Norwegian regular general practitioners’ experiences with out-of-hours emergency situations and procedures

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ABSTRACT

Objective: To study the participation of Norwegian regular general practitioners (RGPs) in the out-of-hours system in 2006 and what kind of emergency situations and procedures they experienced in the past 12 months. RGPs’ confidence in performing certain emergency procedures was also mapped.

Methods: In May 2006 all 3804 RGPs taking part in the RGP scheme in Norway were sent a questionnaire dealing with several aspects of the emergency out-of-hours duty. The RGPs who had participated were asked about 14 pre-selected emergency situations, experiences with different pre-selected emergency procedures and their self-confidence with these in the past 12 months.

Results: After two reminders 2913 (78%) answered and 1832 (63%) confirmed they had taken part in emergency out-of-hours services in the past 12 months. 95% of participating RGPs answered questions about emergency situations, 74–78% about emergency procedures. The most common situations were chest pain, psychiatric problems and asthma, experienced by 94%, 92% and 88%, respectively. The number of occasions the doctors had experienced the most frequent emergency procedures (presented as median 25–75% percentiles) were: intravenous medication, three (1–10); oxygen mask, three (1–10); venous access, four (1–10). The doctors reported almost no experiences with other procedures. The doctors reported a high self-confidence in performing the emergency procedures. Male doctors working four or more shifts per month and doctors working in rural areas reported more experiences both in emergency situations and procedures.

Conclusion: Approximately two-thirds of RGPs in Norway took part in the out-of-hours service. A wide variety of emergency cases was experienced by the RGPs. Despite this, experiences with most emergency procedures during a 12-month period are low. Regular training is therefore necessary to maintain good skill levels.

In Norway the local municipalities are responsible for the emergency primary healthcare system (out-of-hours services and casualty clinics) and local emergency medical communication centres (LEMC).¹ ² In 2006, 435 municipalities were organised into 260 out-of-hours districts with 99 intermunicipal cooperatives and 161 single municipal out-of-hours districts.³ The central government is responsible for the secondary healthcare system, including hospitals, regional national emergency medical communication centres (EmCC), ground and boat ambulances and the national air ambulance service.

During daytime patients can call their regular general practitioner (RGP) and get an immediate appointment. They can also ask for assistance from LEMC or meet directly at a casualty clinic without an appointment. Furthermore, they can call EMCC and ask for an ambulance. The LEMC can transfer the call to the EMCC when there is a need for an ambulance. The ambulance can transport the patient to a casualty clinic or directly to hospital.

A closed and nation-wide medical radio network is used for communication between doctors on call, ambulance personnel and EMCC. When someone calls the emergency number (113), the call is routed to the nearest EMCC. Based on a decision tool (Norwegian index for medical emergencies) used by nurses working in the EMCC, problems can be classified into three different levels of response. Immediate need of help (life threatening) is red. Yellow is urgent but not immediately life threatening and green is lowest priority. When an emergency is classified as red, there will be a simultaneous radio alarm to both the RGP on call and the ambulance. The intention is that both the ambulance and the RGP on call shall attend the patient and work as a team. Ground and air ambulances are important resources for RGPs when treating emergency patients.

RGPs on call are expected to take care of patients arriving at casualty clinics and attend patients at the scene together with the ambulance services. As a rule, all RGPs are obliged to take part in out-of-hours work, with a few exemptions such as age over 55 years, pregnancy and illness. Some RGPs entrust their shifts to other doctors, eg, junior doctors working in hospitals or universities. No formal education or courses are required for doctors doing out-of-hours emergency work.

RGPs are expected to play an important role in the “chain of survival”, especially in rural areas.¹ Nevertheless, little is known about their experiences with emergency situations and emergency procedures. A previous study indicated that they are rarely involved in emergency procedures, but that study did not deal exclusively with doctors doing out-of-hours work.⁴

The aim of this study was to investigate Norwegian RGPs’ experience with emergency situations and emergency procedures during out-of-hours work. Furthermore, we mapped their confidence in performing certain emergency procedures.

METHODS

The study was conducted from May 2006 to February 2007. A list of all Norwegian RGPs was collected from the RGP registry of the National Centre for Emergency Medical Communication in Bergen, Norway; Section for General Practice, Department of Public Health and Primary Health Care, University of Bergen, Bergen, Norway; Ambulance Foundation, Drøbak, Norway; Correspondence to: Mr E Zakariassen, National Centre for Emergency Primary Health Care, Kalfarveien 31, 5018 Bergen, Norway; erik.zakariassen@isf.ub.no

Accepted 5 February 2008

Emerg Med J 2008;25:528–533. doi:10.1136/emj.2007.054338
Insurance Administration. After excluding vacant RGP practice licences and duplicates (n = 111), a questionnaire was sent to the remaining 5804 RGPs. An additional 47 RGPs were excluded due to unknown address, closed practice, leave of absence, illness or death. The total number of potential respondents thus became 3757. Two reminders were sent.

We asked for age and gender, if the municipality was part of an intermunicipal cooperative, burden of out-of-hours work in the municipality (number of shifts per month) and whether the RGP actually participated in out-of-hours work (none, reduced or full time). If not full-time participation, we asked for the percentage of full time. If not full-time participation, we asked the percentage of full-time. RGP who had done out-of-hours shifts during the past 12 months were asked about their experiences and the number of out-of-hours shifts was dichotomised by four categories: four or more in one group and 2–3 in the other. Numbers of inhabitants in the out-of-hours districts were dichotomised (small or large) in accordance with Statistics Norway’s definition of a large municipality (more than 20 000 inhabitants).

The statistical analyses were performed using Statistical Package for the Social Sciences (SPSS version 13). Standard univariate statistics were used to characterise the sample. Differences in reported experiences with emergency cases and emergency procedures (confident, fairly confident, uncertain or not able). We also asked whether their confidence in performing the same procedures (confident, fairly confident, uncertain or not able).

We also asked who performed the procedure (the RGP, ambulance personnel, another doctor or another healthcare provider). We asked about their confidence in performing the same procedures (confident, fairly confident, uncertain or not able).

The statistical analyses were performed using Statistical Package for the Social Sciences (SPSS version 13). Standard univariate statistics were used to characterise the sample. Differences in reported experiences with emergency cases and emergency procedures were analyzed by Pearson’s χ² test. A p value of <0.05 was considered statistically significant. Skewed

Table 1 Percentage of Norwegian RGPs experiencing at least one of the 14 predefined emergency situation (N = 1832)

| Emergency situations                          | Gender  | Age, years | Municipal centrality | Inhabitants in the out-of-hours district | Out-of-hours shifts per month |
|-----------------------------------------------|---------|------------|----------------------|-----------------------------------------|-----------------------------|
|                                              | All     | <44        | ≥45                  | 0-1                                     | ≥2-3                        |
| Chest pain/myocardial infarction/ pulmonary   | 94      | 95         | 92*                  | 95                                      | 94                          |
| oedema (n = 1766)                             | 95      | 96         | 94                   | 86                                      | 61*                         |
| Psychiatry (n = 1771)                         | 92      | 93         | 89*                  | 94                                      | 93                          |
| Asthma/COPD (n = 1768)                        | 88      | 90         | 85*                  | 92                                      | 92                          |
| Intoxication/overdose (n = 1770)              | 69      | 73         | 60*                  | 74                                      | 70                          |
| Head injury (n = 1759)                        | 68      | 71         | 60*                  | 72                                      | 73                          |
| Seizures (n = 1763)                           | 60      | 64         | 50*                  | 65                                      | 67                          |
| Coma/unconsciousness (n = 1755)               | 59      | 64         | 49*                  | 63                                      | 74                          |
| Call-outs (n = 1763)                          | 52      | 55         | 45*                  | 54                                      | 79                          |
| Anaphylaxis (n = 1773)                        | 47      | 49         | 43*                  | 53                                      | 46                          |
| Hypoglycaemia (n = 1772)                      | 42      | 47         | 31*                  | 46                                      | 52                          |
| Cardiac arrest (n = 1772)                     | 42      | 45         | 35*                  | 45                                      | 58                          |
| Multi-trauma (n = 1767)                       | 30      | 33         | 25*                  | 35                                      | 46                          |
| Hypothermia (n = 1772)                        | 12      | 14         | 9*                   | 17                                      | 16                          |
| Birth (n = 1771)                              | 11      | 11         | 10*                  | 15                                      | 21                          |

*p < 0.05.

COPD, chronic obstructive pulmonary disease; RGP, regular general practitioner.

Table 2 Median number of experiences with emergency procedures among Norwegian RGPs and the percentage of doctors experiencing at least one procedure during the past 12 months

| Procedures                        | Median no of experiences | Percentages of | Gender | Age, years | Municipal centrality | Inhabitants in the out-of-hours district | Out-of-hours shifts per month |
|-----------------------------------|--------------------------|----------------|--------|------------|----------------------|-----------------------------------------|-----------------------------|
| Venous access                     | 4                        | 1-10           | 78     | 81         | 70*                  | 88                                      | 61*                         |
| Oxygen on mask                    | 3                        | 1-10           | 77     | 80         | 70*                  | 83                                      | 91                          |
| IV medication/Fluid               | 3                        | 1-10           | 78     | 81         | 69*                  | 85                                      | 93                          |
| Applied cervical collar           | 0                        | 0-2            | 41     | 44         | 31*                  | 54                                      | 61                          |
| CPR                               | 0                        | 0-1            | 36     | 39         | 28*                  | 51                                      | 49                          |
| Bag/mask ventilation              | 0                        | 0-1            | 37     | 40         | 31*                  | 52                                      | 51                          |
| Defibrillation                    | 0                        | 0-1            | 30     | 33         | 23*                  | 45                                      | 41                          |
| Intubation                        | 0                        | 0-1            | 22     | 24         | 18*                  | 40                                      | 30                          |

CPR, cardiopulmonary resuscitation; IV, intravenous; RGP, regular general practitioner.

*p < 0.05.
distributed data are presented as median with 25–75% percentiles.

Logistic regression analyses were used to calculate the odds ratio (OR) for experiencing emergency situations or emergency procedures and for RGPs’ self-confidence with the procedures. Independent variables in these analyses were doctors’ gender and age, shifts per month, inhabitants in district and intermunicipal cooperatives. The dependent variables (emergency situations, emergency procedures) were dichotomised as either at least one experience or not experienced at all. RGPs’ self-confidence was dichotomised to “confident” (confident and fairly confident) or “not able” (uncertain and not able).

RESULTS

After two reminders 2913 (78%) returned the questionnaire and of these 1832 (63%) confirmed they had participated in out-of-hours services during the past 12 months. Ninety-five per cent of the participating RGPs answered questions about emergency situations. Response rates for individual items in the questionnaire were 74–78% for questions about emergency procedures and 85–91% for questions about self-confidence. The response rate for questions about who performed the procedures was at the most 27% and these data were therefore not analyzed further.

The material is described in table 3. Most RGPs work in large municipalities with high centrality, in intermunicipal cooperatives and have less than four shifts per month. Female doctors were younger than their male colleagues, but otherwise there were small differences regarding gender.

The RGPs’ experiences with the 14 predefined emergency situations are listed in table 1. Female RGPs consistently reported less experience than male RGPs. Likewise, RGPs working in large municipalities with high centrality reported less experience than their colleagues working in smaller and more remote municipalities. Doctors working four or more shifts per month also reported more experience with these situations than doctors working fewer shifts.

The RGPs’ experiences with the eight predefined emergency procedures are listed in table 2. The same patterns of differences between subgroups were found as for emergency situations. The RGPs rarely experienced most of these procedures during a 12-month period and for some there was no experience at all (table 2).

The doctors reported high self-confidence in performing these emergency procedures, with the exception of intubation. Male doctors working four or more shifts per month and doctors working in smaller and more remote municipalities reported slightly higher self-confidence (table 4).

The differences found by descriptive analyses (tables 1, 2 and 4) were supported by logistic regression analyses (tables 5, 6). In general, male RGPs working many shifts in smaller and more remote areas reported more experience and higher self-confidence.

DISCUSSION

This study reveals that RGPs taking part in out-of-hours emergency care in Norway are exposed to several different emergency situations. Some emergency situations are rarely
en countered, but the findings emphasise the need for knowledge and skill in a wide variety of emergencies.

The response rate in this study was good and the representativeness of the RGPs included has been demonstrated. Therefore, we believe these results reflect the actual experiences encountered, however, that the reported confidence in emergency procedures does not necessarily reflect the actual practical skills in the same procedures.

Already published data from this study show that 50% of the RGPs took a full-time part in out-of-hours duties, 15% partly and 55% did not participate. Female and older doctors working in large and central municipalities participated less. The

### Table 4 Doctors' reported self-confidence in different emergency procedures (%)

| Gender   | Defibrillation | IV medication/ fluid | Oxygen on mask | Intubation | Venous access | Applied cervical collar | CPR | Bag/mask ventilation |
|----------|----------------|----------------------|----------------|------------|--------------|-------------------------|-----|---------------------|
|          | Con (95% CI)   | Not able (95% CI)    | Con (95% CI)   | Not able (95% CI) | Con (95% CI) | Not able (95% CI) | Con (95% CI) | Not able (95% CI) | Con (95% CI) | Not able (95% CI) | Con (95% CI) | Not able (95% CI) | Con (95% CI) | Not able (95% CI) |
| Male     |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| Female   |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| Age, years |               |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| <44      |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| >45      |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| Municipal centrality |          |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| 0–1      |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| 2–3      |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| Inhabitants in municipality |       |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| <19999   |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| >=20000  |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| Out-of-hours work per month |      |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| <4       |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |
| >4       |                |                      |                |            |              |                         |     |                     |              |                |              |                         |     |                     |

Con, confident; CPR, cardiopulmonary resuscitation; IV, intravenous.

*p < 0.05.

### Table 5 Odds ratio for experiencing emergency situations and emergency procedures during one year among Norwegian RGPs

| Emergency situations | Female doctor | Age >=45 years | >4 Out-of-hours shifts per month | >20 000 inhabitants | Intermunicipal cooperatives |
|----------------------|---------------|----------------|---------------------------------|---------------------|-----------------------------|
|                      | OR (95% CI)   | OR (95% CI)    | OR (95% CI)                     | OR (95% CI)         | OR (95% CI)                 |
| Chest pain (n = 1459) | 0.40 (0.24 to 0.66) | 0.71 (0.42 to 1.18) | 0.72 (0.42 to 1.18) | 0.89 (0.71 to 1.12) | 1.07 (0.81 to 1.42) |
| Psychiatry (n = 1459) | 0.45 (0.29 to 0.70) | 0.71 (0.45 to 1.12) | 2.04 (1.15 to 3.61) | 0.91 (0.77 to 1.07) | 0.80 (0.63 to 1.00) |
| Asthma (n = 1459)    | 0.49 (0.34 to 0.72) | 0.60 (0.36 to 0.81) | 2.52 (1.49 to 4.38) | 0.71 (0.47 to 1.08) | 0.80 (0.63 to 1.02) |
| Intoxication (n = 1459) | 0.54 (0.42 to 0.68) | 0.56 (0.42 to 0.72) | 1.16 (0.87 to 1.54) | 0.83 (0.64 to 1.08) | 0.80 (0.63 to 1.02) |
| Head injury (n = 1459) | 0.58 (0.45 to 0.74) | 0.64 (0.46 to 0.88) | 1.42 (1.07 to 1.88) | 0.90 (0.69 to 1.16) | 0.75 (0.58 to 0.95) |
| Seizures (n = 1459)  | 0.50 (0.39 to 0.64) | 0.60 (0.46 to 0.84) | 1.81 (1.38 to 2.37) | 0.87 (0.66 to 1.12) | 0.81 (0.65 to 1.03) |
| Coma (n = 1459)      | 0.53 (0.41 to 0.68) | 0.68 (0.53 to 0.88) | 1.79 (1.36 to 2.36) | 0.94 (0.76 to 1.23) | 0.84 (0.64 to 1.03) |
| Call-outs (n = 1280) | 0.61 (0.47 to 0.80) | 0.78 (0.63 to 0.98) | 2.41 (1.59 to 3.72) | 0.89 (0.73 to 1.08) | 0.80 (0.64 to 1.00) |
| Anaphylaxis (n = 1459) | 0.67 (0.53 to 0.85) | 0.79 (0.59 to 0.93) | 1.93 (1.40 to 2.65) | 1.34 (1.05 to 1.70) | 0.88 (0.71 to 1.08) |
| Hypoglycaemia (n = 1459) | 0.52 (0.41 to 0.67) | 0.64 (0.40 to 1.01) | 1.70 (1.32 to 2.18) | 1.33 (1.00 to 1.70) | 0.90 (0.61 to 1.35) |
| Cardiac arrest (n = 1459) | 0.67 (0.52 to 0.86) | 0.76 (0.62 to 1.05) | 1.99 (1.49 to 2.67) | 1.34 (1.02 to 1.74) | 0.80 (0.64 to 1.02) |
| Multi-trauma (n = 1459) | 0.65 (0.50 to 0.84) | 0.77 (0.63 to 1.00) | 1.73 (1.34 to 2.24) | 1.37 (0.99 to 1.87) | 0.80 (0.64 to 1.02) |
| Hypothermia (n = 1459) | 0.69 (0.49 to 0.98) | 0.78 (0.68 to 1.03) | 1.99 (1.42 to 2.78) | 1.12 (0.80 to 1.57) | 1.07 (0.81 to 1.45) |
| Birth (n = 1459)     | 0.80 (0.56 to 1.14) | 0.99 (0.55 to 1.09) | 2.50 (1.53 to 4.12) | 0.73 (0.51 to 1.06) | 1.00 (0.79 to 1.30) |

CPR, cardiopulmonary resuscitation; IV, intravenous; OR, odds ratio; RG, regular general practitioner.
majority of RGPs work in large and central municipalities, in intermunicipal cooperatives and have less than four out-of-hours shifts per month. The majority of out-of-hours districts are, however, single municipalities with a mean population of approximately 14 000 inhabitants and doctors there have four or more out-of-hours shifts per month.3

Chest pain, asthma and psychiatric emergencies were the most common situations reported by the RGPs. This is similar to what has been reported from Australia where GPs also play an important role in the treatment of emergencies in rural areas.9

The most common emergency situations are probably mostly treated within the casualty clinic. More seldom cases such as cardiac arrest and multi-trauma are usually treated at the scene and transported directly to hospital. In remote areas the RGP may play a crucial role in these critical situations but in cities the RGPs are often bypassed, patients being transported directly to hospital. Cities often have a larger fleet of ambulances, more ambulance personnel with formal education and shorter distances to hospitals.9 This may explain some of the differences found between RGPs working in central and remote areas. Similar to a previous Norwegian study,10 we also found that RGPs are more often on “call-outs” in remote municipalities.

Intravenous medication/fluid, venous access and oxygen on mask were the most common emergency procedures, whereas the other procedures were hardly ever performed. The findings are similar to a previous study.7 The most common procedures are in accordance with usual prehospital treatment in both chest pain and asthma. Most RGPs cannot expect to achieve satisfactory skills without regular training in procedures such as cardiopulmonary resuscitation and trauma life support. This is also stressed by the World Organisation of National Colleges and Academies of Family Medicine/General Practice (WONCA).11

Despite low exposure to emergency procedures the doctors have an overall high self-confidence in performing them, even procedures we know require regular practice to maintain a suitable skill level, such as cardiopulmonary resuscitation and bag/mask ventilation.12 13 A study from the United Kingdom14 shows that final-year medical students report high skill levels even with few successfully completed training sessions in bag/mask ventilation. If the doctors do regular skills training the high level of self-confidence could in fact correlate with real practical skill levels. If regular training is not the reality the self-confidence is a false security. Doctors working four or more shifts per month reported higher self-confidence, a natural consequence of more experience and thus real life training.

We have no good explanation as to why female RGPs consistently reported less experience and less self-confidence in emergency situations and procedures than male doctors. The difference also persisted in the regression analyses correcting for possible confounders such as different numbers of out-of-hours shifts. It is difficult to believe that the frequency of heart attacks and other emergencies in a municipality depend on the gender of the doctor on call. There may be gender differences in how male and female doctors define emergencies in the casualty clinic. There may also be unknown confounders related to which municipalities female versus male doctors choose to work in. One study of self-reported practical skill levels in emergency procedures among graduating doctors showed no gender differences,15 others showed that male gender was associated with a higher skill level.15 16 In addition, in research in self-confidence in other topics such as mathematics and learning, gender differences could be due to overestimation by men and more correct estimation by women. Women show a better ability to discriminate between correct and wrong answers, but gender differences in self-confidence in specific topics are uncertain.15

CONCLUSIONS
This study shows that Norwegian RGPs take an active part in emergency treatment in Norway, especially in rural areas, and RGPs doing out-of-hours work are exposed to many different emergency situations. They take responsibility for this without any formal demand in emergency training. Knowledge of different emergency clinical problems is important and RGPs should master a variety of practical skills and emergency procedures. Individual RGPs rarely experience these situations, however, emphasising the need for regular training. Regular training with quality assessment should probably be mandatory for RGPs taking part in out-of-hours work.

Competing interests: None.

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Aortic post-traumatic pseudoaneurysm

A 41-year-old construction worker plunged 30 feet from a rooftop of a building under construction. He was transferred to hospital and chest radiography revealed multiple rib fractures but no significant dilation of the mediastinum shadow. A contrast-enhanced CT scan revealed contusive brain injury, rib fractures, left hydropneumothorax, subcutaneous emphysema and a deformity of the contour of the descending thoracic aorta representing a pseudoaneurysm (fig 1). Endovascular graft replacement was performed successfully.

An aortic pseudoaneurysm is a contained rupture of the aorta in which most of the aortic wall has been breached and luminal blood is held in only by a thin rim of the remaining wall or adventitia.\(^1\) CT scanning is used to screen trauma patients and it is the imaging modality of choice in these patients. It is indicated in the evaluation of chest injuries (mediastinum, parenchyma, bones) and in the assessment of aortic injury.

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Competing interests: None.

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Figure 1  Contrast-enhanced CT scan of the patient.