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GP decisions to participate in emergencies: a randomised vignette study

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How this fits in
While GP participation in pre-hospital emergencies may contribute to better patient care, little is known about how GPs decide whether to participate or not. This study examine how factors other than patient symptoms influence GPs’ decisions to participate in call-outs using a vignette. We found that GP participation was less likely when the incident was not due to a trauma, was far away and when other patients were waiting in the out of hours clinic.
Abstract:

Background

Little is known about how General Practitioners (GPs) decide whether to participate in emergencies.

Aim

To test whether GPs participation is associated with cause of symptoms, distance to the patient, other patients waiting and out of hours (OOH) clinic characteristics.

Design and Setting

Online survey to all Norwegian GPs (n = 4701).

Method

GPs were randomised to vignettes describing a patient with acute shortness of breath and asked if they would participate in a call-out. The vignettes varied with respect to cause of symptoms (trauma versus illness), distance to the patient (15 versus 45 minutes) and other patients waiting at the OOH clinic (crowding versus no crowding). The survey included questions about OOH clinic characteristics.

Results

Of the 1013 GPs (22%) that responded, 76% reported that they would participate. The proportion was higher in trauma (83% versus 69%, chi square 24.8, p <0.001), short distances (80% versus 71%, chi square 9.5, p = 0.002) and no crowding (81% versus 70% chi square 14.6, p < 0.001). Participation was associated with availability of a manned response vehicle (adjusted odds ratio [OR] 2.06, 95% confidence interval [CI] 1.25-3.41), and team training at the OOH clinic once a year (OR 1.78, 95% CI 1.12-2.82) or more than once a year (OR 3.78, 95% CI 1.64-8.68).

Conclusion
GPs were less likely to participate when the incident was not due to trauma, was far away and when other patients were waiting. A manned response vehicle and regular team training were associated with increased participation.

**Introduction**

Norwegian regulations define emergencies as acute onset or deterioration of disease or injury where prompt medical help can be decisive for the patient’s life and health [1]. The national emergency communication center (EMCC) is the first point of contact in life-threatening situations. The EMCC will then issue a “red response” alert to the local out of hours (OOH) clinic and dispatch an ambulance to the scene. According to regulations, the general practitioner (GP) on duty is expected to participate in such call-outs whenever necessary. The judgment of whether it is necessary, however, is left to the GP’s discretion [1]. The official policy in Norway is that GPs should participate on these call-outs [2]. However, GPs on call participate in about half of “red response” call-outs [3,4].

The municipalities are legally bound to have at least one GP on call 24/7. Duty work at the local OOH clinic is a part of working as a regular GP in Norway [1]. In some OOH clinics, the GPs get a fixed salary, in others they are payed according to a blended scheme with salary and fee for service. The municipality is responsible for equipment, staffing and management at the OOH clinics. GPs will occasionally encounter emergencies during their normal office hours too, but then they are not connected to the EMCC and not expected to attend emergencies away from their office.

Studies have shown that GPs in Ireland, Canada and Australia encounter a variety of emergencies and perform a wide range of interventions [5,6,7]. In another study from Ireland, 36% of GP practices were involved in a cardiac arrest during a 5-year period. Both rural and urban GPs tended to cardiac arrests
[8]. In England and Sweden, researchers have found that GP involvement in emergencies can reduce hospital admissions, reduce costs and improve quality of care [9,10].

Little is known about how GPs decide whether to participate in call outs. A previous study found that GPs perceive such decisions as difficult, and that different GPs assess the same information in red alerts differently [11]. Based on qualitative interviews with emergency medical technicians (EMTs) and GPs we hypothesized that factors, not directly linked to the patient’s condition, might influence this decision. [11,12]. An interview study of 47 GPs in the Western part of Norway found that being occupied with other patients at the OOH clinic and distance to the patient were reasons for not participating on red response alerts [13].

The primary aim of this study was to test – using a randomized design – whether distance to the patient, crowding at the OOH clinic and cause of symptoms (trauma versus acute illness) might influence GPs’ decisions to participate in red alert call-outs. A secondary aim was to examine whether participation in emergencies is associated with OOH clinic characteristics.
Materials and methods

Participants and data collection

In August 2016 all GPs in Norway registered by the Norwegian Health Economics Administration (HELFO database) (n = 4701) were invited to participate in an online survey. The invitation and two reminders were sent by mail. The Norwegian Center of Rural Medicine used a dedicated Facebook group to encourage GP participation.

Questionnaire

We presented the GPs with a vignette describing a red alert from the EMCC regarding a patient suffering of acute shortness of breath and asked if they would participate in an ambulance call-out (figure 1 and 2). The vignettes varied with respect to cause of symptoms (trauma versus acute illness), the distance to the patient (15 versus 45 minutes) and patients waiting to be examined at the OOH clinic (crowding versus no crowding). This yielded 2 x 2 x 2 = 8 versions of the vignette (table 1), and each participant was randomly allocated to one version only. The GPs were not informed about the randomization. The questionnaire also included socio-demographic questions and organizational aspects regarding the GPs’ local OOH clinics. The questionnaire and vignettes were developed based on previous qualitative studies with GPs and EMTs [11,12].

Box 1 Example vignette (vignette group number one).

Box 2 Example vignette (vignette group number seven).

Table 1 Vignette groups

Outcome measure

Our primary outcome measure was the proportion of GPs reporting that they would participate in the call-out (i.e. by attending the patient). Possible response options were “yes” and “no”.
Independent variables

Our main independent variables were cause of dyspnea (trauma versus medical condition), distance to patient (15 minutes versus 45 minutes) and crowding at the OOH clinic (other patients waiting versus no patients waiting). Independent variables of secondary interest were if the OOH clinic was co-located with the ambulance service (yes or no), if the OOH clinic had a dedicated response vehicle (dedicated vehicle with driver, dedicated vehicle without drive or no dedicated vehicle), distance to nearest hospital (more than 60 minutes’ drive or less than 60 minutes’ drive) and if the OOH clinic had team training with the ambulance service (never/not relevant, less than annual, annual, several times a year).

Statistical analysis

GP characteristics were described using means and percentages. We tested the hypothesis that the proportion of GPs attending to the hypothetical call-out differed between the eight versions of the vignette using Pearson’s chi-squared test. Multivariable logistic regression was used to explore possible associations between the participation in call-out and OOH clinic characteristics.

Analyses were done using IBM SPSS Statistics 26. P values <0.05 were considered statistically 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 (reference number 48819).
Results

Of the 4701 GPs invited 1013 responded, giving a response rate of 22%. Eleven respondents were excluded from further analyses because they were no longer GPs, leaving us with a total of 1002 respondents. Our sample was fairly representative of Norwegian GPs with respect to age, gender, number of patients on the GP’s list and specialist status (table 2). Twenty six percent of the respondents worked at an OOH clinic more than a one-hour’s drive from the nearest hospital. Since 19 percent of Norwegian GPs work in rural municipalities [14], rural doctors were slightly overrepresented. The eight randomized groups were fairly balanced with respect to age, sex, length of patient list, specialist status and distance to nearest hospital.

Table 2 Characteristics of responders in the eight vignette groups

The majority (76%) of the participants reported that they would participate in the call-out. Across the eight scenarios, the proportion that would participate in the call-out varied from 59% to 87% (table 3).

Table 3 Vignettes ranked in order of participation rates (from high to low)

Participation in the call-out was more likely when the patient had sustained a trauma, distance to the patient was short and there was no crowding at the OOH clinic (table 4).

Table 4 Participation rate related to condition, distance and crowding

Participation in the call-out was associated with working at a OOH clinic that was equipped with a response vehicle manned by a dedicated driver (adjusted odds ratio [OR] 2.06, 95% confidence interval [CI] 1.25-3.41), and working at a OOH clinic that conducts team training once a year (OR 1.78, 95% CI 1.12-2.82) or more often than once a year (OR 3.78, 95% CI 1.64-8.68) compared to less than once a year (table 5).
Table 5 Multivariable logistic regression analyses: associations between GPs participating on call-out in vignettes and OOH clinic characteristics

Discussion

Summary

The majority of our respondents would participate in the hypothetical call-out to a patient with severe breathing difficulties. Participation in the call-out was more likely when the patient had sustained a trauma, distance to the patient was short and there was no crowding at the OOH clinic. GP participation was associated with working at an OOH clinic equipped with a manned response vehicle and regular team training.

Strengths and limitations

The main strengths of our study are the fairly large sample and the randomized design. However, there are important limitations. First, our findings are based on vignettes. Whether vignettes based studies can be considered representative of real life practice is a long standing concern. However there is evidence that they compare favorably to studies based on standardized patient techniques, claims data and medical record abstraction [15,16,17,18]. In any case, it would hardly be possible to design a similar randomized controlled trial in a real life setting. Twenty-two percent of the GPs participated in our survey. A higher response rate would have been desirable, but relatively low response rates amongst GPs are often observed [19]. The sample was fairly representative of the GP population with respect to age, gender, specialty attainment and list size. A slightly higher number of rural GPs in our sample should be taken into consideration when interpreting our findings. Further, we cannot exclude the possibility that GPs are unrepresentative with respect to unobservable characteristics.

Comparison with existing literature
Seventy-six percent of the GPs reported that they would participate in the call-out, which is high compared to studies and reports indicating that Norwegian GPs participate in 50% to 60% of call-outs [3,4,13]. The reason for the difference between our vignette study and observational studies may be that in real life the GPs receive alerts about a multitude of conditions, including several where they do not see the need of GP participation [11]. In contrast, the clinical setting in the vignette was perceived as relevant by most GPs. Rural GPs were slightly overrepresented in this study, and we may speculate that they are more engaged in pre-hospital emergency medicine than the average GP. Another reason might be that the GPs in our study over-reported, perhaps motivated by social desirability [20]. In a review 43% of health related studies using questionnaires were found to be influenced by social desirability [21].

Our study suggests that distance to the emergency incident may affect GP participation in call-outs. Our findings corroborate with a previous Norwegian study where utilization of out-of-hours services was inversely associated with distance from the OOH clinic. This association was also found in patients with severe symptoms [22].

We found that patients waiting to be examined at the OOH clinic lead to less GP involvement on call-outs, suggesting that GPs are aware of the opportunity costs in terms of reduced health services provided to other patients. In a previous qualitative study some of the GPs argued they often would be more needed at the OOH-clinic, and that the EMTs are often competent to handle the call-out themselves [11]. The negative effect of crowding on patient treatment and outcome in Emergency Departments is well-established [23].

More GPs participated on the call-out when the patient had breathing difficulties related to trauma. This is aligned with the results of our previous qualitative study, where GPs reported greater inclination to participate when the alert suggested a dramatic situation such as a trauma [11]. Breathing difficulties in trauma patients is a potential time critical, life-threatening symptom. One could argue that these
patients would be more likely to benefit from GP participation. However, a recent study has shown that non-traumatic breathing difficulties may be at least as severe as trauma, and that non-traumatic breathing problems may pose greater diagnostic and therapeutic challenges in the pre-hospital setting [24, 25]. Consequently, the non-traumatic patients might benefit more from the GPs' medical knowledge. According to decision-making theory, we make intuitive decisions based on experience and pattern recognition or analytical decisions by analyzing the information thoroughly [26]. As the decision whether to participate is a time critical decision based on limited information, it will often be an intuitive decision. However, improving decisions in this environment is not a trivial task.

Call-out participation was also associated with working at an OOH clinic equipped with a manned response vehicle. Fifty percent of OOH clinics in Norway claim to have a dedicated response vehicle, but we do not know how many that have a driver [27]. Experiences from several OOH clinics in Norway suggest that introducing a GP manned response vehicle with a dedicated driver leads to fewer hospital admissions [2].

Team training had the strongest association with GP call-out participation. The direction of this association is not obvious; it could go both ways. Pre-hospital emergency team training is mandatory in Norway. There are several benefits of simulation based team training including better patient treatment [28], as well as learning and leadership practices [29,30]. Furthermore, prehospital personnel want to participate in team training [11,12]. Despite this only about 60% of Norwegian OOH clinics report annual training activities and we do not know how often the individual healthcare worker participates [4].

Implications for practice

Our results raise several questions when designing a prehospital emergency medicine system with strong GP involvement.
First, should the GPs be allowed to decide whether to participate on a call-out, or should this decision be made by the EMCC? In a qualitative study from Norway GPs reported that they wanted to keep this authority as they perceived the GP to be best suited for making the decision in the given context [11].

However, GP skills may not be needed in all emergencies. In a qualitative study Norwegian EMTs suggested that GP contribution is most important in patients with non-specific symptoms, geriatric patients, children and psychiatry [12]. Accurate dispatch from physician-staffed EMS was one of the top five research priorities in physician-provided pre-hospital critical care according to a European research collaboration [31]. There is, however, limited knowledge about which criteria accurately identify patients requiring advanced care in pre-hospital medicine [32].

Second, since distance to the incident and OOH clinic crowding were associated with less GP involvement in hypothetical call-outs, to what extent should OOH clinics be centralized? Western European countries have traditionally had a wide variety of organization of OOH services [33]. In countries like UK, Netherlands and Denmark, there has been a shift towards centralization of OOH clinics and increased use of triage and advice by telephone. If patients waiting to be examined at the OOH clinic affects the GPs’ decision to participate in call-outs, OOH-clinics may need to be better staffed. Alternatively, measures might be taken to avoid unnecessary contacts to the OOH clinic, such as having patients call ahead for advice, and triage by phone as in the Netherlands and Denmark, or at arrival at the OOH clinic [34].

Our findings should be investigated further, as they are based on hypothetical vignettes in questionnaires. Real life data from the EMCCs may be used to study associations between GP participation and distance, type of emergency and availability of response vehicles, respectively. It would also be interesting to design a project implementing team training in areas that do not train and measure if this affect GP participation on callouts. Ultimately, studies of associations between GP participation and patient outcomes would be desirable.
Conclusion

GPs were less likely to participate in hypothetical emergency call-outs when the incident was not due to a trauma, was far away and when other patients were waiting in the OOH clinic. The availability of a response vehicle with a driver and regular team training was associated with increased participation in the call-outs.

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Box 1 Example vignette (vignette group number one).

The information that differs between vignettes is put in boldface in this example.

You are on duty at your local OOH clinic. It is a weekday and the time is seven pm. You are the only physician on call, it is quiet and you are doing paperwork. The alarm sounds.

“There has been a car accident on an 80 kilometers per hour road. There is one injured person. The patient is a sixty years old man complaining of acute breathing difficulties. He has rapid breathing and problems with speaking complete sentences. He is awake.”

The patient is located 15 minutes’ drive from the OOH clinic.

Would you participate in this call-out?

Table 1 Vignette groups

Box 2 Example vignette (vignette group number seven).

The information that differs between vignettes are is put in boldface in this example.

You are on duty at your local OOH clinic. It is a weekday and the time is seven pm. You are the only physician on call, there are several patients waiting to be examined. The alarm sounds.

“The patient is a sixty years old man complaining of acute breathing difficulties. He has rapid breathing and problems with speaking complete sentences. He is awake.”

The patient is located 45 minutes’ drive from the OOH clinic.

Would you participate in this call-out?
| Vignette group number | Mean age, years | Female n (%) | Mean number of patients on GP list | Specialist in General Practice n (%) | Rural (> 1 hour’s drive to nearest hospital) n (%) |
|-----------------------|----------------|--------------|----------------------------------|-------------------------------------|-----------------------------------------------|
| 1 (n = 113)           | 44             | 49/112 44 %  | 1024                             | 66/113 58 %                         | 24/108 22 %                                   |
| 2 (n = 136)           | 45             | 70/135 52 %  | 1034                             | 71/136 52 %                         | 39/131 30 %                                   |
| 3 (n = 125)           | 45             | 61/125 49 %  | 1070                             | 78/125 62 %                         | 28/119 24 %                                   |
| 4 (n = 109)           | 44             | 42/106 40 %  | 1011                             | 62/107 58 %                         | 23/103 22 %                                   |
| 5 (n = 127)           | 45             | 60/125 48 %  | 1038                             | 79/125 63 %                         | 28/122 23 %                                   |
| 6 (n = 118)           | 45             | 53/116 46%   | 1038                             | 67/116 58%                          | 35/114 31%                                    |
| Vignette group (combination of condition, distance and crowding) | Number (proportion) of GPs participating on call-out in the vignette | Missing |
|---------------------------------------------------------------|-------------------------------------------------------------------|---------|
| Trauma-short distance- crowding                               | 115/132 (87%)                                                     | 4       |
| Trauma-short distance-no crowding                             | 98/113 (87%)                                                     | 0       |
| Medical condition-short distance-no crowding                   | 105/123 (85%)                                                     | 4       |
| Trauma-long distance-no crowding                               | 101/125 (81%)                                                     | 0       |
| Trauma-long distance- crowding                                | 80/107 (75%)                                                      | 2       |
| Medical condition-long distance-no crowding                    | 92/129 (71%)                                                      | 3       |
| Medical condition-long distance- crowding                      | 84/139 (60%)                                                      | 3       |
| Medical condition-short distance- crowding                     | 70/118 (59%)                                                      | 0       |
| Total:                                                         | 745/986 (76%)                                                     | 16      |

Table 3 Vignettes ranked in order of participation rates (from high to low).
Difference between scenarios: Chi square 60.8 DF 7, p<0.05

**Table 4 Participation rate related to condition, distance and crowding**

| Variables          | Number (proportion) of GPs participating on the call-out in the vignette | Chi-Square value/df | P value |
|--------------------|----------------------------------------------------------------------------|---------------------|---------|
| Trauma condition   | 394/477 (83 %)                                                             | 24.8/1              | < 0.001 |
| Medical condition  | 351/509 (69 %)                                                             |                     |         |
| Short distance     | 388/486 (80%)                                                              | 9.5/1               | 0.002   |
| Long distance      | 357/500 (71%)                                                              |                     |         |
| No crowding        | 396/490 (81%)                                                              | 14.6/1              | < 0.001 |
| Crowding           | 349/496 (70%)                                                              |                     |         |
| All                | 745/986 (76%)                                                              |                     |         |

**Table 5 Multivariable logistic regression analyses: associations between GPs participating on call-out in vignettes and OOH clinic characteristics**

|                                      | GPs participating on call-out in vignette | OR crude (95 %CI) | OR adjusted (95% CI) |
|--------------------------------------|-------------------------------------------|-------------------|----------------------|
| Co-located ambulance                 |                                           |                   |                      |
| Yes                                  | 694/925 (75%)                             | 0.80 (0.59-1.09)  | 0.88 (0.63-1.23)     |
| No                                   | 277/357 (78%)                             | Ref               | Ref                  |
|                                      |                                           |                   |                      |
| Dedicated response vehicle            |                                           |                   |                      |
| Yes, with driver                     | 703/937 (75%)                             | 1.78 (1.15-2.75)* | 2.06 (1.25-3.41)*    |
| No                                   | 138/167 (83%)                             |                   |                      |
|                  | Yes, without driver | No                  | Ref                  | Ref                  |
|------------------|---------------------|---------------------|----------------------|----------------------|
| Distance to hospital | 123/163 (76%)      | 442/607 (73%)       | 1.15 (0.77-1.71)     | 0.92 (0.60-1.42)     |
| More than 60 minutes | 715/953 (75%)       | 200/244 (82%)       | 1.71 (1.19-2.47)*   | 1.47 (0.97-2.23)     |
| Less than 60 minutes | 515/709 (73%)       | Ref                 | Ref                  |                      |
| Team training     | 730/968 (75%)       | 300/436 (69%)       | Ref                  | Ref                  |
| Never/not relevant | 196/257 (76%)       | 1.46 (1.03-2.07)*   | 1.44 (0.98-2.11)     |
| Less than annually | 167/200 (84%)       | 2.29 (1.50-3.51)*   | 1.78 (1.12-2.82)*    |
| Annually          | 67/75 (89%)         | 3.80 (1.77-8.12)*   | 3.78 (1.64-8.68)*    |
| Several times a year |                   |                      |                      |                      |

Also adjusted for gender, age, specialist status and OOH clinic location (Large city: Oslo, Bergen, Stavanger or Trondheim, single municipality or inter municipality)

* p<0.05