

# BMJ Open From direct attendance to telephone triage in an emergency primary healthcare service: an observational study

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## ABSTRACT

**Objectives** To describe how an intervention to limit direct attendance in an emergency primary healthcare service affected the contacts to the clinic and the level of care given, and which factors were associated with a change from direct attendance to telephone contact.

**Design** Observational study.

**Setting** Seven Norwegian emergency primary healthcare services. The telephone triage operators are primarily registered nurses.

**Participants** Registered patient contacts to the services during 2007–2019.

**Interventions** In 2013, one of the seven services made an intervention to limit direct attendances to the emergency primary healthcare clinic. Through an advertisement in a local newspaper, the public was encouraged to call in advance. Patients who still attended directly, were encouraged to call in advance next time.

**Measures** We compared the proportions of direct attendance and telephone contact, and of consultation by a general practitioner and telephone consultation by an operator, before and after the intervention. We also compared the proportions of direct attendance regarding gender, age group, time of day and urgency level. Descriptive analyses and log binomial regression analyses were applied.

**Results** There were 1 105 019 contacts to the seven services during the study period. The average proportion of direct attendance decreased from 68.7% (95% CI 68.4% to 68.9%) to 23.4% (95% CI 23.2% to 23.6%) in the service that carried out the intervention. Telephone consultation by an operator increased from 11.7% (95% CI 11.5% to 11.8%) to 29.2% (95% CI 28.9% to 29.5%) and medical consultation by a general practitioner decreased from 78.3% (95% CI 78.1% to 78.5%) to 57.0% (95% CI 56.7% to 57.3%). The youngest and the oldest age group and women had the largest decrease in direct attendance, by –81%, –74% and –71%, respectively.

**Conclusion** The intervention influenced how the public contacted the service. Information campaigns on how to contact healthcare services should be implemented on a regular basis.

## BACKGROUND

High demand for emergency medical services, including emergency primary care

## Strengths and limitations of this study

- The Watchtower database contains 1 105 019 observations collected for the period 2007–2019, which gives a reliable picture of the development in patient contacts and the management of these.
- The observations were collected from seven emergency primary healthcare services, including one service that initially had a larger proportion of direct attendance compared with the others (73% vs 12% in 2007).
- The quality of the recordings was high, with few incomplete recordings throughout the study period.
- Information on how the intervention was carried out has been collected retrospectively, which may have resulted in lack of minor details regarding this process.
- Occasional under-reporting is unlikely to have introduced selection bias relevant to the variables used in this study.

services, is a well-known phenomenon worldwide.<sup>1 2</sup> Overcrowding in these services is a problem for public health and a patient safety challenge of large importance and magnitude.<sup>3 4</sup> Reasons for this development are complex and several factors may contribute. Examples include an increased number of older people in the population, internal structures affecting patient flow within the emergency departments and limited access to daytime primary care services.<sup>1 3</sup> Furthermore, there is an increasing tendency of people with non-urgent symptoms contacting emergency medical services due to factors such as patients' worry or anxiety, and convenience for the patient.<sup>1 5–9</sup> Studies from the Netherlands and Germany found that physicians consider many face-to-face consultations at primary care clinics to be unnecessary and that approximately one of four patients attending the emergency primary care service

could wait, and then see their general practitioner (GP) during opening hours.<sup>9 10</sup>

A well-known and much used strategy to handle overcrowding is the use of telephone triage. Telephone triage is well established in several European countries, including Norway,<sup>8 11 12</sup> and the free European non-emergency medical assistance number 116 117 has been introduced in Norway and several other countries. The driving force for implementation of telephone triage has been a notion that it is possible to direct patients to the right level of care and help patients to self-manage non-urgent symptoms.<sup>11</sup> A review of studies estimated that as much as 50% of calls to services in a general healthcare setting can be handled by telephone advice alone.<sup>11</sup> In a recent systematic review on demand, use and outcomes in emergency primary care services, it was found that between 14% and 54% of the patients in different European emergency primary care services received a telephone advice as the outcome of the contact.<sup>2</sup> Although the literature indicates that telephone triage constitutes an important part of patient handling in the emergency primary care service, to our knowledge, the effect of conversion from direct attendance to telephone triage has not been studied.

Since 2006 a representative sample consisting of seven Norwegian emergency primary healthcare clinics (The Watchtower project) have monitored all contacts to their clinics.<sup>13</sup> Although emergency primary healthcare clinics in Norway in general have a low rate of direct attendances by patients, some have a high rate. One of the watchtowers had a particularly high rate of direct attendance; 73% in 2007, compared with 12% for the other watchtowers combined,<sup>14</sup> even though telephone triage was part of the service provided. In 2013 this watchtower instigated an information campaign aimed at the public, encouraging people to call in advance, and thereby reducing the number of direct attendances to the clinic. The aim of this study was to describe how this intervention affected the contacts to and use of the clinic, through the following research questions: (1) How did the distribution of direct attendance versus contact by telephone change after the intervention? (2) How did this change in mode of contact affect the level of care given? (3) Did patient gender or age, time of day, weekday or urgency level influence the likelihood of direct attendance, before and after the intervention?

## MATERIAL AND METHODS

The study was performed as an observational study, based on data collected in the Watchtower project during the period 2007–2019.

### Setting

Norway has a two-layered healthcare system, where the primary healthcare services have a gatekeeping function for secondary healthcare. The public is advised to contact the emergency primary healthcare service in urgent

situations and the emergency medical communication centres (113), which are organised under the secondary healthcare service, only in acute or life-threatening situations. The emergency primary healthcare service can be contacted through 116 117, which routes the call to the local emergency medical communication centre. Direct attendance at the emergency primary healthcare clinic is also possible in some services, mainly in the largest towns and cities. The operators handling the telephone calls to the emergency primary healthcare service are primarily trained as registered nurses.<sup>12</sup> The operators triage the patients and refer them to the appropriate level of care. In non-urgent cases where a consultation with a GP on-call is not indicated, the operator may handle the contact solely by telephone consultation, providing self-care advice and/or advising the patient to contact his or her GP.

### The Watchtower project

The ongoing Watchtower project collects observational data from seven emergency primary healthcare clinics in Norway. The seven watchtowers cover 4.6% of the Norwegian population.<sup>13</sup> They vary considerably regarding their catchment areas, ranging from 117 to 5624 km<sup>2</sup>, and 5212 to 95 950 inhabitants, in 2019. One of the watchtowers is in Tromsø, a city in the northern part of Norway, with a population of 70 358 inhabitants in 2013. They used to have a high rate of direct attendance at their emergency primary care clinic and in 2013 the management intervened to change the inhabitants' practice of attending directly to contact the service by telephone first. However, direct attendance at the clinic was still possible.

### The intervention

The intervention included: (1) During the summer of 2013, information was published in a local, and widely read, newspaper, where the public was informed to call in advance before attending the emergency primary care clinic and (2) in November 2013 the staff started to inform patients who attended the clinic directly to call in advance next time. Patients who still attended the clinic directly and were triaged by the triage nurse in the clinic to a non-urgent medical consultation by a GP, were given an approximate time for the consultation and sent home to wait there. The staff working in the emergency primary care service was highly motivated for the change.

### Data collection and variables

Information on all contacts to the participating clinics, both by telephone and direct attendance, was recorded anonymously in an online database (Zoho Creator) by the operators on duty. For each contact we recorded administrative information, gender and age of the patient and outcome of the contact. The anonymous recording prevented us from tracing individual patients with repeated contacts during the observation period.

*Mode of contact* was classified into direct attendance at the emergency primary healthcare clinic, or telephone contact. *Action taken* was classified in one of the following

categories: telephone consultation/advice by nurse or other health personnel, not a GP (referred to as telephone consultation by operator), telephone consultation by a GP, medical consultation by a GP, consultation by other than a GP, call-out by a GP and ambulance, home visit by GP and other (eg, call out by ambulance without the GP on call, police).

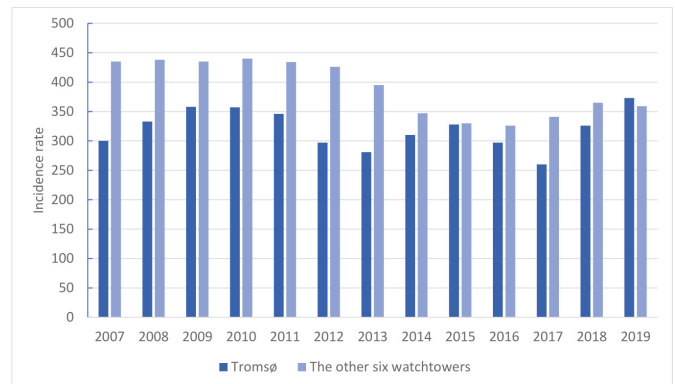
*Time of day* was registered by three categories, reflecting the work shifts of the healthcare personnel: Daytime 08:00–15:29, afternoon 15:30–22:59 and night 23:00–07:59. We also recorded *day of the week* (Monday–Sunday), and the patient's *gender* (male/female) and *age* (under 1 year of age was recorded as '0'). The patients' age was categorised into six different age groups (0–4 years, 5–14 years, 15–29 years, 30–59 years, 60–79 years and 80+ years) to compare findings between the age groups.

*Urgency level* was assessed by the operator in accordance with the Norwegian Index for Medical Emergency Assistance (Index)<sup>15</sup> into one of three urgency levels defined by colour: Red (acute), yellow (urgent) and green (non-urgent).

*Municipality of residence* was registered within one of three categories: residence of the municipality/municipalities covered by the emergency primary care service, the rest of Norway and the rest of the world (mainly tourists).

### Data analysis

In this study we focused on the data from Tromsø, and we compared the general trend there with the other six watchtowers. The data from the other watchtowers contained only small variations, and we therefore analysed them as one unit. Descriptive analyses were applied to compare direct attendance and telephone contact between Tromsø and the other watchtowers in the years 2007–2019. As the intervention was implemented in the last part of 2013, we considered 2013 and 2014 as a 'washing out' period and omitted these data from the before and after analyses. We analysed data from 2007 to 2012 and from 2015 to 2019 as separate units, and then compared the two results. Proportions of mode of contact and actions taken within the different urgency levels, before and after the intervention, were analysed by descriptive analyses. 95% CIs were calculated for all the proportions. Proportions of direct attendance for the two genders, the different age groups, within the different shifts, weekdays and urgency levels, before and after the intervention, were calculated by descriptive analyses. The relative changes before and after the intervention were calculated in per cent. To test whether gender, age group, time of day and urgency level influenced the likelihood of direct attendance before and after the intervention, log binomial regression analyses were applied, using direct attendance (yes/no) as dependent variable and gender, age group, time of day and urgency level as independent variables. Significance level was set to 0.05. Data was analysed using IBM SPSS statistics (V.26).



**Figure 1** Number of contacts per 1000 inhabitants per year (incidence rate) for Tromsø and the other six watchtowers combined for the years 2007–2019.

The Watchtower database is owned and managed by the National Centre for Emergency Primary Health Care. No patient identifiable data were recorded at any time. The database was only accessible to the researchers in the project.

### Patient and public involvement

No patients were involved.

## RESULTS

### Number of contacts and contact rate to the watchtowers in the study period

There was a total of 1 105 019 contacts to the seven watchtowers in the study period 2007–2019 and 293 288 (26.5%) of the contacts were contacts to the emergency primary healthcare service in Tromsø.

Tromsø mostly had a lower number of contacts per 1000 inhabitants (incidence rate) compared with the other six watchtowers combined, throughout the whole study period (figure 1). However, the incidence rate to the other watchtowers decreased after 2012, becoming more similar to Tromsø.

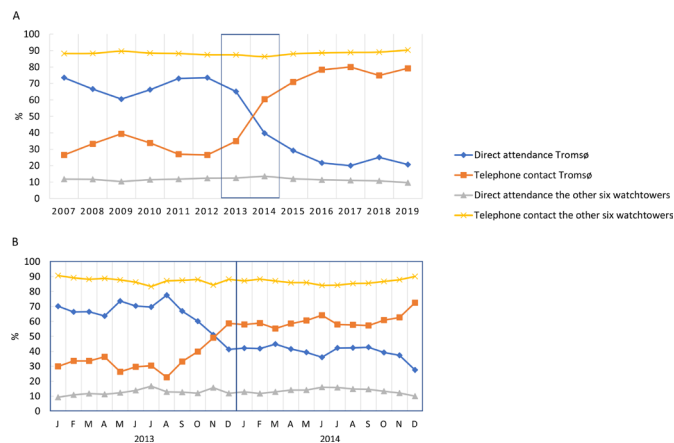
### Direct attendance before and after the intervention

Figure 2A,B show a considerable change in the distribution between direct attendances and contacts by telephone in Tromsø after the intervention in 2013. The average share of direct attendances decreased from 68.7% (95% CI 68.4% to 68.9%) in the years before the intervention, to 23.4% (95% CI 23.2% to 23.6%) in the years after. The proportions remained largely unchanged for the other watchtowers, where the average proportions were 11.6% (95% CI 11.5% to 11.7%) before the intervention and 11.0% (95% CI 10.9% to 11.1%) after. Figure 2B shows that the major change happened within the last 4 months of 2013. Furthermore, figure 2A shows that the share of direct attendances continued to decrease up to 2017.

### Actions taken before and after the intervention

Telephone consultation by operator increased from 11.7% (95% CI 11.5% to 11.8%) of all contacts before





**Figure 2** (A,B) Proportion of direct attendance and telephone contact in Tromsø and the other watchtowers from 2007 to 2019 (A), and month by month for the years 2013–2014 (B). The black vertical line in B shows the transition from 2013 to 2014.

the intervention to 29.2% (95% CI 28.9% to 29.5%) after. Medical consultation by a GP decreased from 78.3% (95% CI 78.1% to 78.5%) to 57.0% (95% CI 56.7% to 57.3%) of all contacts. Table 1 shows the mode of contact and action taken in Tromsø before and after the intervention, within the three urgency levels. The changes in telephone consultation by operator and medical consultation by a GP were seen primarily within the green urgency level, where telephone consultation by operator increased from 15.5% (95% CI 15.2% to 15.7%) before the intervention to 38.7% (95% CI 38.4% to 39.1%) after, and medical consultation by a GP decreased from 74.9% (95% CI 74.6% to 75.2%) before the intervention to 50.4% (95% CI 50.1% to 50.8%) after.

### Predictors of direct attendance

Table 2 shows the proportion of direct attendance in Tromsø before and after the intervention, and the relative change in direct attendance, within the genders and the different age groups, and in the different shifts, weekdays and urgency levels.

Women had a larger reduction in direct attendances, compared with men (relative change: -71% vs -61%). Within the different age groups, the youngest (0–4 years) and the oldest (80+) had the largest reduction (relative change: -81% and -74%, respectively). The share of direct attendances decreased almost equally in the different shifts of the day, in weekdays and weekends and within the green and yellow urgency levels, while there was a smaller reduction within the red urgency level (data not shown).

The share of direct attendances by residents from Tromsø and residents from the rest of Norway decreased from 66.7% (95% CI 66.4% to 67.0%) and 81.1% (95% CI 80.4% to 81.7%), respectively, to 22.0% (95% CI 21.7% to 22.2%) and 20.9% (95% CI 20.3% to 21.5%), respectively, after the intervention. Residents from the rest of the world (mainly tourists) continued to have a

high share of direct attendances after the intervention, only decreasing from 86.0% (95% CI 84.8% to 87.1%) to 65.2% (95% CI 63.8% to 66.6%).

The log binomial regression analysis (table 3) shows a similar pattern for the relative risk (RR) for direct attendance before and after the intervention.

The strongest predictor was the age, which became an even stronger predictor after the intervention. Compared with the oldest age group, patients in the age group 15–29 and 30–59 years had the highest RR of direct attendance both before and after the intervention, with a twofold increased RR before the intervention (2.13 (95% CI 2.07 to 2.20) and 2.03 (95% CI 1.97 to 2.10) respectively), and an almost threefold RR after (2.92 (95% CI 2.70 to 3.14) and 2.95 (95% CI 2.74 to 3.18) respectively). Urgency level seems to be a less important predictor for direct attendance after the intervention, compared with before. There were significant differences with  $p$  value < 0.001 between the reference category and the other categories for all the variables included in the analysis.

## DISCUSSION

### Statement of the principal findings

The proportion of direct attendance to the emergency primary healthcare service in Tromsø decreased considerably after an intervention in 2013. The effect occurred quickly and persisted. There was a decrease in the share of medical consultations by a GP and an increase in the share of telephone consultation by operator, primarily seen within the green urgency level. The largest change in conversion to telephone triage was seen in women and in the youngest and oldest age groups.

### Strengths and limitations

To our best knowledge, this is the first study to report on conversion from direct attendance to telephone triage in an emergency primary care setting, a setting elsewhere often referred to as out-of-hours (OOH) primary care. A large number of observations over a total of 13 years were available for this study, which enabled us to compare data over a long period. The quality of the data was good. The number of incomplete recordings was low throughout the study period, varying between 1.0% and 4.6%.<sup>16</sup>

When comparing estimated national numbers of GPs' consultations based on the watchtower data with the yearly statistics on reimbursement claims from the services, there seemed to have been an under-reporting of cases in the watchtowers, and results showed between 6% and 28% deviation in the years 2007–2019.<sup>16</sup> Under-reporting of cases could be caused by periods with registration of additional variables, busy shifts and periods with many temporary workers, such as during holidays. However, because of the large number of observations over an extended period, we believe data from the Watchtower project give a reliable picture of the activity within the watchtowers and that findings from the project can be generalised to the Norwegian emergency primary

**Table 1** Mode of contact and action taken in Tromsø, before and after the intervention, within the three urgency levels green, yellow and red. Presented by proportions with 95% CIs

Variables	Green			Yellow			Red		
	2007–2012	2015–2019	2015–2019	2007–2012	2015–2019	2015–2019	2007–2012	2015–2019	2015–2019
	% (95% CI)	% (95% CI)	(N=76 578)	% (95% CI)	% (95% CI)	(N=30 663)	% (95% CI)	% (95% CI)	(N=7679)
Mode of contact	(N=91 399)	(N=76 578)	(N=38 176)	(N=2978)	(N=30 663)	(N=7679)	(N=2978)	(N=30 663)	(N=7679)
Direct attendance	70.8 (70.5 to 71.1)	24.2 (23.9 to 24.5)	67.1 (66.6 to 67.6)	25.6 (25.1 to 26.1)	22.5 (21.0 to 24.0)	13.1 (12.4 to 13.9)	22.5 (21.0 to 24.0)	25.6 (25.1 to 26.1)	13.1 (12.4 to 13.9)
Telephone contact	29.2 (28.9 to 29.5)	75.8 (75.5 to 76.1)	32.9 (32.4 to 33.4)	74.4 (73.9 to 75.0)	77.5 (76.0 to 79.0)	86.9 (86.1 to 87.7)	77.5 (76.0 to 79.0)	74.4 (73.9 to 75.0)	86.9 (86.1 to 87.7)
Action taken	(N=91 347)	(N=76 463)	(N=38 135)	(N=2969)	(N=30 584)	(N=7618)	(N=2969)	(N=30 584)	(N=7618)
Telephone consultation by operator	15.5 (15.2 to 15.7)	38.7 (38.4 to 39.1)	3.4 (3.2 to 3.6)	9.3 (9.0 to 9.6)	1.5 (1.1 to 2.0)	3.6 (3.2 to 4.0)	1.5 (1.1 to 2.0)	9.3 (9.0 to 9.6)	3.6 (3.2 to 4.0)
Medical consultation by a GP	74.9 (74.6 to 75.2)	50.4 (50.1 to 50.8)	89 (88.7 to 89.4)	80 (79.5 to 80.4)	44.2 (42.7 to 46.3)	47.3 (46.1 to 48.4)	44.2 (42.7 to 46.3)	80 (79.5 to 80.4)	47.3 (46.1 to 48.4)
Telephone consultation by a GP	6.5 (6.4 to 6.7)	5.4 (5.3 to 5.6)	5.1 (4.9 to 5.3)	4.8 (4.6 to 5.0)	2.5 (1.9 to 3.3)	2.2 (1.9 to 2.5)	2.5 (1.9 to 3.3)	4.8 (4.6 to 5.0)	2.2 (1.9 to 2.5)
Consultation by other than a GP	2.2 (2.1 to 2.3)	3.2 (3.1 to 3.3)	1 (0.9 to 1.1)	0.9 (0.8 to 1.0)	1.2 (0.9 to 1.7)	0.3 (0.2 to 0.4)	1.2 (0.9 to 1.7)	0.9 (0.8 to 1.0)	0.3 (0.2 to 0.4)
Call-out with ambulance and GP	0.1 (0.01 to 0.01)	0.1 (0.03 to 0.1)	0.6 (0.6 to 0.7)	0.8 (0.7 to 0.9)	36.6 (35.2 to 38.7)	17.5 (16.7 to 18.4)	36.6 (35.2 to 38.7)	0.8 (0.7 to 0.9)	17.5 (16.7 to 18.4)
Home visit by GP	0.1 (0.1 to 0.1)	0.1 (0.03 to 0.1)	0.2 (0.2 to 0.3)	0.1 (0.1 to 0.2)	0.3 (0.1 to 0.6)	0.1 (0.1 to 0.2)	0.3 (0.1 to 0.6)	0.1 (0.1 to 0.2)	0.1 (0.1 to 0.2)
Other*	0.7 (0.7 to 0.8)	2.1 (2.0 to 2.2)	0.7 (0.6 to 0.7)	4.1 (3.9 to 4.4)	13.7 (12.5 to 15.0)	29 (28.0 to 30.0)	13.7 (12.5 to 15.0)	4.1 (3.9 to 4.4)	29 (28.0 to 30.0)

\*The action 'other' includes call-out with ambulance without a GP.  
GP, general practitioner.

**Table 2** Proportion of direct attendance (DA) with 95% CIs in Tromsø before and after the intervention, and the relative change in DA, in total and by gender, age group, shift, weekday and urgency level

Variables	2007–2012 (n=1 33048)	2015–2019 (n=1 18306)	Relative change in DA
	% DA (95% CI)	% DA (95% CI)	%
Total	68.7 (68.4 to 68.9)	23.4 (23.2 to 23.6)	–66
Gender			
Female	67.7 (67.3 to 68.0)	20.3 (20.0 to 20.7)	–71
Male	69.9 (69.5 to 70.2)	27.1 (26.7 to 27.5)	–61
Age group			
0–4 years	61.6 (60.9 to 62.3)	12 (11.4 to 12.5)	–81
5–14 years	72 (71.1 to 72.8)	22.9 (22.0 to 23.7)	–68
15–29 years	75.9 (75.5 to 76.3)	27.3 (26.9 to 27.8)	–64
30–59 years	72.2 (71.7 to 72.6)	27.9 (27.5 to 28.4)	–61
60–79 years	63.4 (62.7 to 64.2)	23.6 (23.0 to 24.3)	–63
80+	34.5 (33.4 to 35.6)	8.9 (8.3 to 9.6)	–74
Shift			
Day shift (08:00–15:29)	72.7 (72.2 to 73.1)	24.8 (24.4 to 25.2)	–66
Evening shift (15:30–22:59)	71.2 (70.9 to 71.6)	24.4 (24.1 to 24.8)	–66
Night shift (23:00–07:59)	48.3 (47.6 to 49.1)	16.5 (16.0 to 17.1)	–65
Weekday			
Monday to Friday	68.8 (68.5 to 69.1)	24.4 (24.1 to 24.7)	–65
Saturday to Sunday	68.3 (67.9 to 68.8)	21.6 (21.2 to 22.0)	–68
Urgency level			
Green	70.8 (70.5 to 71.1)	24.2 (23.9 to 24.5)	–66
Yellow	67.1 (66.6 to 67.6)	25.6 (25.1 to 26.1)	–61
Red	22.5 (21.0 to 24.0)	13.1 (12.4 to 13.9)	–43

healthcare service. Information on how the intervention was carried out was collected retrospectively, which may have resulted in minor missing details regarding this process. Furthermore, using a newspaper as the information channel might not have the same transfer value to other countries, and different type of media might be needed to create a similar effect. Tromsø is a small city by international standards and its local society might differ from other more populated cities, in terms of inhabitants passing on information read in a newspaper to other residents. It is likely that the newspaper information and the new policy of the operators spurred discussion among the general population as well as healthcare personnel, thus altogether becoming a powerful tool for change.

### Discussing important differences in results

The results showed that it is possible to create considerable change in patient behaviour within a short amount of time. The information published in a newspaper during the summer 2013 seems to have had the most instant effect, as we saw the steepest decrease in direct attendances during the following months. Studies evaluating the effect of media campaigns to change health behaviour are often in relation to campaigns targeting quite complex health-risk behaviours. Two review

studies found that mass media campaigns in the context of different health-risk behaviours, such as tobacco use and alcohol use and sedentary behaviour, can be effective, even though the evidence was mixed.<sup>17 18</sup> The intervention in the current study did not target a complex health behaviour and the proposed change could rather be seen as simplifying the process of contacting the healthcare service. Furthermore, the staff working in the emergency primary healthcare service was highly motivated for the change and continued to remind patients who attended directly to call in advance the next time, which probably contributed to maintain the change over time. Implementation of changes in the healthcare services are considered challenging, but in an interview study with healthcare workers it was suggested that the opportunity to influence the change, and perceiving the change as meaningful, could be related to successful change.<sup>19</sup> The well-motivated staff in the current study might therefore have contributed towards the result. However, it was not possible to evaluate the individual effect of reminding patients who attended directly to call first the next time, as the anonymously recorded data prevented us from tracing repeated contacts from the same patient.

**Table 3** Likelihood (relative risk (RR)) with 95% CIs for direct attendance in Tromsø, by gender, age group, time of day and urgency level

Variables	2007–2012		2015–2019	
	RR	95% CI	RR	95% CI
<b>Gender</b>				
Women	0.96	0.95 to 0.97	0.74	0.72 to 0.75
Men	Ref.		Ref.	
<b>Age group</b>				
0–4 years	1.69	1.63 to 1.75	1.21	1.11 to 1.32
5–14 years	1.97	1.90 to 2.03	2.26	2.08 to 2.45
15–29 years	2.13	2.07 to 2.20	2.92	2.70 to 3.14
30–59 years	2.03	1.97 to 2.10	2.95	2.74 to 3.18
60–79 years	1.81	1.75 to 1.87	2.52	2.33 to 2.73
80+	Ref.		Ref.	
<b>Time of day</b>				
Dayshift (08:00–15:29)	1.49	1.47 to 1.52	1.45	1.40 to 1.50
Evening shift (15:30–22:59)	1.47	1.44 to 1.49	1.48	1.43 to 1.54
Night shift (23:00–07:59)	Ref.		Ref.	
<b>Urgency level</b>				
Green	2.83	2.65 to 3.03	1.67	1.57 to 1.77
Yellow	2.79	2.61 to 2.98	1.81	1.71 to 1.92
Red	Ref.		Ref.	

Mutually adjusted log binomial regression analysis using night shift, men, age group 80+ and red urgency level as reference.

There were significant differences with  $p$  value < 0.001 between the reference category and the other categories for all the variables included in the analysis.

When a large share of the patients converted to telephone triage, the utilisation of the clinics' resources changed to more patients receiving telephone consultation by operator and fewer receiving medical consultation by a GP. This might have contributed to a more appropriate use of medical consultations, as we found that it was mainly within the green urgency level that telephone consultation by operator increased. The emergency primary healthcare service is mainly for assessing urgent conditions that cannot wait until the opening hours of the patients' GP. However, patients who attend directly tend to receive a consultation by a doctor, despite no medical need. Furthermore, by telephone triage, patients who need consultation by a GP, but not urgently, can be given an approximate time slot and wait at home, which might contribute to prevent overcrowding of the clinic. In 2018 82% of the Norwegian services had this routine.<sup>20</sup>

The proportion of telephone consultation by operator was 29% in the years after the intervention. However, proportion of telephone consultations varies between the different services in Norway<sup>21</sup> and between different countries.<sup>2</sup> In a systematic review it was found that between 14% and 54% of the patients in different European OOH primary care settings received a telephone advice as the outcome of the OOH contact.<sup>2</sup> The change in telephone consultation by operator and medical consultation by a

GP was primarily seen within the green urgency level, which is reassuring as this is the group where telephone consultation by the operator is most appropriate as an alternative. Previous research found that a high share of telephone triage decisions was appropriate,<sup>22 23</sup> and most of the patients understood and followed the advice given.<sup>22 24</sup>

The youngest and the oldest age groups had the largest decrease in direct attendances, even though they already had the lowest share of direct attendances before the intervention. Several studies have found that the youngest age group represents a large share of the contacts to the emergency primary care service,<sup>2 25</sup> and also receive the highest share of telephone advice by operator, compared with the other age groups.<sup>12 25</sup> The oldest age group had the least likelihood of attending directly, both before and after the intervention, which may have natural causes, such as difficulties to attend the clinic directly because of physical limitations and the need for someone to accompany them. In an interview study from the UK, elderly people expressed having to leave home as a barrier for contacting the OOH services.<sup>26</sup> Furthermore, in a previous study we found that contacts from the oldest age group were made by health personnel on behalf of the patient in 41% of the cases and they also had the lowest rate of telephone consultation by operator.<sup>12</sup>



## The meaning of the study

The current study shows that it is possible to influence the way patients contact healthcare services by small interventions, and that the distribution between direct attendance and contact by telephone influences the outcomes of patient contacts. The potential effect of information campaigns aimed at the public on how to contact the healthcare services should not be underestimated and such should probably be implemented on a regular basis. Furthermore, the findings indicate that information on how to contact the emergency primary care service also should be aimed at tourists, as this group continued to have a high proportion of direct attendance at the emergency primary care clinic after the intervention.

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