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Original article

Equipment, laboratory analyses and drugs in out-of-hours services in Norwegian municipalities

Abstract

Background. Availability of equipment for diagnostics and treatment in Norwegian OOH (out-of-hours) services has not been documented. Status and needs should be established, so minimum requirements can be developed.

Material and method. In spring 2006, the National Centre for Emergency Primary Health Care sent a questionnaire to all 261 municipal OOH services in Norway. Information was requested on availability of equipment, laboratory tests, drugs and routines for cardiopulmonary resuscitation, laboratory work and handling of drugs.

Results. The response rate was 85 %; 223 of 261 OOH services responded. 150 services shared premises with GP offices in the municipality, 59 did not share premises and 14 OOH services shared premises with emergency care units. OOH services that shared premises with GP offices had a broader spectre of equipment, laboratory analyses and drugs than services that did not share premises. Doctors on call did much of the laboratory work at OOH services with shared premises, but assisting personnel did the quality control work. 27 % of services without shared premises were not members of NOKLUS (Norwegian Quality Improvement of Primary Care Laboratories). Doctors trained advanced cardiopulmonary resuscitation at least annually in 52 % of all OOH services, and in 40 % of services without shared premises. At 74 % of OOH services without shared premises, assisting personnel practiced cardiopulmonary resuscitation at least annually.

Interpretation. Availability of equipment and repertoire of analyses is to a large extent determined by whether or not OOH services share premises with GP offices, but probably also by distance to ambulance, hospital and pharmacy. Lack of routines for laboratory work, and infrequent training in advanced cardiopulmonary resuscitation, may lead to suboptimal quality of analyses and less competence than that needed.

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In Norway, availability of medical services at all hours is a municipal responsibility, and each municipality is obliged to organize the service and provide premises, equipment and assisting personnel for the doctor on call. Prerequisites for good medical quality – in terms of availability and control of equipment – has not been investigated to a large extent. Type of equipment and personnel that should be available for a doctor on call has not been defined in any Norwegian regulation, national standard or agreement. We have therefore investigated availability of equipment, laboratory analyses and drugs (for diagnostics and treatment) and routines for cardiopulmonary resuscitation, laboratory work and handling of drugs.

Material and method

The National Centre of Emergency Primary Health Care has established a registry for all Norwegian OOH (out-of-hours) services (the Primary Care Registry) (1, 2). In spring 1982, a questionnaire was sent to 282 host municipalities that either had their own OOH service or participated in an inter-municipal medical emergency cooperative (according to the registry). One reminder was sent.

The questionnaire had multiple-choice answers and some space for additional information, and consisted of four parts. Knowledge about equipment and routines at GP offices and some larger OOH services formed the basis for developing the response options. The managers were requested to take responsibility for completing the form. In the first part of the form they had to check off for type of equipment available for doctors on call during evenings and nights. We also asked about how often doctors and assisting personnel practiced cardiopulmonary resuscitation.

In the second part of the form we asked about types of laboratory analyses performed by the OOH service, types of personnel who do the sampling and analyses and how samples were transported to an external laboratory. The third part of the form was about which routines the OOH service had for training personnel in use of laboratory equipment and for quality control of the equipment, and if the OOH service was a member of NOKLUS (Norwegian Quality Improvement of Primary Care Laboratories). They were also asked about routines for cuts and blood contamination and if the employees were offered hepatitis B vaccination. In the last part of the form we asked about routines for storage and distribution of drugs. Drugs available in the OOH service were to be checked off from a list consisting of 30 drugs for intravenous use, 27 for oral use, three for inhalation and three for local use.

Based on information from the Primary Care Registry (1), the OOH services were grouped according to whether they had more or less than 10 000 inhabitants in their district. OOH districts with more than 10 000 inhabitants have often employed assisting personnel part of the time or around the clock – how many depend on the number of inhabitants they serve. The analyses also take into account whether the OOH services shared premises and assisting personnel

Main message

- Norwegian OOH services often share equipment with GP offices.
- OOH services with shared premises have more equipment than those which do not share premises.
- In OOH services with shared premises doctors on call often do the laboratory analyses while assisting personnel control the quality of the equipment.
- Doctors practice advanced cardiopulmoary resuscitation less often in large OOH services that do not share premises than in smaller services with shared premises.

Table 1 Availability of equipment by number and size of OOH districts and whether premises are shared or not

	OOH services (N = 209)		Shared premises < 10 000 inhab. (n = 125)	Shared premises > 10 000 inhab. (n = 25)	Not shared premises (n = 59)
	No.	(%)			
ECG	207	(99)	125	25	57
Urine catheter	207	(99)	123	25	59
Ophthalmoscope/ othoscope	207	(99)	124	25	58
Intravenous canula	205	(98)	123	25	57
Equipment for wound suture	205	(98)	124	25	56
Gynecological equipment	203	(97)	122	25	56
Eye drops	201	(96)	119	25	57
Pulverization apparatus	201	(96)	122	24	55
Oxygen apparatus	199	(95)	120	24	55
Permanent urine catheter	199	(95)	119	24	56
Equipment for eye rinsing	196	(94)	117	24	55
Bag/mask for ventilation	196	(94)	117	23	56
Emergency bag	185	(89)	113	22	50
Defibrillator	183	(88)	113	23	48
Bacteriological media	179	(86)	115	22	42
Rectal thermometer	179	(86)	105	20	54
Vision chart	177	(85)	112	22	43
PEF equipment	174	(83)	111	19	44
Suction	167	(80)	103	19	45
Tonometer	166	(79)	109	23	34
Laryngeal tube	164	(78)	97	20	47
Sterilization equipment	160	(76)	91	22	47
Special luminous emergency coat	154	(74)	97	22	35
Microscope	153	(73)	100	17	36
Tamponade equipment	148	(71)	93	20	35
ECG interpretation module	146	(70)	89	17	40
Magnifying lamp	144	(69)	86	19	39
Rectoscope/ anoscope	145	(69)	105	20	20
Endotracheal tubes	142	(68)	91	19	32
Virological media	133	(64)	95	16	22
Oxymeter	134	(64)	83	9	42
Ear thermometer	128	(61)	67	14	47
Spirometer	119	(57)	94	16	9
Equipment for laryngo-scopy	102	(48)	75	10	17
Equipment for gastric lavage	94	(45)	77	10	7
Equipment for casting	93	(44)	77	6	10
Heart monitoring system	89	(42)	59	5	25
Intraosseous canula	69	(33)	54	6	9
Equipment for suture of ligaments	54	(25)	38	4	12
Ultrasound apparatus	30	(14)	20	3	7
X-ray apparatus	28	(13)	16	4	8
Alcometer	11	(5)	5	0	6

with GP offices or emergency care units or did not share premises or assisting personnel with anyone. SPSS version 13.0 was used to make simple cross-table presentations and frequency analyses.

Results

261 of the 282 municipalities in the registry study had their own OOH service in evenings and nights. 223 of the 261 municipalities responded, rendering a response rate of 85. The service offered in evenings was about the same as that offered during nights. 14 of the OOH services shared premises with emergency care units and thereby had access to other services and equipment than the others, they are therefore not further described. The OOH services without shared premises all serve at least 10 000 inhabitants. Services that share premises with GP offices were divided into two groups according to number of inhabitants they serve (more or less than 10 000 inhabitants). Data from these three groups (n = 209) are presented.

Equipment for diagnostics and treatment

Table 1 shows availability of various equipment for doctors on call. X-ray, ultrasound apparatus and alcometer are rarely available, while more than 90 % of OOH services have access to ECG, urine catheter, othoscope and ophthalmoscope, as well as equipment for suture, gynecologic examinations and intravenous access. Almost all services also had eye-rinsing fluid, pulverization apparatus, oxygen apparatus and a defibrillator.

Emergency bags and special luminous coats for use during emergency calls are less available at OOH services without shared premises. OOH services with shared premises are generally better equipped (especially the smaller ones) than those without shared premises.

Laboratory analyses

Six laboratory tests are available at almost all OOH services: CRP, blood sugar, urine stick, pregnancy test, streptococcus antigen test and haemoglobin (tab 2). Only a few OOH services have the possibility to do clinical chemical analyses such as potassium, ALAT and creatinine.

Quick tests for CK-MB, D-dimer and troponin are also rare. INR analysis is available in every fourth OOH service, i.e. mainly in those with shared premises (in which equipment is also shared with the GP office). Only 3 % (2/59) of OOH services without shared premises have the INR analysis. We see the same tendency for HbA1c and cell counts. The opposite is the case for diagnostic kits for mononucleosis and Chlamydia, which are common in OOH services without shared premises.

Drugs

All OOH services have some drugs available, and most of them have a broad spectre

of drugs on stock (tab 3). The OOH services usually buy and store the drugs themselves, only 5 % of them state that doctors on call are responsible for providing necessary drugs. 44 % of OOH services that buy drugs for their own use buy single doses meant to be sufficient until the pharmacy opens. 48 % of the services also have small packages of drugs for sale, while a few of them only have drugs for internal use. Concerning availability of drugs, OOH services with shared premises were only slightly different from those that did not share premises.

More than 90 % of OOH services have the following drugs for injection (tab 3): adrenaline, hydrocortisone, metoclopramide, tetanus-/diphtheria vaccine, opiates, diclophenac, diazepam, naloxone and atropine. In general, small OOH services with shared premises are best equipped, while those that do not share premises have fewest drugs for injection – larger OOH services with shared premises come in a position between the two first. Antibiotics for injection, antiarrhythmic drugs and antithrombotic drugs indicated in heart attack are far more prevalent in services with shared premises, especially in the smaller ones.

Many OOH services have a large choice of drugs for oral use. Small services have a broader offer than the two other types of services. Typical drugs on offer are anxiolytics such as diazepam, antipsychotic drugs, hypnotics and opiates, but also antibiotics (e.g. dicloxacillin and clindamycin), laxatives and warfarin, and to a certain extent carbamazepin and drugs against migraine attacks (tab 3).

Table 2 Availability of laboratory analyses by number and size of OOH districts and whether premises are shared or not

	OOH services (N = 209)		Shared premises < 10 000 inhab. (n = 125)	Shared premises > 10 000 inhab. (n = 25)	Not shared premises (n = 59)
	No.	(%)			
CRP	207	(99)	123	25	59
Urine strip	200	(96)	119	24	57
Glucose	200	(96)	118	23	59
Urine-HCG	194	(93)	118	20	56
Strep test	193	(92)	113	22	58
Haemoglobin	190	(91)	113	21	56
Blood in faeces	157	(75)	99	17	41
Urine cultivation	121	(58)	83	18	20
Mononucleosis test	116	(56)	57	14	45
Urine microscope	102	(48)	68	11	23
SR	69	(33)	57	6	6
Chlamydia test	55	(26)	29	6	20
INR	52	(25)	45	5	2
HbA1c	32	(15)	27	4	1
Cell counter	28	(13)	21	5	2
Leucocytes	22	(11)	16	4	2
Trombocytes	19	(9)	13	4	2
D-dimer	13	(6)	9	1	3
Troponin	12	(6)	7	0	5
ALAT	8	(4)	4	1	3
Creatinine	8	(4)	4	1	3
Influenza test	8	(4)	5	1	2
GT	7	(3)	4	0	3
Urate	6	(3)	3	0	3
Potassium	5	(2)	2	1	2
CK-MB	4	(2)	2	0	2
Cholesterol	3	(2)	2	0	1
Helicobacter pylori	4	(2)	4	0	0
Sodium	3	(1)	1	0	2

Some routines in OOH services

52 % of doctors are offered regular (at least once a year) training in advanced cardiopulmoary resuscitation, 31 % practice less than this and 17 % never practice. At OOH services with shared premises, 55 % of the assisting personnel practice cardiopulmoary resuscitation annually or more often, while this is the case for 60 % of doctors – i.e. quite similar frequencies. In OOH services without shared premises the assisting personnel practice more often than the doctors; 74 % at least annually, versus only 40 % of doctors.

In small OOH services with shared premises doctors on call take the samples and do the analyses themselves in 88 % of cases, versus 56 % at larger OOH services with shared premises. Assisting personnel in the OOH service are responsible for internal and external quality assurance in almost all cases. In 90 % of OOH services without shared premises (n = 59) employed assisting personnel do the sampling and analyze blood samples. Nurses do internal quality assurance in 86 % of OOH services, but also ambulance workers are involved in this (in 10 % of the OOH services without shared premises). Interal quality control is done regulary in 71 % of the OOH services, sporadically or less often than every other week in 16 % of them, in 4 % of them upon suspicion of a mistake, while in 8 % of cases there are no routines in place for such controls. 73 % of the OOH services without shared premises have external quality control throught their own membership in NOKLUS.

85 % of OOH services state that all their employees have access to guidelines for all equipment and that new employees are trained and shown how to use it. Laboratory binders from NOKLUS are available in 68 % of the OOH services. Samples are sent with a messenger in 24 % of the OOH services and by normal post in 58 % of the services, while 10 % deliver themselves.

67 % of OOH services have written routines for handling of blood contamination and cuts, in 19 % of services the doctor on call decides the measures to be taken; in 7 % the doctor in charge (medically responsible) takes responsibility, while 7 % of OOH services have no routines for this. 64 % of OOH services offer employed health personnel (not those on short-term contracts) vaccination against hepatitis B; the services without shared premises offer such vaccination to the highest proportion of employees (78 %).

Discussion

In this study we have investigated type of equipment, drugs and laboratory analyses that doctors on call in Norwegian OOH services can expect to be available for them. A response rate of 85 % provides us with a representative sample from OOH services organized in different ways. We have not investigated skills or whether the equipment has been used correctly, only the availabilty of equipment. The overview provided is just a reflection of reality and should not be regarded as recommended standards for

properly equipped OOH services. It also remains unknown whether less equipped GP offices or OOH services can lead to erroneous medical diagnoses or prehospital treatment. This should be investigated in follow-up studies.

The study shows that Norwegian OOH services share premises with GP offices to a large extent and that the repertoire of equipment and analyses are determined by whether premises are shared or not. OOH services without shared premises have a narrower repertoire. This may be explained by the fact that many of the larger OOH services have a central location with a short distance to ambulance, hospital and pharmacy (2). Types of equipment requiring much competence, and expensive machines – such as ultrasound and X-ray – are not readily available in Norwegian OOH services. Some equipment is mainly available because it is used in the GP office; e.g. rectoscope/anoscope, spirometer and equipment for indirect laryngoscopy. However, equipment used for casting, gastric lavage and intraosseous needle, is used most often when there is a certain distance to hospital; i.e. in smaller OOH services and in rural districts. In certain OOH districts the health trust is responsible for all patients calls with the priority grade «red response» (1); this can be explained by the lower availability of equipment for medical emergencies and drugs found at OOH services that do not share premises with others. We also found that A and B drugs are less available in these services. This may have several explanations; the most likely is that strict requirements for handling, storage and prescription of these drugs cause OOH services that consider they can manage without them to not have them on stock. When open-around-the clock pharmacies are in the vicinity, the patients can get the drugs there.

Laboratory analyses are used in connection with one third of patient consultations, according to NAV (the Norwegian Labour and Welfare Administration) statistics from 2006. CRP-analyses are used most often, as shown by fees for CRP being included in 93 % of remuneration cards for laboratory analyses (3). In our study we see that a large majority of OOH services use tests that are simple and quick, while few of them use more costly and time-consuming equipment and tests – such as those needed for clinical chemical analyses and cell counts.

Some of the differences we have found can be explained by centrality of the service and whether or not premises are shared, but lack of requirements on availability of equipment indicate that economical factors should also be taken into account. National guidelines on types of equipment required in the OOH services would dimish these differences. The general advice provided in «Handbook for OOH services» is closest to what could be regarded as national guidance. It is not known to what extent the OOH services use this Handbook or other guidelines, so meaningful comparisons cannot be made between our findings and available recommendations. National guidelines that outline the types of required equipment and the level of competence for health personnel working in OOH services should therefore be developed.

In OOH services with shared premises, the regular personnel at the GP office usually perform quality controls (external and internal) of the laboratory equipment that is also used by personnel working in the OOH services (including different doctors on call). In general, nurses and doctors on call have little training and experience with laboratory work. All Norwegian GP offices are members of NOKLUS, but this study shows that more than one fourth of OOH services without shared premises are not part of the quality assurance system of NOKLUS. Some also do not have access to guidelines for laboratory equipment or the NOKLUS folders. It should be investigated further whether this reduces the quality of analyses from the OOH services.

The information we have collected about hepatitis B vaccination provides little information about vaccination coverage, as most of those educated the last years have been vaccinated and doctors on call are their own employers (not employees of the OOH services). However, it does show that most OOH services emphasize safety for their employees, even though many of them still let vaccination be optional.

The frequency of training in advanced cardiopulmonary resuscitation is highly variable; it is lowest for doctors on call in larger OOH services without shared premises, while that for assisting personnel increases with the size of the service provider. This probably reflects that larger OOH services, with assisting and administrative personnel in a larger professional environment, have a better ability to organize systematic training. It is difficult to organize systematic training for all personnel in intermunicipal OOH services, because the doctors who take on duties are often not familiar with the district; many of them live in other municipalities and some of them work in hospitals in more densely populated areas and take on extra duties (4–6). The fact that many doctors practice cardiopulmoary resuscitation less often than once a year, can make it difficult to maintain the necessary competence over time (7, 8). Cooperation with ambulance personnel and other health professionals may also suffer because of this.

Conclusion

Available equipment and repertoire of analyses is highly dependant on whether the OOH service shares premises with a GP office, but also on the distance to ambulance, hospital and pharmacy. It may be unfortunate that much laboratory equipment is used by personnel with little experience in using it, this should be investigated further. Municipal OOH services should put more emphasis on regular training in cardiopulmonary resuscitation.

Disclosed conflicts of interest: None

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