doctor, by some of the GPs. These examples might explain the association between working in casualty clinics without other healthcare personnel, and participating in emergency medicine. It is not possible, using our results, to prove that GPs working at smaller local casualty clinics participate more in emergency medicine. However, this is an interesting finding that would be relevant to explore further. Especially as there has been, and probably will continue to be, a trend toward centralizing into fewer and bigger casualty clinics serving larger areas and greater populations.

5.3 Methodological considerations

In this project, we have chosen two different methodological designs that include the use of two different methods to produce knowledge, from different research traditions, with their own characteristics and procedures. Although the methods arise from quite different research

paradigms, scientists argue that the same standards can be applied to both, but that the content of the standards then need to be tailored to the individual method [36]. However, applying the same criteria to different methods is debated, and other scientists argue that to judge qualitative and quantitative studies using the same criteria is problematic [36,65]. In this section, I have chosen to discuss the use of the two methods using the same criteria: reflexivity, internal validity and external validity, while I acknowledge that this is one of several different ways of evaluating these methods. I made this decision as I believe that there are some basic principles that apply to all science, independent of method used. I will start by discussing the choice of methods and how they interact. I will then discuss how my background, positions and perspectives might have influenced the project, the issue of reflexivity. Finally, I will discuss the internal validity of the findings and how the findings can be used in other settings, external validity.

5.3.1 Choice of method

The overall aim of this project was to examine GPs' participation and contribution in emergency medicine. We decided to start examining this topic using qualitative methods. This gave us the opportunity to develop explorative and nuanced knowledge. We then wanted to examine the general GP population, by using a survey partly based on the knowledge gained form the explorative studies.

Since the aim of the first studies was to examine EMTs' and GPs' experiences with GPs in emergency medicine, we chose to use focus group interviews. This method was chosen because qualitative methods are appropriate when exploring a field with limited previous knowledge [36]. As we wanted to take part in the EMTs' and GPs' experiences and their mutual interpretation of these experiences, we chose interviews, and not observations, to

collect data. It would, however, be interesting to supplement our findings with observational studies. They can tell us more about what GPs actually do in emergency medicine. This could have given the project a new dimension, and interesting perspectives to discuss in the focus groups. Although we did not have observational data, we had some previous knowledge about GP participation in emergency medicine, as several of the members of the research group have extensive experience from working in pre-hospital EMS, in different professions. This experience was, along with scientific literature, the basis of the interview guides. However, an observational study will not give us information about how the GPs think, evaluate and interpret when they act. One-to-one interviews could have been a relevant alternative to the focus groups. This might have given the participants the possibility to talk about issues that they would be uncomfortable raising in the group. The opposite is also possible. That they felt secure since they were together with their colleges, and therefore talked about issues they would not be comfortable relating to us on their own. An example of this could be that in both the EMT groups and GP groups, the participants shared experiences and thoughts that differ from the professional norm.

In the last study, we sought to examine GP participation in emergency medicine in the total GP population of Norway. We did this by survey. We chose survey as it is a pragmatic way to reach many individuals in a population, in order to get their perspective. We argue that this perspective is important to supplement the research already done on GP activity from EMCC data. By using a survey we also had the opportunity to ask the GPs directly about their opinion, like how they assess their role in emergency medicine. We could not have done this using active data from EMCC. A survey gave us the opportunity to ask for details about the GPs and their workplace, and compare this to information on work load, which would have been difficult using existing data. This method also gave us the opportunity to test for factors associated with GP participation. The challenge with using self-reported survey data, is that

we do not know whether what the GPs report actually is correct. This leads to several possible biases. This does not imply that it is impossible to use data from surveys, but it is important to bear this in mind when interpreting the results.

Although this project does not have a definite mixed method design, the choice of methods and the relationship between them is not incidental [66]. It was a deliberate decision to start the project with qualitative studies, and then to follow with a quantitative study. The knowledge from Study 1 and 2 acted as a basis for developing the questionnaire. This was important, as there was no validated questionnaire in this field that we could use. We were also able to use knowledge from the first two qualitative studies when interpreting the findings from the survey. To let studies, carried out using different methods, collaborate in this way is recommended when there is limited knowledge in a field [36]. Thus, I claim that the different studies in the project, with their different methods, complement and enhance each other.

5.3.2 Reflexivity

The concept of reflexivity, which is a premise for quality research, is based on the assumption that the researcher will always influence the different steps of a research project in some way or another. What we investigate, the angle we investigate from, the methods we use, and how we frame and communicate our findings, are all affected by the researcher's background and position according to Malterud [36]. Objectivity is therefore not a goal, but the goal is to identify and reflect on one's own position throughout all research phases, as well as to use a reflective stance to constantly question, evaluate and contextualize any research premise and finding. Although reflexivity is often highlighted in qualitative research, scientists also argue that this concept is valid when doing quantitative research as well. I will address reflexivity

by presenting my background, motives and perspectives and how they might have influenced every step of the research project, in the following section.

My experience with EMS started in 2004, when I worked as a locum EMT in Oslo, the capital of Norway, during medical school. At the end of medical school, I also worked as a locum physician at the Oslo Accident and Emergency Outpatient Clinic, which is a large casualty clinic. Through these experiences, I got the impression that EMTs were well trained, had a lot of experience, and could cope with most emergency situations on their own. I seldom met GPs participating in medical emergencies outside of the casualty clinic in Oslo. Most of the education about emergency medicine at medical school was carried out by EMTs and anesthesiologists, and many of the prominent experts in the field of pre-hospital emergency medicine in Norway are anesthesiologists working with the helicopter-based air ambulance service, not representatives of GP run casualty clinics. This might have strengthened my impression that GPs play a small part in emergency medicine outside hospitals, and I think that I brought with me some of this preconception into this Ph.D. project. I have also worked as a GP in rural parts of Norway during this project. The first four years were in a town with 20.000 inhabitants, two hours' drive from a hospital. As a result of these conditions, the town had a well-functioning, high quality, GP-manned casualty clinic and ambulance station. In this town, we had regular ambulance call-outs, and the casualty clinic personnel worked and trained regularly with the EMT personnel. The last two years I have been working at a small casualty clinic, serving 2000 inhabitants located two hours' drive from the nearest hospital. In this little village I worked mostly alone, but there was also one ambulance that I worked with from time to time.

I have experienced that GPs and EMTs can be highly trained and involved in pre-hospital emergency medicine, but I have also experienced that in rural areas you often work by yourself, and GPs and EMTs have limited experience, since they seldom treat severely injured

patients. These different experiences have probably influenced my Ph.D. project in different ways during its progress. My preconception at the start of the project may have led me to underestimate the use and benefit of GPs in emergency medicine. I felt that pre-hospital EMS was a field best served by the ambulance EMTs and ambulance helicopters. My experience from working in the town with 20.000 inhabitants, during the first years of my Ph.D., might have made me overly optimistic about the pre-hospital emergency treatment in rural areas. There I worked at a casualty clinic where emergency medicine was a priority in regards to staffing, equipment and training, resulting in a local pre-hospital EMS that probably is more advanced than most rural communities. This optimism was then adjusted after working in the small village with limited resources and few patients, during the last years of my Ph.D. I then experienced that local pre-hospital EMS also is carried out with few resources and limited training. Nevertheless, I still felt that the local ambulance team and I, as the on-call GP, were important providers of EMS in the local community, and that a few local and dedicated resources can have a large impact. Having had hands-on experience with the field that I am studying, before and during the project have pros and cons. One possible pitfall is to believe that all other casualty clinics are the same as the ones that I have been working at, and that my personal experiences are general GP experiences. I have tried to counter this by being aware of this pitfall, trying not to interpret the data to fit my beliefs, and always discussing the findings and my interpretations with the research group. However, it is also a strength that I have in-depth working experience from three distinctly different casualty clinics. This made me realize how different pre-hospital care throughout Norway actually is.

The fact that the research team has experienced members from different EMS professions, as well as different research backgrounds, has been an important tool to improve flexibility and validity throughout the project. My background as a GP and researcher in the field of prehospital EMS, might also have influenced the participants during the focus group

interviews. One could speculate that the EMTs would speak more highly of the GPs' role in EMS in order to please me. The same might be the case of the GPs. We were aware of this possible influence and during the interviews we explicitly stated that there were no right or wrong answers to our questions. I was also conscious of how my own beliefs and experiences influenced me while I carried out the interviews. We believe that since participants in the EMS groups and GP groups put forward views that are contrary to my preconceptions and the official norm, we succeeded in limiting this influence during the interviews.

It has also been a strength to the project that I have a background in the field. It has helped me to communicate with the EMTs and GPs, as we share a common background and language.

As mentioned above, some scientist argue that reflexivity is just as relevant in quantitative papers [36]. For example, I believe that the preconceptions discussed in connection with the qualitative studies are also relevant when I planned, preformed and analyzed the survey study. When we developed the survey I was aware that my personal experiences as a GP, that led me to believe that GPs might be an important resource in the local community, would affect the formulation and design of the questionnaire. To counter this effect, we made sure that the questions reflected the knowledge from Study I and II, we discussed the questions in our research group and with an external expert, and we piloted the survey on a group of GPs. We have also shown and discussed the results with colleges in Norway and abroad, during and after analysis, in order to get feedback and to challenge our interpretation. The possible importance of participation in interdisciplinary team training is one of the main results in the survey. I have had a part-time job as an instructor in this type of team training since medical school, and have begun to believe this is an efficient way to improve the local EMS. It is conceivable that this has influenced my work when evaluating the impact of this result.

5.3.3 Internal validity

Internal validity is the question of whether the results of the study are trustworthy or if they are artifacts of the way the study was designed or conducted. The correct choice and quality of study design, data collection and analysis are key points when evaluating internal validity [67].

Paper I + II

Internal validity is often referred to as credibility in qualitative research, and the question is whether the study and its design is able to answer the research questions posed [36]. According to Mays and Pope there are several strategies that can improve validity in qualitative studies [65]. The strategies are triangulation, responder validation, detailing of data collection and analysis, reflexivity, attention to negative cases and fair dealing. I will now discuss how I have, or could have, used these strategies to improve the validity of this project.

Triangulation is a strategy where different methods for collecting data (for example interviews and observations) or sources with different perspectives are used. Even though triangulation is listed here as a strategy for validation, it should not be seen as a way to test some data by seeing if it is present in other data. Triangulation is recommended as a way to get a richer interpretation, and to explore if the inferences made in different analyses may converge. I did not use triangulation as a deliberate strategy during the different studies, but one can argue that interviewing GPs in Study 2 about the same themes as we used interviewing EMTs in Study 1, could be seen as a way of triangulation. It would have been interesting to triangulate our data with observational data in a later stage.

Responder validation is a strategy to let the responders and researchers check that they have the same account. This is seen as a strong validation strategy, but has limitations as the responder might not agree with the researcher's analysis, since this analysis is often based on

several responders, theories and own experience. Responder validation can be a useful strategy to avoid misinterpretation and to clarify issues. We did not use responder validation in our studies, and as a result we might have overlooked misinterpretations. One can argue that as we did several consecutive focus group interviews in the same population, we had the possibility to clarify issues in similar groups, although this is not responder validation per se.

We have sought to be as thorough and detailed when describing the process of data collection and analysis as feasible, when writing papers for medical journals. We hope that this gives the reader the possibility to judge whether the interpretation is supported by data, and by doing so, improving the validity of the papers. We acknowledge that these descriptions could be even more detailed than presented, but argue that we have produced is a compromise between demand for information, limited space in medical journals, and seeking to maintain anonymity.

I argue that the analytical approaches were relevant in order to explore the data material and produce knowledge on the research questions. The analytical approaches made it possible to develop categories and themes that were experience-near or made up a coherent line of statements/story across cases from focus groups. The analysis produced knowledge that was helpful when designing the survey in Study III, and when interpreting the data from the survey.

Throughout the project I have tried to be aware of how my background and my preconceptions have affected the different parts of the project. I have discussed this, the issue of reflexivity in more detail in the section above.

We tried to be aware of, and actively look for, data that contradicted the emerging explanations, during the interviews and when analyzing the data, as a strategy to gather a rich data. An example of this was when the younger EMTs and younger GPs expressed opinions

about the use of GPs in emergency medicine that differed from their older peers. Finally, we tried to ensure that all members of the groups had the opportunity to share their experiences and take part in the discussion.

We have also attempted to improve the internal validity by the way we have organized the research team. I have lead all interviews, but I have always had an observer taking part. The observer, Erik Zakariassen in Study 1, and Peder Halvorsen in Study 2, have had the opportunity to observe and pick up issues that I might have overlooked. We also included a senior researcher with experience in qualitative methods as a third member in the first interviews of each study, Torben Wisborg and Mette Bech Risør, to observe and comment on how we conducted the interviews. By doing so, we were given the possibility to reflect on and improve the data collection. Finally, we involved the whole research team in the analysis and writing of the papers in order to get more perspectives and experiences, and to balance my preconceptions.

Paper III

The aim of this study was to examine GP participation in emergency medicine. To answer this question, we used self-reported data collected using a survey. In order to assess the validity of this study, it is important to discuss the choice of method, outcome variables and whether we can trust the data.

One could question whether self-reported data is the best method for answering this research question. Would it be better to answer this question using data based on observation? I acknowledge that it is important to observe and count number of times a GP takes part in a call-out. However, it is also important to examine this by self-reporting. Firstly, we used self-reported data as we were interested in examining GPs' perceived role in emergency medicine. As this is a question related to the GP's own view, it is not accessible through observational

studies. Secondly, we wanted to examine details about the individual GP, his workplace and how often he took part in casualty clinic work and ambulance call-outs. As this data would be difficult and resource-consuming to collect, using a survey is consequently a more feasible solution. This information can also be used to test for associations between GP and workplace factors, and GP participation in emergency medicine. This new knowledge, based on data from individual self-reported GP characteristics and participation, will add depth and nuance to previous knowledge-based observed group data on GP participation.

Another issue is the choice of outcome measures. In order to answer the question about GP participation in emergency medicine, we chose the following outcome measures: Perceived role in emergency medicine, frequency of being on call, and proportion of ambulances with GP participation. Splitting participation into these three different outcomes, was a result of context as well as results from the first two studies. The context was the discourse that GPs are pulling out of emergency medicine, which was based on the number of ambulance call-outs that the GPs participate in. This argument is founded on the assumption that participation in emergency medicine equals participation on ambulance call-outs. Study I and II gave us new perspectives that challenged this assumption. The GPs found that they played an important role in emergency medicine, while they did not see the need to participate on all ambulance call-outs. The GPs explained that they participated in several different arenas like their regular office, casualty clinic, by phone, as well as taking part in ambulance call-outs. This led us to examine different types of participation in the survey. We asked about casualty clinic work as well as ambulance call-outs, in order to see if different arenas matter. We also included the question about role in emergency medicine, since we acknowledged that there might be a dimension of participation that we did not capture by asking about participation in different arenas. One could argue that asking a GP about how he perceives his role in emergency medicine is subjective and difficult to define. Can we infer knowledge about GP

participation based on this subjective question? One could argue that GP participation can only be measured using data from registers counting number of times GPs participate. Although the subjective question about perceived role cannot give us exact information about GP participation, it does give valuable information about how one of the main actors in pre-hospital emergency care in Norway, perceives their contribution. We hoped that by surveying these different types of participation we would provide new perspectives, thereby nuancing the discourse of GPs' participation in emergency medicine.

There is also the question of whether the outcome measures overlap. In the analysis, we considered a model with the GP's perception of his/her own role as the main outcome measure, adjusting for working at casualty clinics (being on call) and participation in call-outs. However, during the analysis, we realized that the three variables might be causally related in complex ways that we were not able to account for in a simple cross-sectional design. For example, they might be intermediate steps in a casual chain, so we decided that it would be best not to put them in the same model.

Although self-reported data is commonly used in research, it is often debated whether we can trust the data. When assessing the validity of self-reported data, several biases should be accounted for. The participants might misunderstand the questions, they might deliberately answer wrongfully, or they may have difficulties remembering the right answer [68].

When conducting a survey it is important that the respondents understand what you are asking. I do not believe that this was a big problem in our study. As the participants were Norwegian GPs and it was piloted on Norwegian GPs, I anticipate that the majority of the GPs understood the questions. Since the survey was voluntary, and concerns an issue that is relevant to GPs, I also believe that most participants treated the survey seriously, giving few nonsense answers. Social desirability bias is a phenomenon where the responders are not

answering truthfully, in order to appear socially desirable [68]. This is often reported when the participants are asked about sensitive topics like drugs or criminal behavior, especially if anonymity is not guaranteed, or the answers are traceable back to the respondents. I believe that it is less likely that social desirability has an impact on our data. Firstly, the topic we examined, GP participation in emergency medicine, is not very sensitive. Secondly, there are no obvious right or wrong answers. And thirdly, we facilitated honest answers by designing the questions and data collection to ensure anonymity. Lastly, it is an issue whether the respondents remember the answers to our questions, called recall bias [68]. This is an important validity issue in retrospective studies where scientists try to map different exposures. I do not consider recall bias to influence our data as much, as we asked the GPs about more general questions related to present issues, like if they presently worked at an casualty clinic monthly, once half a year, or once a year, and not detailed questions.

Another possible bias in surveys is acquiescence bias, or "yea-saying". In this type of bias the respondent tend to answer yes to all questions, or sometimes no. One of the reasons for this bias might be that there are too many questions, so the participant reaches a survey fatigue. We tried to minimize acquiescence bias avoiding leading questions, by limiting the number of questions, and avoiding simple yes/no answers.

5.3.4 External validity

The issue of external validity is important in quantitative as well as qualitative research. However, what is meant by external validity differs between the two methods. In qualitative research, we use the expression "transferability" and in quantitative we use the expression "generalizability" [36]. Transferability is the question of range and limitations for the application of the study findings, beyond the context in which the study was done.

Transferability is supported by an adequate sampling strategy and the effort to make strong, general arguments [36]. Generalizability in quantitative methods is the act of drawing broad inferences from particular observations, usually from a sample to the population that the sample presumably represents.

Paper I + II

Transferability

Transferability is closely related to the adequacy of sampling, and the selection of information-rich participants [36]. In other words, transferability is dependent on a relevant sampling strategy - who are the participants, how and why were they selected to participate. Second, transferability relies on the effort to analyze and contextualize findings to an extent that the reader of these is able to understand how findings may have general value, and be applicable to other contexts. Related to transferability and evaluating qualitative research, it may also be appropriate to consider usefulness, i.e. how the knowledge can be applied in an everyday setting [69].

For Study I, we sampled a mix of on-duty and off-duty personnel, in total four focus group interviews with five to nine participants in each, both genders, and working experience from under one year to more than ten years. As participation was voluntarily, we expected that the participants were interested in emergency medicine, and had experiences and opinions that they wanted to share. Using data from experienced participants is considered a strength in qualitative studies, but the researchers have to be cautious so that those who represent differing views are given the possibility to present their experience. We believe that we achieved this, since we encountered both positive and negative experiences, and views on the use of GPs in emergency medicine. The views and experiences were similar among those working close to and far from the nearest hospital. This was, however, not analyzed and

discussed thoroughly in the paper, and as a consequence we cannot draw inferences from this. Because the interviews in Paper I were done in rural areas in different parts of Norway, with personnel of both genders and a variety of experience, and because the analysis aimed to move it beyond the actual study, we think that our findings in Paper I are useful when discussing the GPs' participation in emergency medicine in rural Norway, from an EMT perspective. They may also have transferable value for other researchers and readers in terms of the findings on how working and training together can improve teamwork.

In Norway, nurses and GPs often work together at casualty clinics, not unlike the situation when GPs and EMTs work together on ambulance call-outs. It is probable that our findings of how the different professions have different knowledge and skills that complement each other, and that interdisciplinary teamwork may improve patient care, is transferable to the teamwork of casualty clinic nurses and GPs. It is possible that some of our findings are relevant for EMT personnel in rural areas in other countries as well.

In Study II, we collected data from a group of GPs in training, and from GPs working at three different casualty clinics in rural Norway, in the winter of 2014. The GPs in training had between one and five years of experience working as a GP, and they worked in different towns in the county. The towns are all small (less than 20.000 inhabitants), and two of the towns have a small hospital. The three casualty stations had GPs with experience ranging from one to 30 years, and were of both genders. By including the GPs that participated in the training group, we were given the opportunity to get experience from different parts of a large rural county. We do not believe that their limited experience was a serious limitation to the transferability, as we found similar experiences at the casualty clinics where more experienced GPs participated, and since casualty clinic duty is often performed by the younger and less experienced GPs. As in the EMT study, participation in the GP study was voluntary, favoring participation of GPs that have an interest in the topic. We came across

GPs arguing for and against GP participation, indicating that we managed to recruit participants with different opinions on this question. We believe that the results from Study II are useful in order to understand the use of GPs in emergency medicine in Norway, and like Study I, Study II may have transferable value for other researchers or general readers in terms of the findings on teamwork and decision-making. It is also possible that they will be relevant in other countries, to the extent that they have organized their EMS in a similar way.

An interesting question is whether the results from the qualitative papers can be applied in non-rural areas. As more of the hospital emergency medicine is centralized to a limited number of larger hospitals, it is possible that GPs and EMTs working close to local hospitals increasingly will experience challenges related to transportation time and logistics, as well as deciding the appropriate treatment level. The GPs in our study described a shift in emergency medicine, from working by themselves to now being a part of a team. This result is probably transferable to GPs in general as healthcare and primary care are increasingly using teams when treating patients. That interdisciplinary team training may improve patient care in situations that are unfamiliar, as reported by GPs, may also be transferable to other situations where doctors tend to ill patients as part of a team, for instance at hospitals. I also postulate that the trend in organizing hospital EMS by centralizing acute hospital care, will lead to more urban GPs facing challenges similar to those of the rural GPs we interviewed.

Paper III

Generalizability

Before drawing conclusions about generalizability, several limitations must be borne in mind. When comparing the study sample to all GPs in Norway, our respondents were somewhat younger (45 vs. 48), and the proportion of females and specialists in general practice slightly higher. The national mean patient list size was 1128, which is a little higher than in our

sample (1128 versus 1044). Since these variables are registered and controlled for in the analysis, we believe that these differences do not jeopardize the external validity of our data.

Another issue is the question of rurality. In our questionnaire, we asked if the GP has to drive over or under an hour to the nearest hospital. The one hour distance to a hospital was chosen as a pragmatic proxy for working in a rural area, since one of our hypotheses was that GPs working at a distance from hospitals were more involved in emergency medicine (being on call, participating in ambulance call-outs, feeling that they play a part in emergency medicine). The variable was also chosen since we believed it to be fairly wide-ranging, reducing the GPs' perceived risk of being identified through a combination of variables (age, sex, list size and distance to hospital). We believed this to be important, as the fear of being identified could lead to fewer participants or participants being reluctant to answer truthfully.

Unfortunately, we do not know the proportion working more than one hour away from hospitals in the total Norwegian GP population. However, according to the classification of centrality used by Statistics Norway, the proportion of rural GPs in Norway (19%) are those working in fairly remote (class 1) and remote municipalities (class 0) [70]. These municipalities have 15.000 inhabitants or less. Even though this is not directly comparable to our rural definition, we believe that this is as close as we can get. Since the proportion of rural doctors in our survey was 26%, we assume that rural doctors might be slightly overrepresented among our respondents.

In hindsight, it would have be interesting if we had asked the GPs about the population size served by "their" casualty clinic, as well as distance to the hospital. This could have enabled us to build better statistical models, and making better comparisons between our sample and the national average. But then, as previously discussed, the amount of information asked for had to be balanced with the intention to preserve anonymity.

However, even if our sample was fairly similar to the total GP population with respect to age, gender, specialty attainment, list size and proportion of rural GPs, there might be other, unmeasured differences that could lead to systematic errors. Errors arising from systematic differences in the characteristics of those who do and do not agree to participate in a study is called participation bias. We invited all regular GPs by mail, followed by two reminders. The Norwegian Center of Rural Medicine also made a news story, urging GPs to participate. This was posted in a Facebook group for Norwegian GPs, that has over 3500 members, and on The Norwegian Center of Rural Medicine's homepage and Facebook page. This could have resulted in a higher proportion of social media users and GPs that are interested in rural medicine in the responder group, than in the general GP population. Users of social media are younger and more often females [71]. This could be a variant of participation bias, and a possible explanation of why our responders are younger, more often women, and perhaps more rural. It is also possible that the GPs that answered are special, that they have a special interest in emergency medicine, and that the results are not as general as we would like to think when we only look at the demographic variables that we have. However, we do not know the level of interest in emergency medicine among Norwegian GPs, and we did not ask about it in the survey. We can therefore only speculate whether the responding GPs have a more positive attitude towards participating in emergency medicine, than the total GP population, causing us to overestimate the GPs' role perception and participation in emergency medicine. Another potential participation bias might be that busy GPs did not have time to answer our survey. We have however, adjusted for list size, and it is difficult speculate if and in which way a large work load might influence attitudes towards emergency medicine. Even though caution should be applied when generalizing from our results, the data from more than 1000 unselected Norwegian GPs has an important intrinsic value, thus, we

consider our findings representative of Norwegian GPs. The results may also be of interest in other countries where GPs play a similar role in the pre-hospital emergency system.

5.4 Ethical considerations

Ethical considerations in the qualitative studies

The participants received written and oral information about the project, that it was voluntary to participate, and the possibility to withdraw before the interviews began. This was done in accordance with the general research ethics principles of participation, based on informed consent. The interviews were recorded. The audio files were deleted after transcription. The transcribed data did not contain names, but the participants were given a code describing their gender and years of experience in their profession. The participants were advised not to share information that they learned from other participants during the interviews. This was done in order to limit sensitive information being spread.

The participants exposed themselves in the interviews, as they shared experiences of not following protocol or guidelines. This was important information, adding richness to the data. At the same time, I was mindful that sharing this information would not harm the participants, e.g. limiting the possibility of recognition. We, therefore, limited the data describing the ambulance stations and casualty clinics that we visited, and kept the information about participants to a minimum, while still containing relevant information.

The balance between keeping the voice of the individual respondent while the data is analyzed together with data from other respondents, is a challenge in qualitative research [72]. The participants might experience that they have been misinterpreted if they do not recognize their voice in the results of the research. I find this balance challenging, and therefore had a

special focus on it during the project. During the interviews I was careful to ask clarifying questions like “Have I understood you right that you think….”. We also turned back to the transcripts, regularly, trying to ensure that we had understood the participant correctly. We also discussed this during analysis in order to avoid confusing our own presumptions with the participants. A possible technique to avoid misunderstandings that we did not try, is to verify the information in the interviews afterwards by letting participants read the transcript [72]. This would reduce the possibility of misunderstandings, but we would still have the possibility of participants not recognizing their voice in the final product.

Ethical considerations in the quantitative study

The survey data was collected and stored according to regulations from NSD - Norwegian Centre for Research Data. The participants received a written invitation that contained information about the project, and that it was voluntary to participate. The invitation was drafted according to NSD recommendations. As opposed to qualitative studies, there is not a high risk of participants being recognized in quantitative studies, since these present aggregated data. There is, in the same way as in qualitative data, the possibility to offend on a group level, so that members of a group feel that they are inaccurately presented, and will therefore not participate in any future research. Again, I think this risk is low, since our survey did not include particularly sensitive topics.

An ethical issue that is relevant to this study is whether the project justifies the strain that we put on the participating GPs. GPs are often invited to participate in surveys, since they are believed to be able to relay important knowledge. If researchers flood the GPs with surveys, the GPs will eventually grow tired of answering them, and will no longer participate in similar studies. An important question is therefore whether the information can be obtained through other sources. As I have argued in the discussion of methods, self-reported data is an

important supplement to data from observations. I therefore argue that this survey is necessary, even though it adds to the strain on GPs. We were conscious not to burden the GPs unnecessarily. They were contacted by e-mail, we only sent two reminders, and were careful not to make the questionnaire too comprehensive. The fact that over 1000 GPs took the time to complete the survey in their busy life is a sign that they considered this survey worthwhile and important.

6 Implications for clinical practice

When organizing pre-hospital EMS service in the future health authorities may do well considering the findings that, according to the participants, the EMTs and GPs have different knowledge and skills, and that the two professions complement each other in emergency medicine. These findings suggest that pre-hospital health care services should be organized in such a way that the patients are served by both professions in cooperation. Furthermore, there was nothing in our data to suggest that large, centralized casualty clinics facilitate GP participation in prehospital emergencies; if anything, it might be quite opposite. This should be taken into account when considering the organization of casualty clinics in the future. Finally, the findings presented in this thesis give support for continued implementation of team training, since this was strongly associated with GP participation.

7 Future Research

In order to investigate GP contribution in emergency medicine further, I believe that large scale studies comparing pre hospital services with or without GP participation are needed. Based on my findings, it may be wise to focus on GP contribution in terms of early diagnosis and clinical decision-making and how these contributions are related to patient outcomes.

When doing so, it would be desirable to include patient and community perspectives. I also recommend that future investigations on GP participation in emergency medicine reflect our finding that the GPs participates in different arenas, not just on ambulance call-outs. Finally, it would be interesting to examine the association between team training and participation further. Is there a causal relationship between the two, and in what direction?

8 Conclusion

My studies suggest that the GP still plays an important part in emergency medicine on different pre-hospital arenas. According to my informants, salient GP contributions were diagnostic skills and clinical decision-making. Interdisciplinary team training was strongly associated with self reported participation in emergency medicine. These findings may serve as a point of departure for future studies of the utility of GP participation in terms of patient outcomes. Until further data becomes available, I believe that measures to facilitate continued GP participation in pre hospital emergencies and further implementation of team training are warranted.

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Appendices

Appendix I: Questionnaire (Norwegian and English version)

Appendix II: NSD - Norwegian Centre for Research Data: letter dated 02.08.12

Appendix III: Regional committee for medical and health research ethics: letter dated 29.06.12.

Appendix IV: NSD - Norwegian Centre for Research Data: letter dated 22.06.16

Questionnaire to Norwegian GPs about casualty clinic duty, emergency medicine and callouts.

The following questions was used in the analysis in Study III. Magnus Hjortdahl has translated the questions into English when preparing the thesis, as the original questionnaire is in Norwegian. The original questions in Norwegian are also included.

A. Background information about you:

1. Gender:

1.	Female	
2.	Male	

2. Your age**:** ____ years

3. Are you a specialist GP?

1.	Yes	
2.	No	

4. How many patients are there on your list?

Fill in: _____ number of patients

5. During the last year, how often have you worked at the casualty clinic?

1.	Weekly (one or more a week)	
2.	Monthly (between one and three a month)	
3.	Semiannual (between one and five during six months)	
4.	Annual (one each year)	
5.	Not relevant (Have not worked there the last year)	

6. To what degree do you experience that you, as a GP, play a role in emergency medicine?

1 (small degree) 5(large degree)

☐ ☐ ☐ ☐ ☐ ☐

B Questions about your casualty clinic

7. What type of casualty clinic do you work at?

1.	Municipal, not a large city	
2.	Municipal, large city (se below)	
3.	Inter-municipal	

large city casualty clinic: Oslo, Bergen, Stavanger, Trondheim

8. Are there several physicians working at the same time at your casualty clinic?

1.	Yes	
2.	On an off	
3	Never	

9. Is there a physician on stand by if you have to tend to a call out?

1.	Yes	
2.	No	

10. Are you collocated with the ambulance service?

1.	Yes	
2.	No	

11. Do you have a dedicated response vehicle for the physician?

1.	Yes, with a driver	
2.	Yes, without a driver	
3.	No	

12. Are you located more than a 60 minutes car drive from the nearest hospital?

1.	Yes	
2.	No	

13. What proportion of ambulance call outs do you usually participate in?:

Never	25%	50%	75%	Always	Not relevant
☐	☐	☐	☐	☐	☐

14. Are there nurses/other healthcare personnel present at your casualty clinic 24/7?

1.	Yes	
2.	No	

15. How often do you carry out emergency medical training exercises with other professions (EMTs, community care nurses, personnel from air ambulance services, others) in your casualty clinic?

1.	We never do	
2.	Less that once a year	
3.	We train once a year	
4.	We train several times a year	
5.	Not relevant (have not worked at casualty clinic the last year)	

Spørreskjema til norske fastleger om legevakt, akuttmedisin og deltagelse på utrykning.

A. Bakgrunnsopplysninger om deg:

1. Kjønn:

1.	Kvinne	
2.	Mann	

2. Din alder**:** ____ år

3 Er du spesialist i allmennmedisin?

1.	Ja	
2.	Nei	

4. Hvor mange pasienter er det på listen din?

Skriv: _____ antall pasienter

5. Hvor ofte har du hatt legevakt det siste året?

1.	Ukentlig (1 eller flere i uken)	
2.	Månedlig (1 til 3 i måneden)	
3.	Halvårlig (en til fem i halvåret)	
4.	Årlig (en vakt i året)	
5.	Ikke relevant (ikke hatt vakt siste året)	

6. I hvilken grad opplever du at du som allmennlege har en rolle innen akuttmedisin:

1 (liten grad) 5(stor grad)

☐ ☐ ☐ ☐ ☐ ☐

B Spørsmål om din legevakt:

7. Hva slags legevakt jobber du på?

1.	Kommunal, ikke storby	
2.	Kommunal, storby (se under)	
3.	Interkommunal	

storby legevakt: Oslo, Bergen, Stavanger, Trondheim

8. Er dere flere leger på jobb samtidig når du har legevakt?

1.	Ja,	
2.	Av og til	
3	Aldri	

9. Er det en lege i beredskapsvakt hvis du må rykke ut?

1.	Ja,	
2.	Nei	

10. Er dere samlokalisert med ambulansetjenesten?

1.	Ja,	
2.	Nei	

11. Har dere eget utrykningskjøretøy til legen?

1.	Ja, med sjåfør	
2.	Ja, uten sjåfør	
3.	Nei	

12. Er dere lokalisert mer enn 60 minutters bilkjøring fra nærmeste sykehus?

1.	Ja,	
2.	Nei	

13. Hvor stor andel av uttrykninger ved «lege-ambulansealarm» deltar du vanligvis på:

Aldri	ca 25%	ca 50%	ca 75%	Alltid	Ikke relevant
☐	☐	☐	☐	☐	☐

14. Er det sykepleiere/annet hjelpepersonell tilstede på din legevakt hele døgnet?

1.	Ja,	
2.	Nei	

15. Hvor ofte har dere trening i akuttmedisin med andre aktører (ambulansetjenesten, hjemmesykepleien, luftambulansen, andre) ved din legevakt:

1.	Vi har aldri trening	
2.	Det er mer enn et år mellom hver gang	
3.	Vi trener en gang i året	
4.	Vi trener flere ganger i året	
5.	Ikke relevant (ikke hatt vakt siste året)	

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Vår dato: 02.08.2012 Vår ref:31049 / 3 / KH Deres dato: Deres ref:

TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 11.07.2012. Meldingen gjelder prosjektet:

31049	*Lege-ambulansealarm – hva betyr legen for ambulansearbeiderne? En kvalitativ undersøkelse*
Behandlingsansvarlig	*Universitetet i Bergen, ved institusjonens øverste leder*
Daglig ansvarlig	*Magnus Hjortdahl*

Etter gjennomgang av opplysninger gitt i meldeskjemaet og øvrig dokumentasjon, finner vi at prosjektet ikke medfører meldeplikt eller konsesjonsplikt etter personopplysningslovens §§ 31 og 33.

Dersom prosjektopplegget endres i forhold til de opplysninger som ligger til grunn for vår vurdering, skal prosjektet meldes på nytt. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/forsk_stud/skjema.html.

Vedlagt følger vår begrunnelse for hvorfor prosjektet ikke er meldepliktig.

Vennlig hilsen

Vigdis Namtvedt Kvalheim

Kjersti Håvardstun

Kontaktperson: Kjersti Håvardstun tlf: 55 58 29 53
Vedlegg: Prosjektvurdering

Personvernombudet for forskning

Prosjektvurdering - Kommentar

Prosjektnr: 31049

Personvernombudet kan ikke se at det foretas behandling av personopplysninger med elektroniske hjelpemidler eller at det opprettes manuelt personregister som inneholder sensitive personopplysninger. Prosjektet vil dermed ikke omfattes av meldeplikten.

Det legges til grunn at opptak ikke behandles på datamaskin samt at data anonymiseres ved transkribering ved at verken direkte eller indirekte personidentifiserbare opplysninger fremgår. Det vil ikke finnes en koblingsnøkkel som knytter transkripsjoner til informant.

Det er videre lagt til grunn at det ikke innhentes personidentifiserbare opplysninger om verken leger eller pasienter.

Lydopptak slettes innen prosjektslutt.

REK
REGIONALE KOMITEER FOR MEDISINSK OG HELSEFAGLIG FORSKNINGSETIKK

Region:	Saksbehandler:	Telefon:	Vår dato:	Vår referanse:
REK nord	Veronica Sørensen	77620758	29.06.2012	2012/1260/REK nord
			Deres dato:	Deres referanse:

Vår referanse må oppgis ved alle henvendelser

Magnus Hjortdahl
Hesteskoen 8
9510 Alta

2012-1260 Lege-ambulansealarm – hva betyr legen for ambulansearbeiderne? En kvalitativ undersøkelse

Vi viser til skjema for framleggingsplikt av 20.06.2012.

Framleggingsplikt
De prosjektene som skal framlegges for REK er prosjekt som dreier seg om "medisinsk og helsefaglig forskning på mennesker, humant biologisk materiale eller helseopplysninger", jf. helseforskningsloven (h) § 2. "Medisinsk og helsefaglig forskning" er i h § 4 a) definert som "virksomhet som utføres med vitenskapelig metodikk for å skaffe til veie ny kunnskap om helse og sykdom". Det er altså formålet med studien som avgjør om et prosjekt skal anses som framleggelsespliktig for REK eller ikke.

Formålet er ikke å fremskaffe ny kunnskap om sykdom eller helse som sådan, men å utforske ambulansearbeideres erfaringer med å ha lege med på akuttoppdrag. Prosjektet er ikke fremleggingspliktig. Det forutsettes at intervjuobjektene skal overholde sin lovpålagte taushetsplikt og at det således heller ikke er nødvendig med disp. fra taushetsplikten.

På bakgrunn av det overnevnte anser REK at prosjektet ikke er framleggingspliktig.

Vedtak
Etter søknaden fremstår prosjektet ikke som et medisinsk og helsefaglig forskningsprosjekt som faller innenfor helseforskningsloven. Prosjektet er ikke fremleggingspliktig, jf. helseforskningslovens § 10, jf. forskningsetikkloven § 4, 2. ledd.

Vi ber om at alle henvendelser sendes inn via vår saksportal: http://helseforskning.etikkom.no eller på e-post til: post@helseforskning.etikkom.no

Vennligst oppgi vårt referansenummer i korrespondansen.

Med vennlig hilsen

May Britt Rossvoll
sekretariatsleder

Veronica Sørensen
rådgiver

Magnus Hjortdahl
Institutt for samfunnsmedisin UiT Norges arktiske universitet

9037 TROMSØ

Vår dato: 22.06.2016 Vår ref: 48819 / 3 / STM Deres dato: Deres ref:

TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 01.06.2016. Meldingen gjelder prosjektet:

48819	*Akutt utrykning på legevakt: Hva er allmennlegens bidrag, og hvordan tas beslutningen om å rykke ut?* *Delprosjektet: Allmennlegen, legevakt og akuttmedisin*
Behandlingsansvarlig	*UiT Norges arktiske universitet, ved institusjonens øverste leder*
Daglig ansvarlig	*Magnus Hjortdahl*

Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstiller kravene i personopplysningsloven.

Personvernombudets vurdering forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/meldeplikt/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, http://pvo.nsd.no/prosjekt.

Personvernombudet vil ved prosjektets avslutning, 30.06.2018, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Kjersti Haugstvedt

Siri Tenden Myklebust

Kontaktperson: Siri Tenden Myklebust tlf: 55 58 22 68

Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.

Vedlegg: Prosjektvurdering

Personvernombudet for forskning

Prosjektvurdering - Kommentar

Prosjektnr: 48819

Det fremgår at prosjektet er en nasjonal samarbeidsstudie. UiT Norges arktiske universitet er behandlingsansvarlig institusjon. Personvernombudet forutsetter at ansvaret for behandlingen av personopplysninger er avklart mellom institusjonene. Vi anbefaler at det inngås en avtale som omfatter ansvarsfordeling, ansvarsstruktur, hvem som initierer prosjektet, bruk av data og eventuelt eierskap.

Informasjonsskrivet er greit utformet, men det må presiseres at selve undersøkelsen ikke er anonym. Videre må utvalget informeres om prosjektslutt og tidspunkt for anonymisering av datamaterialet. Vi ber derfor om at følgende endres:
-Setningen: "Deltagelse er frivillig og du vil være anonym." endres til "Deltakelse i prosjektet er frivillig. Du vil ikke kunne gjenkjennes i publikasjoner. Ved prosjektslutt 30.06.2018 slettes kontaktinformasjon og koblinger mellom IP-/epostadresser og besvarelser."

Vi legger til grunn at du går gjennom informasjonsskrivet og sørger for at alle overnevnte punkter er med, slik at samtykket du får fra den enkelte er gyldig.

Personvernombudet legger til grunn at forsker etterfølger UiT Norges arktiske universitet sine interne rutiner for datasikkerhet.

Questback er databehandler for prosjektet. UiT Norges arktiske universitet skal inngå skriftlig avtale med Questback om hvordan personopplysninger skal behandles, jf. personopplysningsloven § 15. For råd om hva databehandleravtalen bør inneholde, se Datatilsynets veileder: http://www.datatilsynet.no/Sikkerhet-internkontroll/Databehandleravtale/.

Forventet prosjektslutt er 30.06.2018. Ifølge prosjektmeldingen skal innsamlede opplysninger da anonymiseres. Anonymisering innebærer å bearbeide datamaterialet slik at ingen enkeltpersoner kan gjenkjennes. Det gjøres ved å:
- slette direkte personopplysninger (som navn/koblingsnøkkel)
- slette/omskrive indirekte personopplysninger (identifiserende sammenstilling av bakgrunnsopplysninger som f.eks. bosted/arbeidssted, alder og kjønn)

Vi gjør oppmerksom på at også databehandler (Questback) må slette personopplysninger tilknyttet prosjektet i sine systemer. Dette inkluderer eventuelle logger og koblinger mellom IP-/epostadresser og besvarelser.

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ORIGINAL RESEARCH Open Access

The role of general practitioners in the pre hospital setting, as experienced by emergency medicine technicians: a qualitative study

Magnus Hjortdahl[1*], Erik Zakariassen[1,2,3] and Torben Wisborg[4,5,6]

Abstract

Background: Together with the ambulances staffed with emergency medical technicians (EMTs), general practitioners (GPs) on call are the primary resources for handling emergencies outside hospitals in Norway. The benefit of the GP accompanying the ambulance to pre-hospital calls is a matter of controversy in Norway. The purpose of the present study was to gain better insight into the EMT's experiences with the role of the GPs in the care for critically ill patients in the pre-hospital setting.

Methods: We conducted four focus group interviews with EMTs at four different ambulance stations in Norway. Three of the stations were located at least 2 hours driving distance from the nearest hospital. The interviews were transcribed and analyzed using systematic text condensation.

Results: The EMTs described increasing confidence in emergency medicine during the last few years. However, they felt the need for GP participation in the ambulance when responding to a critically ill patient. The presence of GPs made the EMTs feel more confident, especially in unclear and difficult cases that did not fit into EMT guidelines. The main contributions of the GPs were described as diagnosis and decision-making. Bringing the physician to the patient shortened transportation time to the hospital and important medication could be started earlier. Several examples of sub-optimal treatment in the absence of the GP were given. The EMTs described discomfort with GPs not responding to the calls. They also experienced GPs responding to calls that did not function in the pre-hospital emergency setting. The EMTs reported a need for professional requirements for GPs taking part in out-of-hours work and mandatory interdisciplinary training on a regular basis.

Conclusions: EMTs want GPs to be present in challenging pre-hospital emergency settings. The presence of GPs is perceived as improving patient care. However, professional requirements are needed for GPs taking part in out-of-hours work, and the informants suggested a formalized area for training between EMTs and GPs on call.

Keywords: Chain of survival, Prehospital, General practitioner, Emergency medical technician, Rural

Background

When a person in Norway is in need of immediate medical care but not defined as having a life threatening situation, he has to consult the local emergency primary healthcare system (casualty clinics). These clinics are staffed by general practitioners (GPs) and organized by the municipalities. The GP will examine the patient, decide if treatment is needed, and if it is necessary admit the patient to a hospital [1]. In rural areas, the nearest hospital may be several hours driving distance away.

If a life threatening situation is suspected, the public is advised to contact the regional national emergency communication center (EMCC) directly by calling the dedicated medical emergency number (113). The EMCC then classifies the problem using a decision making tool [2]. If the operator classifies the call as a life threatening situation ("red response"), an alarm is issued simultaneously to both the GP on call at the local casualty clinic and the local ambulance [2]. The intention is that

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the ambulance and the GP will attend to the patient as a team [3]. Training courses in emergency medicine for GPs working in a casualty clinic are available, but they are not mandatory. The ambulances are usually staffed with emergency medical technicians (EMTs) with 2 years of upper secondary school and 2 years apprenticeship training and certification as health personnel [3].

A national ambulance helicopter emergency medical service (HEMS) staffed with anesthesiologists is established throughout Norway. The HEMS is a limited resource and may be located a distance from the site of the emergency. The availability of the HEMS is also vulnerable to weather and competing missions [4]. A study of three Norwegian dispatch centers in 2007 found that the HEMS was alerted for approximately 8 percent of the "red responses" [5]. Therefore, pre-hospital emergency medicine in Norway is based on the local ambulance and GP on call, with the HEMS as an important supplement [3].

When there is a red response, the GP on call decides, at his or her own discretion, whether or not to accompany the ambulance. There are no official regulations concerning how the GP has to respond to a "red response". If the GP accompanies the ambulance, the local casualty clinic must manage without a physician until the GP returns. This may then lead to temporary weakening of local medical emergency readiness.

The benefit of GPs responding to these call outs is controversial in Norway. A study conducted in 2009 found that EMTs perceive themselves as more capable in emergency medicine than GPs. GPs were also described as the most problematic occupational group to cooperate with during emergencies [6]. Another study from 2009 found that pre-hospital involvement by casualty clinic GPs is important for optimal patient care [7]. Despite the recommendation by national committees that GPs should take part in these call outs [3], the GP is only alerted by the EMCC in 47% of these incidents [5]. The frequency of alerting GPs vary between EMCCs, the cause of this is unknown.

To optimize the use of GPs as a resource in the chain of survival, we need information about EMTs' assessment of GP participation in prehospital patient care. The purpose of the present study was to gain better insight into the experiences of EMTs of the role of GPs in the care for critically ill patients in the pre-hospital setting.

Methods

Data collection

We conducted four focus group interviews with EMTs at four different ambulance stations in Norway. One focus group interview was performed at each station and tape recorded. One of the authors (MH) conducted the interviews and one of the authors (EZ) observed the interviews to take notes and ask follow-up questions at the end of the interview. The interviewer (MH) works as a GP and has part time work as a medical adviser to a local casualty clinic in his municipality. The observer (EZ) is a full time researcher (PhD) in the field of emergency medicine with a background as an emergency medicine nurse. We used an interview guide that was discussed and adjusted after each interview. The participants were given oral and written information about the study prior to the interview.

Participants

The sampling strategy aimed at talking to EMTs working at ambulance stations located in rural areas. We invited four ambulance stations by email, and all stations accepted the invitation. Three of the stations were located at least 2 hours driving distance from the nearest hospital. All personnel working at the station were invited to participate. The interviews were conducted during the day time with a mix of on-duty and off-duty personnel. The number of participants ranged from five to nine, and their experience as EMTs ranged from under a year to over 10 years. Data sampling was terminated when saturation was reached, i.e. no new information occurred during interviews.

Analysis

The interviews were transcribed and analyzed using systematic text condensation as described by Malterud [8]. Initially, we read all of the material to obtain an overall impression. Next, we identified and sorted meaning units for the EMT experiences working with GPs in the pre-hospital setting. The units were then coded and the contents of each coded group condensed. Finally, we summarized the contents of each group into generalized descriptions of different aspects concerning the relationship between EMTs and GPs in this field.

Approval

The Regional Committees for Medical and Health Research Ethics (Health Region North) waived approval (e-mail dated 29.06.2012). The Data Protection Official for Research, Norwegian Social Science Data Services waived approval (letter dated 02.08.2012).

Results

An important supplement

The EMTs described an increased emphasis on training, guidelines, and protocols over the last few years, which has given them increased confidence in emergency medicine. However, EMTs still felt the need to have GPs accompany them when responding to critically ill patients. The presence of GPs made the EMTs feel more confident, especially in unclear and difficult cases that did not fit into their treatment guidelines. The more experienced EMTs were more likely to express the need for GPs. In contrast,

one of the younger EMTs found it more interesting to treat the critically ill patients by himself, as long as everything went "by the book". On-call GPs were described by some as having more clinical skills and being better at diagnosing, especially when it came to children and psychiatric patients. The EMTs felt that the GPs have a greater repertoire of medications available. In most cases the EMTs expressed a desire to use the GP as a consultant when it came to diagnosing and decision making, allowing the EMTs to focus on practical skills. The EMTs reported that the GP was an important supplement to their skills.

EMT describing a call out to a seven months old boy with breathing problems and possible bronchiolitis, a condition the EMTs were not familiar with:

"The child was critically ill. I have never seen breathing like that before. Luckily, we had brought a doctor with us. It would have been catastrophic to the patient if the doctor didn't come along".

The GP's main contributions were described as deciding whether to admit a patient to the hospital and arranging for transportation to the hospital when needed. This contribution was especially important in the case of a patient living in a remote area. Means of transportation, such as ambulance airplanes and ambulance boats, are limited regional resources and, according to the EMTs, are only dispatched after the patient has been examined by a physician. The EMTs shared experience in which bringing the physician to the patient shortened transportation time to the hospital by several hours, and important medication could be started earlier. Reducing the distance traveled by the patient in the ambulance was also considered to be gentler on the patient.

"I remember when we responded to a 40-year-old woman with signs of a stroke. It took 55 minutes from the time that our alarm went off until she was with the neurosurgeon. In this case the GP accompanied us to the patient and he could start the process of transportation right away. If we would have had to transport her to a casualty clinic to see the GP first it would probably have taken two hours to reach the hospital. She is working as normal today".

EMT

Suboptimal care

The EMTs provided several examples of suboptimal treatment in the absence of the GP. The EMTs described situations in which they were forced to give treatment they were not formally given delegation to administer because no GP was present. In other examples, patients were not given the recommended pre-hospital treatment when the ambulance responded to patients without a GP. The EMTs also described discomfort with GPs not responding to the calls. The EMTs were forced to wait for the GP, resulting in a delay in responding to the patient. On the other hand, the EMTs were understanding of the GPs' difficult task in prioritizing whether to leave the casualty clinic.

EMT when asked to comment on the GP's possibility to decide at her own discretion whether to respond to a call out:

"Sometimes I believe that the GP just don't want to accompany us to the patient… Once we had to respond to a knife wound to the abdomen. The GP on call declined to come along. It was dreadful to respond to this patient without a doctor. This kind of incident is very rare to us, and the patient was in bad shape… It was also a challenge to administer further transportation while taking care of the patient being only to EMTs".

Dysfunctional GPs

The EMTs also relayed experiences with GPs who responded but did not function well outside the office. The doctor then became a burden to the EMTs. This was thought to be caused by some GPs having little interest in or knowledge of emergency medicine and little insight into EMT training and protocols. In other cases the GP had poor communication skills or lacked knowledge of geography or local procedures.

EMT describing how the GP can be a burden:

"Once we responded to a cardiac arrest. We were accompanied by a substitute GP. He elbowed his way past us and started to do chest compressions, on the stomach. The result was vomit everywhere. We had to push him out of the way to take care of the patient".

Perfecting cooperation

The EMTs had several thoughts concerning the role of the accompanying GP: a physician should understand the overall situation, allocate assignments, and formulate a plan of action, thereby assuming the role of the leader; have interest in and knowledge of emergency medicine, not only in an office or hospital setting; have insight into EMT guidelines and procedures; and be open to the thoughts and recommendations of the EMTs. Some EMTs expressed a preference for a humble GP that is earnest concerning his or her limitations. The EMTs described it as a good learning experience when the GP sits down with them after treating a patient and explains why he chose to deviate from their guidelines when this occurs.

The EMTs thought that a GP should have to fulfill certain requirements in order to work with emergency

medicine. They also spoke favorably of interdisciplinary training. The EMTs reported a need for mandatory interdisciplinary training on a regular basis to achieve better knowledge and insight. The EMTs believed that this would result in better teamwork, and that both GPs and EMTs would have more respect for each other's knowledge and capabilities, leading to better patient treatment. All of the stations we visited have experience with this type of training program. Most of these training programs lost their quality over time or have been discontinued according to the EMTs. The EMTs noted that it was usually the GPs who were already interested and skilled in emergency medicine that took part in these programs.

> *"It is a problem that we respond to a patient without knowing the qualifications of the GP accompanying us. Interdisciplinary training gives us a unique opportunity to get to know each other. We, EMTs, train. The GPs are welcome to join in on our training, but they seldom have the time or desire to do so".*
>
> EMT

Discussion

Sample and preconceptions

Our sampling strategy focused on EMTs working in rural areas with a long distance to the local hospital. Therefore, one should be careful when transferring these results to an urban setting. Because we asked for volunteers to participate in the interview, there is a possibility that we ended up interviewing personnel with a special interest in the field, selection bias. This gives information from a select group, and one must be aware of this when generalizing the findings, but using a select group of informants thought to have information of interest to the study is in accordance with the applied method of qualitative research [9]. After conducting the four interviews, we read through the transcripts and found relevant material sufficient for analysis. The later groups had many of the same experiences as the first groups, which led us to conclude the data collection after four groups.

As one of the authors (MH) works part time as an instructor in interdisciplinary training, there is a risk of bias in favor of this type of training. We were aware of this preconception and conscious to minimize the effect of this background while planning, interviewing, and interpreting the interviews. Because the EMTs were interviewed by a physician (MH), the EMTs may have felt that they were being tested. The participants may also have given a falsely positive description of the role of the GP to please the interviewer. To counteract this, the interviewer was conscious of not being seen as an authority. It was felt that the informants freely discussed both the limitations and strengths of themselves, as well as those of the GP, during interviews.

Does the GP have a role in the pre-hospital environment?

The EMTs wanted the aid of the GP as a leader and a diagnostic supplement in difficult cases. They also said that they could manage many acute patients on their own. Confidence in emergency medicine was reported in an earlier study showing that EMTs perceive their profession as being best suited to care for pre-hospital patients with severe injury or disease [6]. This may contradict the reported need for GPs in our study. In the previous study the EMTs could only chose EMT or physician as the profession considered best at caring for emergency patients. One interpretation of this choice is that the EMTs consider themselves best at practical skills and treatment according to guidelines. A previous study found that GPs seldom do emergency medical procedures, arguing that the GPs are not ready to take on a greater role in pre-hospital treatment [10]. Our study indicates that GPs could contribute by helping with diagnoses in unclear cases, being leaders, and organizing patient care, supplementing the EMT's skills. Leadership is an important human factor in emergency medical teams, as found when assessing teamwork in hospital trauma teams [11]. We were surprised to learn that the absences of GPs may lead to suboptimal treatment. This strengthens the argument that the presence of the GP is needed.

There is international controversy about who can provide the best medical care for critically ill patients in the pre-hospital setting [12]. Research in this field has focused on whether a well-trained paramedic or emergency medical service (EMS) physician is the best provider of care in these situations. Timmermann argued that some critically ill patients benefit from the care provided by the EMS physician, supporting our findings [12]. Because EMTs and GPs, rather than paramedics and EMS physicians, are the common resource in Norway, one must be careful to use these results in the Norwegian context.

Even though GPs are recommended to have a part in pre-hospital care in Norway, we do not know if their presence improves the overall outcome for patients. Further investigations should look into whether the presence of a GP actually shortens the time until treatment is started and until the patient is at the correct destination for further treatment. Whether the presence of a physician improves overall outcomes for patients should also be assessed. As noted by Timmermann, such a study will be challenging to design and execute [12].

Given our findings, it is a paradox that there are EMCCs that seldom alerts GPs, and that GP participation is low [5]. The GPs in casualty clinics have different reasons for not responding to call outs. One reason might be that the GPs are often preoccupied with other patients. Several

studies have found that the "red response" patients are seldom in a life threatening situation when first examined by the EMT or physician [13,14]. If it was possible to develop some more specific guidelines for when the EMCC alerts the doctor, this may improve the GP response rate and possibly increase precision in getting them to respond to the "right" cases.

Our informants all had experience with poor performing GPs. This was perceived to be the result of a lack of interest and knowledge in emergency medicine and little insight into EMT guidelines. No special requirements or mandatory training currently exist in Norway for GPs working in casualty clinics. Previous studies have shown that GPs may be exposed to several different emergency situations, but some of them rarely [14]. A paper from 2009 investigating emergency medicine in a rural community suggested mandatory training on a regular basis for GPs taking part in out-of-hours work, supporting the view of our informants [7]. The need for interdisciplinary training as described by the EMTs has also been found in previous studies [6,15].

Conclusion

The EMTs interviewed in this study reported wanting a GP present in challenging pre-hospital emergency settings that go beyond their guidelines. The presence of GPs was perceived to improve patient care. The EMTs considered a need for professional requirements for GPs taking part in out-of-hours work. The informants suggested formal training between EMTs and GPs on call.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

MH, EZ and TW participated in study design, in data acquisition and analysis, and critically revised the draft manuscript. All authors read and approved the final manuscript.

Acknowledgements

Magnus Hjortdahl received founding from The Norwegian Committee on Research in General Practice. We are thankful to all EMTs that participated in this study.

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Received: 6 March 2014 Accepted: 5 August 2014
Published: 22 August 2014

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doi:10.1186/s13049-014-0047-1
Cite this article as: Hjortdahl *et al.*: The role of general practitioners in the pre hospital setting, as experienced by emergency medicine technicians: a qualitative study. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 2014 **22:**47.

Scandinavian Journal of Primary Health Care

ISSN: 0281-3432 (Print) 1502-7724 (Online) Journal homepage: http://www.tandfonline.com/loi/ipri20

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To cite this article: Magnus Hjortdahl, Peder Halvorsen & Mette Bech Risør (2016) Rural GPs' attitudes toward participating in emergency medicine: a qualitative study, Scandinavian Journal of Primary Health Care, 34:4, 377-384, DOI: 10.1080/02813432.2016.1249047

To link to this article: https://doi.org/10.1080/02813432.2016.1249047

Published online: 09 Nov 2016.

SCANDINAVIAN JOURNAL OF PRIMARY HEALTH CARE, 2016
VOL. 34, NO. 4, 377–384
http://dx.doi.org/10.1080/02813432.2016.1249047

Taylor & Francis
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RESEARCH ARTICLE

OPEN ACCESS

Rural GPs' attitudes toward participating in emergency medicine: a qualitative study

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ABSTRACT

Objective: Health authorities want to increase general practitioner (GP) participation in emergency medicine, but the role of the GP in this context controversial. We explored GPs' attitudes toward emergency medicine and call outs.

Design: Thematic analysis of focus group interviews.

Setting: Four rural casualty clinics in Norway.

Participants: GPs with experience ranging from one to 32 years.

Results: The GPs felt that their role had changed from being the only provider of emergency care to being one of many. In particular, the emergency medical technician teams (EMT) have evolved and often manage well without a physician. Consequently, the GPs get less experience and feel more uncertain when encountering emergencies. Nevertheless, the GPs want to participate in call outs. They believed that their presence contributes to better patient care, and the community appreciates it. Taking part in call outs is seen as being vital to maintaining skills. The GPs had difficulties explaining how to decide whether to participate in call outs. Decisions were perceived as difficult due to insufficient information. The GPs assessed factors, such as distance from the patient and crowding at the casualty clinic, differently when discussing participation in call outs.

Conclusion: Although their role may have changed, GPs argue that they still play a part in emergency medicine. The GPs claim that by participating in call outs, they maintain their skills and improve patient care, but further research is needed to help policy makers and clinicians decide when the presence of a GP really counts.

Norwegian health authorities want to increase participation by general practitioners (GPs) in emergency medicine, but the role of the GP in this context is controversial.

KEY POINTS

- The role of the GP has changed, but GPs argue that they still play an important role in emergency medicine.
- GPs believe that their presence on call outs improve patient care, but they find it defensible that patients are tended to by emergency medical technicians (EMTs) only.
- GPs offered different assessments regarding whether to participate in call outs in seemingly similar cases.

ARTICLE HISTORY
Received 6 January 2016
Accepted 6 July 2016

KEYWORDS
General practitioners; out-of-hours care; emergency medicine; prehospital emergency care; emergency medical technicians; general practice; Norway

Introduction

In Norway, the main providers of prehospital emergency care are municipal casualty clinics and ambulance services. During open hours, family practices provide emergency care to some extent, but casualty clinics are increasingly providing 24/7 service. The casualty clinics are generally staffed by general practitioners (GPs), whereas emergency medical technicians (EMTs) run the ambulance service. A helicopter emergency medical service (HEMS) staffed with anesthesiologists is established throughout Norway. However, the capacity of the HEMS ambulance is limited, and most patients are handled by the casualty clinic GPs and EMTs alone.[1,2]

If a life-threatening situation is suspected, the public is advised to contact the regional national emergency communication center (EMCC) directly by calling 1-1-3, the dedicated medical emergency number. The EMCC then classifies the problem using a decision aid.[3] If the operator classifies the call as a

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life-threatening situation ("red response"), he is advised to issue an alarm to both the GP on call and the local ambulance.[3] The GP then decides at his or her discretion whether to accompany the ambulance (i.e. take part in the call out). New regulations in 2015 state "The casualty clinic doctor shall contribute in accidents and other emergency situations, among other things attend to call outs when it is necessary".[4] The regulations do not specify what is meant by "when it is necessary". Furthermore, the GP has to take into account that the local casualty clinic has to manage without him or her if he or she accompanies the ambulance on a call out. The recently published white paper from the Norwegian government describing the prehospital system in Norway is critical of declining GP participation in call outs and recommends a higher degree of GP participation in medical emergencies outside hospitals.[5]

Despite regulations,[4] GPs are alerted by the EMCC in no more than 47% of emergency incidents and participate in less than half (42%) of these.[6] A study among EMTs found that they perceived themselves as being more competent than others in handling prehospital emergencies.[7] GPs were described as being the most problematic occupational group to cooperate with during emergencies.[7] Consequently, it has been suggested that the public is better served by better trained and equipped EMTs operating on their own.[8] However, other studies indicate that GPs may contribute substantially in terms of improved diagnostics, early treatment, and transportation to the appropriate level of care when needed.[9–11]

Like other resources, the GP is limited as a resource in prehospital emergency medicine. Evidence of how to use this resource wisely is still sparse. In the present study, we wanted to learn more about how GPs value their role in emergency medicine and their thoughts about taking part in and how they decide to participate in call outs.

Materials and methods

Study design

Using qualitative methodology, we conducted four focus group interviews in rural casualty clinics in Norway between October 2014 and February 2015.

Participants and recruitment

We wanted to talk to GPs who worked in casualty clinics situated in rural areas throughout Norway. Via a colleague of MH, we established contact with one group of young doctors who met regularly to discuss medical issues as part of specialist training. We performed the first focus group interview with this group. The other three groups consisted of GPs working at casualty clinics in rural areas where we knew the doctors in charge of the clinics. We emailed the doctors in charge, asking them to distribute the invitation to their colleagues. All doctors were welcome; the only requirement was that they had actual experience at casualty clinics. We specified in the email that we aimed for variety in experience and between five and eight participants. The first group included ten GPs with experience ranging from one to five years. The other groups had four to five participants with experience ranging from less than one year to more than 30 years. Of the 24 GPs who participated in interviews, eight were female and 16 male (Table 1).

Table 1. Focus groups, participants and experience.

Participants	Gender	Years of experience
Teaching group (A)		
GP 1	Male	2
GP 2	Male	1
GP 3	Male	3
GP 4	Male	2
GP 5	Male	2
GP 6	Female	2
GP 7	Female	5
GP 8	Female	2
GP 9	Female	2
GP 10	Male	2
Casualty clinic (B)		
GP 11	Female	3
GP 12	Male	14
GP 13	Male	32
GP 14	Male	25
GP 15	Female	5
Casualty clinic (C)		
GP 16	Male	4
GP 17	Male	1
GP 18	Male	23
GP 19	Male	<1 (intern)
Casualty clinic (D)		
GP 20	Male	<1 (intern)
GP 21	Female	7
GP 22	Female	6
GP 23	Male	8
GP 24	Male	23

Data collection and analyses

We created an interview guide based on the research questions, existing evidence, and our own clinical experience (Appendix 1). The focus group interviews were then conducted by MH, while PH observed, took notes, and asked follow-up questions at the end. MR was present at the first interview to observe and supervise MH and PH. MH and PH compared field notes after each interview and continuously refined the interview guide. All interviews were audio recorded and later transcribed by MH. Data sampling was terminated after four interviews because the

preliminary analysis indicated that we had enough data to answer our research question, and we started to come across the same patterns.

The data were analyzed using thematic analysis as described by Braun and Clarke.[12] All three authors read through the data after each interview, searching for meanings and patterns. MH then suggested initial codes, that is,. elements of data that were of interest. The codes were then discussed among the authors. Based on these discussions, MH developed potential themes, that is, groups of codes that fit together. The themes were discussed and reviewed, and during this process, MH reread all interviews to validate the themes. At the end of the process, we defined and named the themes. Analysis and coding was a continuous process throughout the write-up.

Research team

The research team was composed of two academic and clinical GPs (MH and PH) and a specialist in medical anthropology (MR).

Results

Emergency medicine is now dominated by other professions

The GPs told us that their role in local emergency medicine has changed over the last few decades. The experienced GPs described a shift from being the community's sole provider of emergency care to being one of many players. The evolution in emergency medicine and transportation has led to a number of patients, such as those with stroke or heart attack, being admitted directly to the hospital by EMTs or the HEMS without the involvement of a casualty clinic GP.

And there is a great change. From being number one, the one and only, to not being in the loop at all. I cannot understand that the EMCC nurse can tell me as the doctor on call to just stay put. "You do not have to participate in the call out." I have heard that several times. Especially concerning stroke. "The helicopter will soon be there." And that is good, for the patient, but we (casualty clinic GPs) get sidelined (GP18; interview number:-page in transcription, C:13; see Table 1).

The experienced doctors reflected on how they have lost a great deal of their professional identity in this shift, whereas the younger doctors tended to be more open to change. The younger GPs thought it was natural that the EMTs took greater responsibility for prehospital emergencies. This difference in attitudes toward the change in task division was apparent in all of the communities we visited. Due to the evolution of EMT-staffed ambulances, the GPs acknowledged that EMTs may often be able to select, with telephone guidance from a doctor, which patients to admit straight to the hospital and which patient should be brought to the casualty clinic for further examination. Some even argued, that in the future, EMTs would handle all critically ill patients without the help of the casualty clinic GP.

It is adequate health care to respond (with an EMT-only ambulance) to some of the patients with pain in their chest or stomach. So it isn't unsafe that a doctor is not coming along (on the call out).

But I choose to go along anyway when it is possible because the quality improves when I take part (GP17; C:4)

The GP in this example argued that EMTs would deliver appropriate health care in many classical emergency situations. Nevertheless, he then added that the quality improves when he, as a GP, takes part. We encountered this ambiguity often when the role of the GP was discussed. Some local communities are served by EMTs alone in emergency situations; the GPs would perceive this as safe but emphasize that their role makes a qualitative difference.

The less-experienced GPs reported limited participation in call outs. Consequently, they had less experience and tended to feel uncomfortable in emergency settings. They also thought that personal relationships with the EMTs would suffer from this lack of participation, possibly resulting in sub optimal work at the scene of the accident. However, even the more experienced doctors recognized this insecurity caused by fewer call outs.

Because emergency medicine is rare, the doctors emphasized that it was important for them to take part in the call outs in order to maintain their emergency medicine skills. During call outs, they get to see patients with medical problems that would not turn up in the casualty clinic. This experience is considered vital given that the ambulance could be absent for extended periods of time, leaving the GPs to handle call outs alone.

Suddenly we are at the scene and are supposed to know [emergency medicine], and doing it all alone, since the other resources are preoccupied. So it is all right to be able to come along, to take part in most of what is going on (call outs) (GP11; B:10).

Some of the GPs also mentioned that because call outs are so rare, it is important to train together with the EMTs. Training sessions were seen as opportunities to get to know each other and minimize the GPs' worry about participating in real situations.

GPs are still an important part of local emergency medicine

Despite less frequent call outs, the GPs still perceived emergency medicine as a natural part of being a doctor in a rural community. Overall, the doctors wanted to be alerted and were positive toward participating in call outs when necessary.

The GPs were under the impression that the local community appreciated their presence on call outs. They reasoned that, because the GPs care for their patients during all parts of life, it is innate to care for them during emergencies as well. The GPs' personal knowledge of their patients is thought to improve patient care.

As the local GP you will have to handle the follow-up (after an accident). So by taking part in current events, you will be better qualified to take care of the family and to follow-up. So I think that it is really important (that the GP is at the scene), even though there are plenty of personnel at the scene to handle the technical part of a resuscitation, it is more to it than just that (GP 14;B:3).

The GPs argued that they have a special interest in taking part in emergency medicine as they work in the community where they live. As fellow citizens they have a tacit and continuous understanding of the local community. Another important reason for taking part in emergencies according to the GPs is that they are the ones taking care of the patient and relatives afterwards. The GPs argued that the follow-up improves when they are involved in the situation from the beginning.

The GPs all experienced contributing to better patient care when participating in call outs. Their main contribution was described in terms of broader medical knowledge and superior diagnostic skills. Potential benefits were early initiation of treatment and the organization of transport to the appropriate level of care, but also the identification of cases in which the patient would be better off staying at home. The GPs could also offer an extra pair of hands, which is often needed in emergency situations.

Yes, then it is logistics, that one can bypass the casualty clinic. That the assessment otherwise done at the casualty clinic is done at the scene and one can proceed straight to the right level of treatment (GP 2;A:9)

The GPs challenged the presumption inherent in research and regulations that GP participation means leaving the casualty clinic to see the patient at the scene. They pointed out that they often participate in emergencies without leaving the casualty clinic, such as by phone or radio. In other situations, they saw the patient at the casualty clinic because the patient turned up there instead of calling the EMCC.

It is the HEMS that takes care of [heart attack and stroke] patients now, except those that turn up directly at the casualty clinic. And they are quite a few, who don't call the EMCC and just turns up at the clinic (GP 13; B:12)

These patients may be just as ill as the patients that are the subject of call outs, and the casualty clinic has to be prepared to handle these cases. Furthermore, in the areas located far from hospitals, EMTs usually take the patient to the local casualty clinic, not directly to a hospital. In these cases, the patient is seen by a GP, even if the GP did not take part in the call out.

The decision whether to leave the casualty clinic is difficult

When deciding whether to leave the casualty clinic, the GPs often considered where they would be needed the most. Some GPs were afraid of putting the casualty clinic in jeopardy if leaving for a call out. Consequently, they would need to know the distance to the ill or injured patient and how long they would be away. Other seriously ill patients expected at the casualty clinic may be a reason to stay there. Furthermore, the number of patients in the waiting room would have some weight in the decision.

The casualty clinic, the casualty clinic without a doctor, it will not function. A call out can actually function without a doctor (only EMTs) (GP10;A:18).

Others thought that incoming patients or patients in the waiting room would hardly constitute a reason against leaving the casualty clinic. They argued that cases triggering a call out would usually be more serious than other cases. Furthermore, through formal or informal back up systems, the casualty clinic could always get another doctor if needed.

It is not very often that I do not respond to a call out. … I believe I usually take part, even though I have patients waiting at the clinic. It is very seldom that I am working with a patient at the clinic that is more severe than the patient the call out is about (GP 23;D:10)

When asked how the information from the EMCC influences their decision to leave the casualty clinic on call outs, the GPs had different opinions. Some told us that they responded to all call outs unless they were tied up with a seriously ill patient at the casualty clinic, regardless of the details offered by the EMCC. Other GPs were more specific and told us that they responded to accidents, cardiac arrests, situations involving many patients or if the patient's condition

was perceived as serious. Sometimes they chose to participate in a call out if informed that there were few other resources available.

It was a serious event the traffic accident. And then it is, as we all agreed upon, important that the doctor is present. But then again there is the issue of knowing (whether it is a serious event beforehand) (GP 10;A:11).

They used words such as "potentially serious" or "dramatic" as examples of cases they would attend to, but they had trouble exemplifying what they meant. The GPs also talked about difficulties identifying these cases beforehand.

I have not seen any guidelines on that. And they probably do not exist. And people feel that what the experienced doctors do is based on experience, and random. I know doctors who consistently say, "no, chest pain, we do not respond to that"… Whereas another doctor says that we have to respond to chest pain in our area, "it might turn into a cardiac arrest etc." That makes me think, that there are two distinct opinions on what to respond to. Concerning something that is so… chest pain, that is something one should be able to make guidelines about (GP 2;A:17)

The above GP is frustrated that his more experienced colleagues give him different advice when he asks for guidance. At least for some typical cases, such as chest pain, he argues that there should be guidelines recommending when the doctor should participate in the call out.

Apart from patient characteristics, some doctors noted that organizational factors, such as being collocated with the ambulance service, increased the likelihood of GP participation in call outs. When co-located the EMTs and GPs often briefly discussed the case together before the GP decided whether to participate.

The GPs generally thought that the decision of whether to attend a call out was difficult. They felt that they could not attend every time, but they were also afraid of missing out on helping an ill patient. The information from the EMCC was often perceived as insufficient. GPs felt that the EMCC was inaccurate in their assessment and that the patients were seldom as ill as expected (i.e., a high degree of over triage). The GPs had experienced the situation appearing less urgent when they obtained more information, often choosing then to not attend the call out. Other GPs acknowledged that the EMCC has a difficult job selecting patients and that some over-triage must be accepted. Some GPs follow their gut instinct, and others choose to go along with almost all call outs. Evidently, the GPs have different ways to deal with the difficult question of how to respond to the alarm. Even though the GPs described the decision as being difficult, they still felt that the local doctor should decide whether to leave the casualty clinic.

Discussion

Principal findings

This study explored GPs' views regarding their role in emergency medicine. According to the GPs, their role has changed from being the only provider of emergency care to being one of many participants. Yet, the GPs felt that they still play an important part in emergency medicine as the prehospital work is thought to improve when they participate in call outs. Participation is also thought to lead to increased skills and competence crucial to attending to grave illness on their own. However, it might be acceptable practice that ambulance personnel handle call outs on their own. We found that GPs have different approaches when deciding whether to participate in call outs.

Strengths and limitations

The strength of this study is that we had the opportunity to explore the GPs' thoughts and experiences in depth. In this way, the study supplements the quantitative studies already done in this field. We are not aware of any similar studies. The organization of casualty clinics and prehospital care in Norway and Scandinavia has a heterogeneous structure. However, we think that our findings are relevant for rural communities where casualty clinic GPs and EMTs form the basis of emergency medicine resources.

The study is based on focus group interviews in which the GPs narrated their thoughts and experiences to the researchers, and this method does not capture decisions and actions made in real life. Furthermore, as the data are a result of context-dependent social interactions, we acknowledge that there has been a process through which participants attributed authority to the knowledge claims of others.[13] As the GPs who were interviewed are located in rural districts, we cannot exclude that GPs from urban areas may have other thoughts and experiences. The interviews, except the first, were performed by two GPs. It is possible that interviewers with other backgrounds would have identified other aspects.

Given PH's background working with rural medicine and MH's background working with casualty clinics, we were aware of potential bias in favor of active GP involvement in local emergency care. The fact that

one of our main findings points to less GP involvement indicates that this is not the case. On the other hand, we think that our clinical and academic experience in the field helped us connect and communicate with the GPs we interviewed.

Findings in relation to theory and other studies

The change in the role of the GP as described by the experienced physicians we interviewed is an international phenomenon, with specially trained nurses now doing work formerly done by GPs and other physicians.[14] The GPs had a pragmatic attitude toward participation in emergencies outside the casualty clinic. Even if the GPs believed that patient care improved in their presence they also thought that it is often sufficient to send the EMTs alone. We also got the impression that whether the patient was seen by a GP sometimes depended on the GP on call and factors at the casualty clinic, not necessarily on patient characteristics. This random GP participation was not an issue in the potentially most serious cases, but then even these patients would not be seen by a GP if they occurred in areas served only by EMTs. That EMT assignments have evolved was one of the key results when Norwegian EMTs were interviewed about the role of the GP in pre-hospital emergency medicine in 2014.[11] Although this change in task division in prehospital acute incidents has been described by other parts of the emergency care community,[8] we have not found this to be clearly stated by GPs in other studies.

The GPs in our study reported that patient treatment improved when they took part in prehospital treatment. EMTs interviewed in 2014 shared this opinion.[11] Studies have found that GPs improve patient care by improving diagnostics and decision making.[9–11] Significant medical expertise was also found to be the important reason for the presence of a doctor in an observational study from Bergen in 2015.[15] We found that GPs relate the improvement in patient care to local knowledge of patients' lives. This phenomenon was described by Helman, who argued that a GP in a local context has a different form of communication, that is, high context communication, with the patient because he or she often lives in the community and knows the patient and his family. Being sensitive to context is thought to improve medical treatment.[16] The GPs we interviewed all wanted to participate in the most acute cases, but not all found it necessary to take part in the less dramatic alarms. We argue, however, that it is in these less dramatic cases that the GPs' medical expertise is most valuable, including the possibility of letting the patient stay at home.

The difficulty of delivering the right resource to the right patient (i.e., triage) was a recurrent theme. The GPs wanted the EMCC to be better at selecting the patients in need of a GP. At the same time, the GPs themselves had difficulty identifying the types of cases in which they would contribute most. The information from the EMCC was also described by the GPs as being insufficient. On the other hand, the GPs' assessment of whether to participate in call outs differed in seemingly similar cases and we could not clearly identify what kind of information would simplify the decision-making process. The importance of the quality of the notification from the EMCC on each GP's decision was also highlighted in a study of 252 incidents in 2015.[15] The challenge of the EMCC picking out the right resource for the right patient was recently discussed in a paper on the use of HEMS in Norway.[2] A study from 2013 showed that the EMCC assessment was downgraded in 42% of cases and upgraded in 11% of cases when the patient was seen by a GP.[9] The problem of under triage was also shown in a systematic review of telephone triage in out-of-hours care.[17] Interestingly, the GPs we interviewed mentioned under-triage to some extent, but most of their concern dealt with the possibility of over triage. The GPs called for better triage by the EMCC in order to identify the cases most suited for GP participation. Rørtveit argued in 2013 that there are few evaluations of the effectiveness and reliability of prehospital emergency systems and that health care personnel often do intuitive triage when they examine the patient.[10] The evidence that triage systems are based on is weak, and when the Norwegian Knowledge Center for health services performed a comprehensive search for studies in order to evaluate triage systems for prehospital care they could not complete the review because of a lack of scientific evidence.[18] Based on this knowledge, it may be unrealistic to expect that the EMCC will be better at triaging given the tools they have at the moment. Perhaps the best solution is, for the GPs to decide case by case based on the information given by the EMCC.

Implications for practice, policy and research

In regards to the presence of the GP improving patient care, our findings suggest an inequity in health care, as it seems somewhat random as to whether a patient gets to see a GP on call outs. Further research is needed to determine whether and in what ways GP participation actually improves patient care, bearing in

mind that GPs do participate in emergency medicine without necessarily taking part in call-outs. If it is possible to identify more precisely the cases in which a GP can make a difference and to incorporate this into the EMCC's decision making tools, the use of GPs may be become more precise and GP involvement improve.

Conclusions

The role of the GP in emergency medicine in rural Norway has changed, but they still consider themselves as playing an important part. GPs want to take part in callouts in order to maintain skills, serve the local community and improve patient care. However, they find it defensible that patients are seen by EMTs on their own. The decision of whether to take part in call outs was perceived as difficult, and the GPs wanted more information to aid them in this decision. The GPs had divergent approaches when deciding whether to participate in call outs. The current situation, with somewhat arbitrary and possibly inequitable use of GPs in call outs, is probably at odds with the preferences of patients, policymakers and clinicians. Further research might contribute to better legislation, better decision-making tools, and ultimately to putting GPs where they really count.

Acknowledgements

The authors thank the GPs that took part in this study.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Funding

Magnus Hjortdahl is funded by the Norwegian Research Fund for General Practice.

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Appendix 1

Interview Guide, as used during the first interview

Aims: To gain insight into the participants' experiences and attitudes toward emergency medicine.

To gain insight into the participants' experiences and attitudes toward participating in call outs.

Themes to discuss: Role of GPs in emergency medicine:
What is your role as a casualty clinic GP in emergency medicine?
How can you contribute as GP?
Can you recount an experience when you played an important role?
How did you contribute in this example?
In what way are you prepared to take part in medical emergencies?
What is the most important factor contributing to you performing in medical emergencies?
What challenges do you face as a GP in medical emergencies?
What can be done to make you perform better in medical emergencies?
Role of GPs in outs
What is your experience with call outs?
What is your role when you take part in call outs?
How do you decide whether to participate in call outs?

Cases to discuss Case 1

You are working at your local casualty clinic. It is 7:30 in the evening. There are several patients waiting to be examined by you and the alarm sounds.

The EMCC are dispatching an ambulance to a 60-years-old male with chest pain and wonder if you will take part in the call out.

Discuss
What is your immediate reaction?
Which aspects influence your decision?

Case 2

You are working at your local casualty clinic. It is 7:30 in the evening. There are several patients waiting to be examined by you and the alarm sounds.

The EMCCs are dispatching an ambulance to a traffic accident. A car has driven of the road 40 min outside of town hitting a tree at the side of the road. There were two people in the car. They are awake but complaining of stomach and chest pain. The EMCC wonder if you will take part in the call out.

Discuss
What is your immediate reaction?
Which aspects influence your decision?

Scandinavian Journal of Primary Health Care

ISSN: 0281-3432 (Print) 1502-7724 (Online) Journal homepage: http://www.tandfonline.com/loi/ipri20

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To cite this article: Magnus Hjortdahl, Erik Zakariassen & Peder A. Halvorsen (2018) Self reported involvement in emergency medicine among GPs in Norway, Scandinavian Journal of Primary Health Care, 36:2, 161-169, DOI: 10.1080/02813432.2018.1459234

To link to this article: https://doi.org/10.1080/02813432.2018.1459234

Published online: 10 Apr 2018.

SCANDINAVIAN JOURNAL OF PRIMARY HEALTH CARE
2018, VOL. 36, NO. 2, 161–169
https://doi.org/10.1080/02813432.2018.1459234

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RESEARCH ARTICLE

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Self reported involvement in emergency medicine among GPs in Norway

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ABSTRACT

Objective: To examine general practitioners' (GPs') perception of their role in emergency medicine and participation in emergency services including ambulance call outs, and the characteristics of the GPs and casualty clinics associated with the GPs' involvement in emergency medicine.
Design: Cross-sectional online survey.
Setting: General practice.
Subjects: General practitioners in Norway ($n = 1002$).
Main outcome measures: Proportion of GPs perceiving that they have a large role in emergency medicine, regularly being on call, and the proportion of ambulance callouts with GP participation.
Results: Forty six percent of the GPs indicated that they play a large role in emergency medicine, 63 percent of the GPs were regularly on call, and 28 percent responded that they usually took part in ambulance call outs. Multivariable logistic regression analyses indicated that these outcomes were strongly associated with participation in multidisciplinary training. Furthermore, the main outcomes were associated with traits commonly seen at smaller casualty clinics such as those with an absence of nursing personnel and extra physicians, and based on the distance to the hospital.
Conclusion: Our findings suggest that GPs play an important role in emergency medicine. Multidisciplinary team training may be important for their continued involvement in prehospital emergencies.

KEY POINTS

Health authorities and other stakeholders have raised concerns about general practitioner's (GPs) participation in emergency medicine, but few have studied opinions and perceptions among the GPs themselves.

- Norwegian GPs report playing a large role in emergency medicine, regularly being on call, and taking part in selected ambulance call outs.
- A higher proportion of GPs who took part in team training perceived themselves as playing a large role in emergency medicine, regularly being on call, and taking part in ambulance call outs.
- These outcomes were also associated with attributes commonly seen at smaller casualty clinics.

ARTICLE HISTORY
Received 11 September 2017
Accepted 14 February 2018

KEYWORDS
Primary health care; emergency medical services; out-of-off hours service; general practitioner; Norway; prehospital emergency medicine; casualty clinic

Background

General practitioners (GPs) are involved in emergency medicine in different ways in different countries. They encounter emergency medicine during office hours, outside of office hours, and in both metropolitan and rural areas [1–3]. In some countries, GPs' involvement both before and after the patient arrives at the hospital is thought to improve patient care and ease the strain on overcrowded emergency departments [4–6]. In Norway, GPs are totally integrated into pre hospital

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emergency medicine [7] and GP-staffed casualty clinics (out-off-hours emergency primary care services) together with the emergency medical technician (EMT) staff of ambulances are the primary prehospital emergency resources. All GPs in Norway are obliged to be on call at the local casualty clinic, but how often they do this differs between municipalities. The organization and structure of the casualty clinics are heterogeneous because they vary in size, staffing, population served, and area covered. The casualty clinic can serve a single municipality or several municipalities, or a sparsely populated area or a large city. The municipality is responsible for offering its inhabitants a casualty clinic staffed with a physician on call 24 h, 7 days per week, but otherwise the staffing varies from a single physician, with or without a colleague on standby at home, to several physicians working at the same time. Some have no nursing staff, whereas others might have several nurses and other ancillary personnel. Some casualty clinics are equipped with a response vehicle for the physician on duty, with or without a dedicated driver.

In the case of a suspected life-threatening event, severe injury, or disease, the emergency communication center (EMCC) will dispatch an ambulance (an ambulance call out). An alarm will simultaneously be sent to the GP on call at the local casualty clinic. The GP on duty then has to decide whether to leave the casualty clinic and attend to the patient at the site (i.e., take part in the ambulance call out) or let the EMTs take care of the patient by themselves. According to Norwegian legislation, the GP on call is obliged to take part in the ambulance call out whenever it is necessary [7]. A study from 2010 found that GPs take part in half of ambulance call outs [8], and a recent white paper on prehospital emergency medicine in Norway raised the concern that GPs take part in too few ambulance call outs [9]. GPs have described a lack of confidence in emergency medical skills [10], and challenges in the cooperation between GPs and EMTs on ambulance call outs have been reported [11].

Although health authorities and other stakeholders have expressed concerns about GPs' participation in out-of-hours services, few have studied the opinions and perceptions among the GPs themselves. The aim of this study was to examine the GP's perception of their own role in emergency medicine, their participation in out-of-hours emergency services and ambulance call outs, and the characteristics of the GPs and the casualty clinics associated with GPs' involvement in emergency medicine.

Methods

Participants and data collection

In August 2016, all Norwegian GPs registered by the Norwegian Health Economics Administration (HELFO database) ($n = 4701$) were invited by postal mail to take part in an online survey about Norwegian GPs and emergency medicine. The first invitation was followed up by two reminders, also sent by postal mail. Furthermore, the Norwegian Center of Rural Medicine provided news coverage to urge GPs to participate; the outreach was posted twice on Facebook (11 September and 29 September 2016). We observed that the use of social media was associated with an increase in survey answers. We used Questback as the supplier of the web-based survey.

Questionnaire

We developed the questionnaire based on information from two qualitative studies conducted by MH in 2014 and in 2016. In the first study, we examined the EMTs experiences when working with GPs in emergency medicine [12]. In the second study, we examined rural GPs' attitudes towards participating in emergency medicine [13]. The survey was piloted on a group of local GPs in Alta, Northern Norway. The survey included questions about the GPs' perceptions of their own role in emergency medicine, and their participation in out-of-hours services and ambulance call outs. We also included socio-demographic data of the GPs and characteristics of their local casualty clinics. For other purposes (not reported here), we asked the GPs about their confidence in performing emergency procedures, their risk attitude, and whether they would participate in hypothetical ambulance call outs.

Outcome measures

We had three primary outcome measures. The first was to determine to what degree the GPs feel that they play a role in emergency medicine as measured on a Likert scale anchored at 1 (small degree) and 6 (large degree). The second was how often they were on call during the last year. Possible response options were weekly (1), monthly (2), twice (3), once (4), and not at all (5). The third outcome was the proportion of ambulance call outs in which they usually participate. Response options were "not relevant" (1), "never" (2), "25%" (3), "50%" (4), "75%" (5), and "always" (6).

Independent variables

To test for associations between primary outcomes and GP characteristics, we included the independent variables gender, age, patient list size, and if the GP was a specialist. This was done in order to see if more experienced GPs were more involved, and if GPs with fewer patients listed were more involved. To explore associations between casualty clinic characteristics and primary outcomes, we included the type of casualty clinic (municipal, inter-municipal, large city) and location (more or less than a 60-minute drive by car from the nearest hospital). These variables were included to explore whether GP involvement in emergency medicine is mainly a rural phenomenon. Furthermore, we included information about staffing (physicians in the clinic, extra standby physicians at home, nurses), colocation with ambulance services, a dedicated vehicle for the GP, and multidisciplinary team training. These are organizational characteristics thought to make it easier for the GP to work at the casualty clinic and to take part in callouts.

Statistical analysis

Descriptive data of the GPs was presented using means and percentages. We used multivariable logistic regression to explore possible associations between the independent variables and our primary outcome measures. The outcome measures were dichotomized. The GP's role in emergency medicine was dichotomized into playing a large role (5 and 6) and not playing a large role (1, 2, 3 and 4). Being on call was dichotomized into being on call regularly (1 and 2) and not being on call regularly (3, 4, and 5). Participation in ambulance call outs was dichotomized into usually taking part in call outs (5 and 6) and not usually taking part in call outs (1, 2, 3, and 4). Analyses were done using IBM SPSS Statistics 23. P values <0.05 were considered as statically significant. MH and PH analyzed the data independently.

The study was approved by the Data Protection Official for Research, Norwegian Center for Research Data, which is the privacy ombudsman for all Norwegian Universities.

Results

Of the 4701 GPs invited, 1013 responded. Eleven respondents were excluded from further analyses because they were not GPs, leaving us with a total of 1002 responders. Our sample was fairly representative of Norwegian GPs with respect to age, gender, number of patients on the GPs list and specialist status, although the mean age was slightly younger and the proportion of females was slightly higher. Thirty five percent worked at a clinic covering a single municipality, 50 percent worked at inter municipal clinics, and 15 percent worked at one of four large city clinics; 26 percent of the respondents worked more than one hour's drive from the nearest hospital. Because about 19 percent of Norwegian GPs work in rural municipalities [14], rural doctors were slightly overrepresented (Table 1).

Table 1. Characteristics of the respondents.

	Respondents $n = 1002$	All Norwegian GPs $n = 4701$
Mean age, years	45	48
Females	439/988[a] (44%)	41%
Mean number of patients on GP list	1044	1128
Specialist	568/992[b] (57%)	53%
Rural	247/965[c] (26%[d])	19%[e]

[a]14 missing answers.
[b]10 missing answers.
[c]37 missing answers.
[d]Rural was defined as over one-hour drive to closest hospital.
[e]Rural defined according to classification of centrality, Statistics Norway.

Forty six percent of the GPs indicated that they play a large role (5 or 6 on a scale from 1 = very low to 6 = very high) in emergency medicine (Figure 1), 63 percent were on call regularly (weekly or monthly) (Figure 2), and 28 percent answered that they usually (between 75 and 100 percent of the time) took part in ambulance call outs when asked by the EMCCS (Figure 3, Table 2).

The perception of playing a large role in emergency medicine was associated with working a long distance from the hospital (adjusted odds ratio [OR] 1.77, 95% confidence interval [CI] 1.23–2.55), working with no nursing staff (adjusted OR 1.55, 95% CI 1.03–2.35), and with taking part in team training once a year (adjusted OR 1.59, 95% CI 1.07–2.35) or more often than once a year (adjusted OR 4.17, 95% CI 2.11–8.07) (Table 3).

Being on call regularly was associated with working at a casualty clinic staffed with only one physician at all times (adjusted OR 1.86, 95% CI 1.21–3.43) or one staffed with only one physician part of the time (adjusted OR 1.86, 95% CI 1.04–3.34), working at a casualty clinic with no nursing staff (OR 3.06, OR 1.77–5.29), and with taking part in team training once a year (adjusted OR 1.72, 95% CI 1.10–2.69) or more often than once a year (adjusted OR 2.71, 95% CI 1.22–6.05) (Table 4).

Taking part in ambulance call outs when alerted by the EMCC was associated with working in a municipal

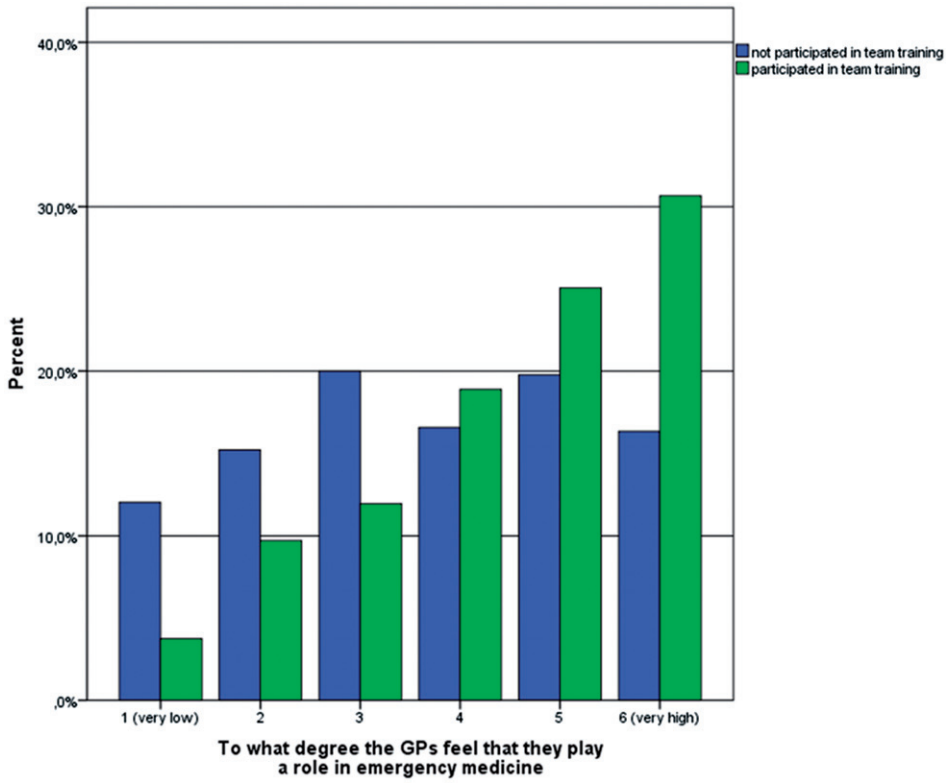

Figure 1. GPs' role in emergency medicine.

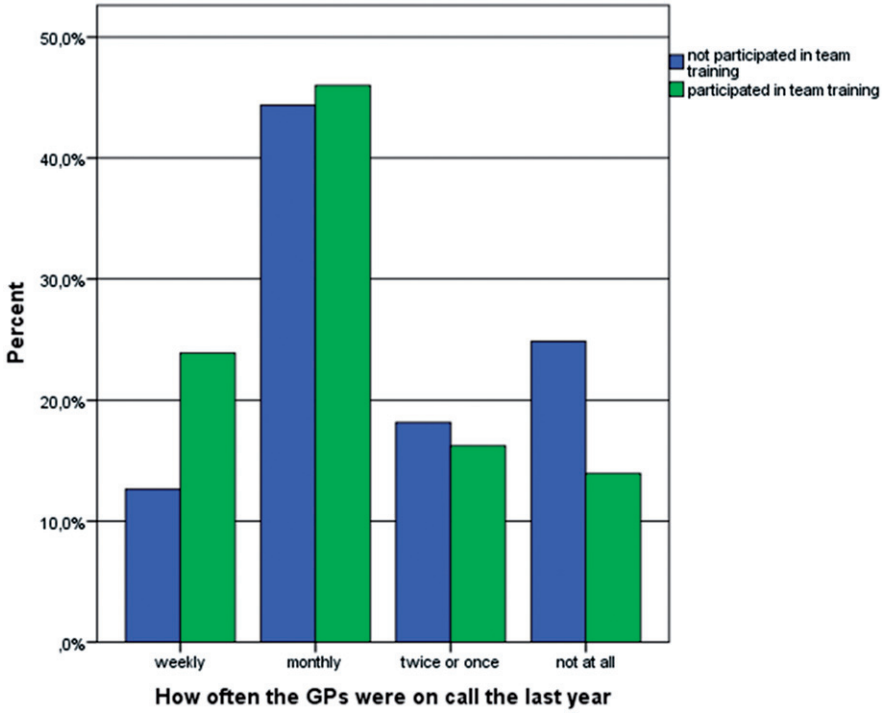

Figure 2. Frequency of being on call.

casualty clinic (adjusted OR 2.69, 95% CI 1.36–5.32), working without a GP on standby (adjusted OR 1.80, 95% CI 1.11–2.91), working with no nursing staff (OR 1.62, 95% CI 1.06-2.47), and with taking part in team training less than once per year (adjusted OR 1.61, 95% CI 1.07–2.44), at least once per year (adjusted OR 2.77, 95% CI 1.77–4.31), or more often than once per year (adjusted OR 3.84, 95% CI 2.11–6.98).

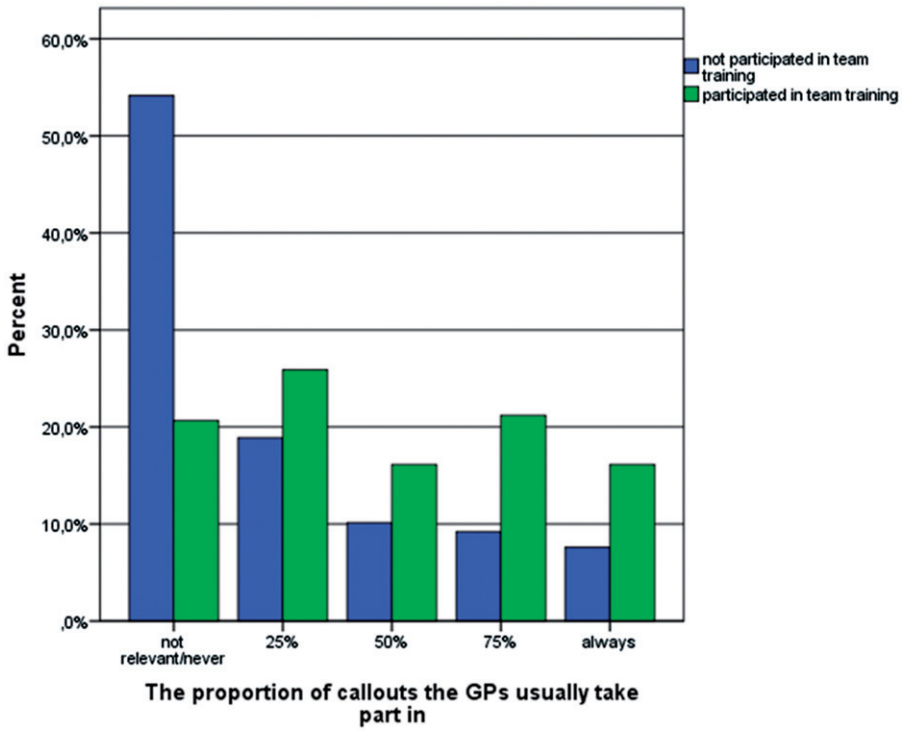

Figure 3: Participation on call outs.

Table 2. Multivariable logistic regression analyses: associations between GPs' perceptions of playing a large role in emergency medicine and casualty clinic characteristics.

Independent variables	GPs perceiving that they play a large role in emergency medicine	OR crude (95% CI)	OR adjusted (95% CI)
Casualty clinic location			
Municipal	187/334 (56%)	2.68[a] (1.77–4.05)	1.23 (0.70–2.15)
Inter municipal	221/474 (47%)	1.84[a] (1.24–2.73)	1.24 (0.74–2.06)
Large city	46/143 (32%)	Ref	
Are there several GPs at work			
Yes	94/270 (35%)	Ref	
On and off	97/242 (40%)	1.25 (0.86–1.73)	0.93 (0.57-1.51
No	169/431 (61%)	2.90[a] (2.12–3.98)	1.43 (0.84-2.44)
Extra GP on stand by			
Yes	154/424 (36%)	Ref	
No	294/514 (57%)	2.34[a](1.80–3.05)	1.38 (0.93–2.04)
Co-located ambulance			
Yes	163/245 (67%)	Ref	
No	290/716 (41%)	0.82 (0.63–1.07)	0.80 (0.59–1.08)
Dedicated response vehicle			
Yes, with driver	60/169 (36%)	0.60[a] (0.42–0.85)	1.02 (0.63–1.66)
Yes, without driver	97/163 (60%)	1.60[a] (1.12–2.26)	1.06 (0.71–1.60)
No	294/613 (48%)	Ref	
Distance to hospital			
More than 60 minutes	163/245 (67%)	2.92[a] (2.15–3.96)	1.77[a] (1.23–2.55)
Less than 60 minutes	290/716 (41%)	Ref	
Nursing staff present			
Yes	303/736 (41%)	Ref	
No	147/213 (69%)	3.18[a] (2.30–4.40)	1.55[a] (1.03–2.35)
Team training			
Never/not relevant	159/440 (36.1%)	Ref	
Less than annually	134/259 (52%)	1.90[a] (1.39–2.59)	1.39 (0.98–1.98)
Annually	104/202 (52%)	1.88[a] (1.34–2.63)	1.59a (1.07–2.35)
Several times a year	60/74 (81%)	7.57[a] (4.10–13.99)	4.17a (2.11–8.07)

Adjusted for gender, age, and specialist status.
[a]$p < 0.05$.

Table 3. Multivariable logistic regression analyses: associations between being on call regularly and casualty clinic characteristics.

Independent variables	Being on call regularly	OR crude (95% CI)	OR adjusted (95% CI)
Casualty clinic location			
Municipal	226/327 (69%)	2.47[a] (1.65–3.70)	0.81 (0.45–1.46)
Inter municipal	320/464 (69%)	2.45[a] (1.67–3.59)	1.42 (0.84–2.41)
Large city	68/143 (48%)	Ref	
Are there several GPs at work			
Yes	128/263 (49%)	Ref	
On and off	159/237 (67%)	2.15[a] (1.50–3.09)	2.04[a] (1.21–3.43)
No	323/426 (76%)	3.31[a] (2.38–4.60)	1.86[a] (1.04–3.34)
Extra GP on stand by			
Yes	213/414 (56%)	Ref	
No	377/507 (74%)	2.30[a] (1.74–3.03)	1.45 (0.95–2.25)
Co-located ambulance			
Yes	229/351 (65%)	Ref	
No	378/565 (67%)	1.08 (0.81–1.43)	1.01 (0.71–1.41)
Dedicated response vehicle			
Yes, with driver	84/164 (51%)	0.50[a] (0.35–0.71)	1.02 (0.62–1.70)
Yes, without driver	121/160 (76%)	1.48 (0.99–2.01)	0.99 (0.61–1.59)
No	409/604 (68%)	Ref	
Distance to hospital			
More than 60 minutes	179/242 (74%)	1.83[a] (1.33–2.54)	1.18 (0.77–1.81)
Less than 60 minutes	426/701 (61%)	Ref	
Nursing staff present			
Yes	432/724 (60%)	Ref	Ref
No	177/210 (85%)	3.63[a] (2.43–5.41)	3.06[a] (1.77–5.29)
Team training			
Never/not relevant	248/435 (57%)	Ref	
Less than annually	177/256 (70%)	1.69[a] (1.22–2.34)	1.26(0.85-1.88)
Annually	130/193 (67%)	1.56[a] (1.09–2.22)	1.72[a] (1.10–2.69)
Several times a year	59/75 (79%)	2.78[a] (1.55–4.99)	2.71[a] (1.22–6.05)

Adjusted for gender, age, and specialist status.
[a]$p < 0.05$.

Table 4. Multivariable logistic regression analysis: associations between usually taking part in ambulance call outs and casualty clinic characteristics.

Independent variables	GPs usually taking part in ambulance call outs	OR crude (95% CI)	OR adjusted (95%CI)
Casualty clinic location			
Municipal	141/330 (43%)	3.83[a] (2.33–6.92)	2.69[a] (1.36–5.32)
Inter municipal	106/473 (22%)	1.48 (0.90–2.43)	1.52 (0.80–2.91)
Large city	23/141 (16%)	Ref	
Are there several GPs at work			
Yes	54/269 (20%)	Ref	
On and off	367240 (15%)	0.70 (0.44–1.12)	0.64 (0.34–1.20)
No	178/428 (42%)	2.84 (1.20–4.04)	1.24 (0.66–2.35)
Extra GP on stand by			
Yes	74/422 (18%)	Ref	
No	194/511 (38%)	2.88[a] (2.12–3.92)	1.80[a] (1.11–2.91)
Co-located ambulance			
Yes	112/357 (31%)	Ref	
No	157/570 (28%)	0.83 (0.62–1.11)	0.77 (0.55–1.10)
Dedicated response vehicle			
Yes, with driver	44/168 (26%)	0.96 (0.65–1.42)	1.85 (1.05–3.26)
Yes, without driver	63/163 (38%)	1.71[a] (1.19–2.46)	1.13 (0.73–1.75)
No	164/609 (27%)	Ref	
Distance to hospital			
More than 60 minutes	98/245 (40%)	2.14[a] (1.57–2.91)	1.17 (0.89–1.73)
Less than 60 minutes	168/707 (24%)	Ref	
Nursing staff present			
Yes	168/729 (23%)	Ref	
No	103/214 (48%)	3.10[a] (2.25–4.26)	1.62[a] (1.06–2.47)
Team training			
Never/not relevant	73/434 (17%)	Ref	
Less than annually	78/257 (30%)	2.16[a] (1.50–3.11)	1.61[a] (1.07–2.44)
Annually	82/200 (41%)	3.44[a] (2.35–5.01)	2.77[a] (1.77–4.31)
Several times a year	39/76 (51%)	5.21[a] (3.11–8.73)	3.84[a] (2.11–6.98)

Adjusted for gender, age, and specialist status.
[a]$p < 0.05$.

Discussion

Half of the GPs who responded to our survey reported that they play a large role in emergency medicine, two thirds were regularly on call, and one third usually took part in ambulance call outs. Playing a large role, regularly being on call, and taking part in ambulance call outs were all strongly associated with multidisciplinary training. These outcomes were also associated with attributes commonly seen at smaller casualty clinics.

Comparison with previous studies

Norwegian studies have shown that GPs play a part in local emergency medicine and improve patient care by participating in call outs [12,13,15]. In 2013, R⊘rtveit found that the EMCC has problems with over and under triage, and having a GP on the scene was suggested as a solution to this challenge [16]. A recent study from England also found that involving GPs improved prehospital treatment by providing better treatment and reducing the number of patients who were admitted to hospital [17]. Despite reporting having a large role in local emergency medicine, the GPs in our survey reported that they only took part in a select number of ambulance call outs. In a previous study, GPs reported being involved in emergency medicine in other ways such as by phone or seeing the patient at the casualty clinic, not by only taking part in ambulance call outs, possibly explaining this contradiction [13].

Taking part in training exercises with other local emergency staff was strongly associated with all of our primary outcome measures. There can be several reasons for this association, and our method cannot be used to prove a causal relationship between training exercises and GP involvement. We speculate that training might lead to knowledge, acquaintances and confidence leading to involvement in emergency medicine. A different interpretation might be that GPs that are involved in emergency medicine tend to take part in training exercises, and that the GPs that are less involved avoid taking part in training exercises. Training medical teams by simulation improves quality by reducing complications and mortality [18]. It is also an arena for learning, resulting in social and structural improvements [19]. Training based on simulation is associated with role clarity, role confidence, and feeling in control [20,21]. Norwegian EMTs want to take part in regular exercises with GPs from the casualty clinics [13], and training in cooperation and interaction between the different branches in emergency medicine is mandatory in Norway [7]. However, only 28 percent of the GPs in our survey reported that they participated annually in this type of training, and only half of Norwegian casualty clinics have annual training sessions [22]. Our findings suggest that annual training exercises could improve the GP's involvement in local emergency medicine.

Working at a long distance from the nearest hospital and working without a nursing staff was associated with a perception of having a large role in emergency medicine. This result was expected since the GPs in these areas must be able to perform emergency medicine by themselves over a long period of time. We anticipated that the availability of nurses and more physicians on call or on standby would be associated with working at the clinic more often and taking part in more ambulance call outs, but we found the opposite result. The reasons for this could be that the absence of these resources is more commonly represented at smaller, rural casualty clinics. These clinics may not necessarily be located more than a one hour car drive away from the hospital. Furthermore, other attributes of rural medicine than the distance from hospitals may be important for GP involvement in emergency medicine. Unfortunately, we are unable to account for such attributes, since we did not collect pertinent data. Fewer GPs work in areas with small casualty clinics such that each GP has to be on call more frequently. GPs working in small rural areas also want to participate in ambulance call outs in order to maintain their skills and improve patient care [13]. It is therefore likely that working at a small casualty clinic is associated with playing a large role in emergency medicine, being on call, and taking part in ambulance call outs.

Strengths and limitations

The main strengths of the study were the large sample size and that our questionnaire, even if not formally validated, was based on qualitative studies among GPs (i.e. our target population). There are also some limitations to our study. First, we used social media to encourage GPs to participate in the survey. This may have led to selection bias because use of social media is more common among younger people and women [23]. This phenomenon might explain why the age in our sample is three years younger than the average age of GPs in Norway and why the proportion of women was larger. Because the study was endorsed by the Norwegian Center in Rural Medicine, we might also have an overrepresentation of rural doctors in our sample. Caution must be used when comparing the

GPs in the survey working in rural areas with the national data, as the survey uses another definition than used by Statistics Norway. Second, our data were based on what the GPs reported and not actual observations. This makes our study prone to social desirability bias [24]. It is also a limitation to the study design that the causal relationship between the three outcomes variables cannot be examined. Third, our responders only represent 21 percent of all Norwegian GPs; therefore, caution should be used when transferring these results to the general population of GPs in Norway. Even though a higher rate of participation would have been desirable, it is well documented that physicians respond to requests for participation in such studies at a lower rate than the general population [25].

Conclusion

Our findings suggest that GPs play an important role in emergency medicine. Multidisciplinary team training may be important for their continued involvement in prehospital emergencies.

Acknowledgements

We wish to thank the Norwegian Center of Rural Medicine for the news coverage about the project. The authors also thank the GPs who took part in this study.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Funding

Magnus Hjortdahl was funded by the Norwegian Research Fund for General Practice. This work was also supported by the Norwegian Center of Rural Medicine.

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