Access to diagnostic tests during GP out-of-hours care: A cross-sectional study of all GP out-of-hours services in the Netherlands*

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KEY MESSAGES
- Our study shows that in 2014, GPs in the Netherlands had limited and varying access to diagnostic tests (imaging, function tests, laboratory tests and point-of-care tests) during GP out-of-hours care.
- Diagnostic tests are not more widely available to GPs working at GP out-of-hours services adjacent to hospitals with an accident and emergency department.

ABSTRACT
Background: In general practice, excluding serious conditions is one of the cornerstones of the consultation. Diagnostic tests are widely used to assist the decision-making process in these cases. Little is known about general practitioners’ (GPs) access to diagnostic tests at GP out-of-hours services.

Objectives: To determine GPs’ access to diagnostic tests—imaging, function tests, laboratory tests, and point-of-care tests (POCT)—during GP out-of-hours care and to assess whether access to diagnostic facilities differs between services located adjacent to or separate from an accident and emergency (A&E) department.

Methods: Cross-sectional survey of all 117 GP out-of-hours services in the Netherlands in 2014.

Results: One-hundred-seventeen GP out-of-hours services participated in the survey; response rate 100%. Access to diagnostic tests during GP out-of-hours care varied across services, although generally there was limited access. Electrocardiography was available in 26% (30/117) of all services, conventional radiography in 19% (22/117), laboratory tests between 37% (43/117) and 65% (76/117). All services had glucose POCT and urine dipstick tests available while none utilized troponin POCT. We observed no relevant differences in access to diagnostic tests between services adjacent to or separate from an A&E department.

Conclusion: GPs in the Netherlands had limited and varying access to diagnostic tests during GP out-of-hours care in 2014. Out-of-hours services adjacent to A&E departments do not offer wider access to diagnostic tests. Further research on the accessibility of diagnostic tests in other European countries with similar and different GP out-of-hours care systems could shed further light on the effects of accessibility to diagnostic tests.

Introduction
European GP out-of-hours services seem highly comparable when looking at the diagnostic scope of patients presenting to these services, with new and/or acute conditions largely contributing to the workload.[1–3] Although the incidence of urgent and acute life-threatening health problems is low, the a priori chance of serious or acute conditions is higher than during routine day care.[1,2] In general practice, excluding serious conditions is one of the cornerstones of the consultation and diagnostic tests are widely used to assist the decision-making process in these cases.[4] During routine consultations general practitioners (GPs) typically have access to most medical imaging, laboratory tests and varying point-of-care tests (POCT) without referral to secondary care.[5]
Given the higher a priori chance of assessing a patient with a serious or acute disease during out-of-hours care, one would expect that access to diagnostic tests would be at least as widely available as during routine day care.

Yet, it is unknown what the availability of diagnostic tests is during GP out-of-hours care. In the past decade, many countries with a developed primary care system have shifted from GPs providing care in small-call rotations from their own practice to large-scale out-of-hours GP cooperatives often located on a central location.[3,6–8] During this shift, many GP out-of-hours services in the Netherlands relocated near an accident and emergency (A&E) department,[6,9] which could be a decisive factor in having access to diagnostic tests.

The primary aim of this cross-sectional study is to determine GPs’ access to diagnostic tests, including imaging, function tests, laboratory tests, and POCT, during GP out-of-hours care in the Netherlands. Furthermore, we aim to assess whether location, adjacent to or separate from an A&E department, affects access to diagnostic tests.

Methods

The Dutch GP out-of-hours system

The Dutch GP out-of-hours system was reorganized around the year 2000; care shifted from small-call GP rotation groups to large-scale GP cooperatives, with generally 40–250 GPs practising in one region, taking care of populations ranging from 100 000 to 500 000 inhabitants.[3,6,8] At the time of the survey, there were 124 GP out-of-hours services in the Netherlands, which were managed by 50 coordinating large-scale GP cooperatives. All out-of-hours services have a telephone triage centre in which trained nurses conduct telephone triage under supervision of a GP and divide all contacts into telephone advice, GP consultation, and home visits by GPs. The services are accommodated with a specially equipped car and a driver that are available to GPs for home visits. More than 95% of GPs provide out-of-hours care through this system.[3,6]

Participants and data collection

In January and February 2014 we invited the managers from all GP cooperatives in the Netherlands to participate in a survey assessing GPs’ access to diagnostic tests during GP out-of-hours care. Two investigators (FS and CZ) performed the surveys by telephone. Respondents were enabled to elaborate on their answers and they were allowed to return the questionnaire by email if they did not know the answer to a specific question. We also permitted managers to refer us to a GP colleague more capable of answering the questions.

The survey was developed using existing literature and was partly based on a previous international POCT survey that our group co-led.[10] The questionnaire consisted of 24 main questions on baseline characteristics, access to imaging and function tests (slit lamp, electrocardiography (ECG), conventional radiography, ultrasonography), access to laboratory tests (regular blood tests, urine sediment, cultures), access to POCT (glucose, C-reactive protein (CRP), haemoglobin, troponin, D-dimers, urine dipstick, pregnancy test, dip slide) at the out-of-hours services and during home visits, and future plans concerning GPs’ access to diagnostic tests. We defined regular blood tests as routine blood analyses (complete blood count, liver, and kidney function), of which the results were available during the GP’s out-of-hours shift. Conventional radiography included frequently ordered X-rays of one or more body parts, including skeletal imaging, plain chest or abdomen X-rays, during the complete out-of-hours shift or a certain timeframe. The availability of and access to diagnostic tests were defined as access to diagnostic tests without referral to secondary care. We piloted the questionnaire to check face-validity and changed it according to the comments.

Baseline characteristics of the GP out-of-hours services were provided by the national organization of GP out-of-hours services (InEen). In some cases, the exact population per service was unknown. In these cases, we calculated the population size by dividing the population of the large-scale GP cooperative by the number of services that fell under the coordination of that specific cooperative.

Statistical analyses

We performed descriptive analyses. To assess the difference between services adjacent to an A&E department and services at a separate location, we divided the services into two groups. Services adjacent to an A&E department were defined as services in a hospital with an A&E department or legally on the grounds of a hospital with an A&E department. This information was provided as benchmark data by the national organization of GP out-of-hours services. We tested differences using Pearson chi-square or Fisher’s Exact Tests, as appropriate. A P-value ≤0.05 was considered significant. We analysed the data using SPSS Statistics 21.
Results

Of all 124 GP out-of-hours services registered in the Netherlands, we excluded seven services; three services had stopped their activities at the moment of data collection, and four provided care at variable locations using the traditional model of small-call rotations. All remaining 117 GP out-of-hours services completed the survey (85% by phone and 15% by email); response rate was 100%. The median number of patients per GP out-of-hours service was 130,000 (IQR 85,000–183,000). Seventy-four (63%) services were located adjacent to an A&E department and 43 (37%) at a separate location.

**GPs’ access to diagnostic tests**

ECG was available in 26% (30/117) of all services and conventional radiography in 19% (22/117). Of the 30 services having access to ECG, 25 were assisted by a cardiologist in interpreting the ECG, and of the 22 services having access to radiography, 13 were assisted by a radiologist in interpreting the X-rays. Laboratory tests were available between 37% (43/117) and 65% (76/117) of services for various analyses. All services had glucose POCT and urine dipstick tests available while none utilized troponin POCT. During home visits, 10% (11/116) of GPs had access to ECG. The availability of different POCT varied considerably; 100% of GPs had access to glucose POCT and none of them to troponin POCT (Table 1). We observed no significant differences in access to diagnostic tests between services adjacent to or separate from an A&E department, except for a significant difference in CRP POCT during home visits (Table 1).

**Future plans concerning GPs’ access to diagnostic tests**

More than half (56%) of GP out-of-hours services expressed plans to expand their diagnostic facilities. These plans mainly concerned adding conventional radiography and POCT for CRP.

**Discussion**

**Main findings**

Our study shows that in 2014, GPs in the Netherlands had limited and varying access to diagnostic tests.
during GP out-of-hours care. In contradiction to our expectations, GP out-of-hours services adjacent to A&E departments do not offer wider access to diagnostic tests.

**Strengths and limitations**

We performed a telephone survey to achieve a high response rate. Although this research method is prone to reporting bias, this direct method facilitated clarification and elaboration on answers given by respondents. Even though we approached managers to take part in this study, we permitted them to refer us to a GP colleague more capable of answering the questions if they felt unable to do so or to return the questionnaire by email to enable them to consult colleagues on certain questions. The results of this study are an actual representation of GPs’ access to diagnostic tests during GP out-of-hours care in the Netherlands, since we included all GP out-of-hours services and obtained a response rate of 100%. However, generalizability of the results to other countries may be challenging as not all GP out-of-hours services are organized in the same manner and different countries may have different views on the use of diagnostic tests in primary care and the position of primary care itself.

**Impact of the accessibility of diagnostic tests on out-of-hours care**

European GP out-of-hours services seem highly comparable with regards to the diagnostic scope of patients presenting to these services and, as stated by the European research network for out-of-hours primary care (EurOOHnet), face similar challenges concerning the organization of out-of-hours primary care.[2,11] Demographic changes and other developments put a strain on services and imply safety risks.[11] It may be argued that access to diagnostic tests including radiography, ECG and blood tests, may influence the utilization of GP out-of-hours care and that improved access to diagnostic tests could reduce unscheduled secondary care use and increase the efficiency of out-of-hours care in general.[7] Reduction of unscheduled secondary care use is particularly important in countries were the annual number of unscheduled attendances at A&E departments has markedly risen over the past years, e.g. the UK.[12,13] One of the main reasons why patients with apparently less urgent conditions present to A&E departments is to see a doctor and have diagnostic tests done in the same place.[14] For example, it is known that the patients’ belief that radiography is necessary, is an important factor for attending an A&E department instead of an out-of-hours primary care facility.[15] Our study shows that GPs in less than 20% of GP out-of-hours services in the Netherlands have direct access to radiography. Therefore, if radiography were more widely available to GPs during out-of-hours care, this could reduce self-referrals and unscheduled care in A&E departments, especially since a relatively large number of out-of-hours contacts involve musculoskeletal injuries.[2,16] The same may be argued for laboratory tests.[17] Other research has shown, that GPs taking care of ‘non-emergency’ patients in an A&E department request fewer diagnostic tests while working as safe as and more cost-effective than the hospital A&E physicians and with equal or higher patient satisfaction.[18–20] Finally, improved access to diagnostic tests may also reduce unnecessary referrals to A&E departments, because serious diagnoses may be excluded more reliably. Alternatively, having diagnostic test facilities available could also drive patients to attend out-of-hours care to get non-urgent diagnostic tests done. Also, when more diagnostic facilities are available to GPs, physicians should be aware of misuse of these facilities.

**Availability of diagnostic tests during GP out-of-hours care**

As far as we know, there is only one other study worldwide on the availability of diagnostic tests during GP out-of-hours care. This study is published in a Norwegian national journal, and shows that GPs in Norway have more access to ECG (26% versus 99%), but less to conventional radiography (19% versus 13%), while differences for laboratory tests are less unequivocal.[21] These differences may partially be explained by differences in the organization of GP out-of-hours care, financial structures, geographical organization and the perspective of physicians towards diagnostic tests. A further comparison of more (European) countries with similar healthcare systems would shed more light on this matter.

**GPs’ perspective and Dutch guidelines**

From the GPs’ perspective, there is a desire to have more diagnostic facilities, e.g. more POCT, available at GP out-of-hours services.[5,10,22] Although we found a similar accessibility of POCT during out-of-hours care compared to a recent Dutch study on POCT use during routine day care, this study also showed that GPs desire more access to POCT during GP out-of-hours care, with a percentage as high as 93% of GPs wanting access to POCT for CRP and 92% to POCT for D-
dimers. This seems logical, as the use of POCT is most promising in acute conditions, and these conditions are more prevalent during out-of-hours care. Furthermore, research has shown that patient satisfaction and medication adherence substantially improve when point-of-care tests are used. It is advised by the profession that GPs should have sufficient access to diagnostic facilities not only during routine day care, but also during out-of-hours care, including interpretation of test results if necessary. In current Dutch guidelines, the use of several diagnostic tests is incorporated in diagnostic algorithms, for example, CRP in the guideline for acute cough and diverticulitis, D-dimers in the guideline for deep vein thrombosis and pulmonary embolism, and ECG in the guideline for atrial fibrillation. Since many GPs do not have access to these diagnostic facilities during out-of-hours care, they are unable to adhere to the guidelines at those moments.

Future plans of the GP out-of-hours services

In our current study, more than half of the GP out-of-hours services expressed plans to expand their diagnostic facilities, though some services reported to be satisfied with their current limited access. This may partially be explained by the workload associated with running tests, and the fact that services require all attending GPs to be familiar with the utilization and interpretation of the available tests. The availability of ECG, for example, would require all GPs to be able to interpret common ECG findings. However, merely 25% of GPs consider interpreting ECGs as one of their job responsibilities. Furthermore, it is known that older and more experienced GPs use less additional diagnostic tests than younger GPs. This could explain why only 26% of all services currently facilitate access to ECG.

Influence of service location

We hypothesized that the accessibility of diagnostic tests is higher in services adjacent to an A&E department compared to services at a separate location. However, in our study, we observed no significant differences between the two groups, except for a difference in CRP POCT during home visits. Although statistically significant, this difference is not clinically relevant. The number of services with CRP POCT during home visits is very small (3/116), it is a relatively new test and this was the only significant test in multiple tests. The arbitrary division of services into two groups by legal location adjacent to an A&E department or not, might have attenuated the differences between groups. Services legally not on the grounds of a hospital, but in walking distance from an A&E department, may still have relatively easy access to diagnostic tests. Barriers to effective collaboration between GP out-of-hours services and the A&E departments may be financial incentives, organizational obstacles, differences in clinical cultures, legal responsibilities, and technological problems. These barriers need to be overcome if effective and efficient collaboration between out-of-hours care providers is a mutual goal.

Implications for research and/or practice

Diagnostic tests are less available during GP out-of-hours care compared to routine day care, which seems contradictory to the fact that patients presenting out-of-hours have a higher a priori chance of serious diseases. Increased access to diagnostic tests may have an impact on the utilization of GP out-of-hours services and A&E departments, and may reduce the number of unscheduled A&E attendances. Further research is necessary to determine the desire and need for more diagnostic tests and on how these tests can be implemented in GP out-of-hours care.

Conclusion

GPs in the Netherlands had limited and varying access to diagnostic tests during GP out-of-hours care in 2014. Contrary to our expectations, GP out-of-hours services adjacent to A&E departments do not offer wider access to diagnostic tests. Increased access to diagnostic tests may have an impact on the utilization and efficiency of GP out-of-hours services and A&E departments. Further research on the accessibility of diagnostic tests in other European countries with similar and different GP out-of-hours care systems could shed further light on the effects of accessibility to diagnostic tests.

Acknowledgements

The authors would like to thank all GP out-of-hours services for participating in this study.

Declaration of interest

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

Funding

This work was supported by the Netherlands Organisation for Health Research and Development (ZonMw); Veni-grant assigned to JWLC [grant number 91614078].
References

[1] Giesen P, Braspennings J. GP out-of-hours service: Common symptoms of acute nature (in Dutch). Huisarts en wetenschap 2004;47:735–6.

[2] Huibers LA, Moth G, Bondevik GT, et al. Diagnostic scope in out-of-hours primary care services in eight European countries: An observational study. BMC Fam Pract. 2011;12:30.

[3] Giesen P, Smits M, Huibers L, et al. Quality of after-hours primary care in the Netherlands: A narrative review. Ann Intern Med. 2011;155:108–13.

[4] Heneghan C, Glasziou P, Thompson M, et al. Diagnostic strategies used in primary care. Br Med J. 2009;338:b946.

[5] Giesen P, Huibers L, Padros Goossens M, et al. Between dream and achievement. GPs’ future vision of their position in acute care (in Dutch). Medisch Contact 2007;62:653–5.

[6] van Uden CJ, Giesen PH, Metsemakers JF, et al. Development of out-of-hours primary care by general practitioners (GPs) in The Netherlands: From small-call rotations to large-scale GP cooperatives. Fam Med. 2006;38:565–9.

[7] Giesen P, Franssen E, Mokkink H, et al. Patients either contacting a general practice cooperative or accident and emergency department out of hours: A comparison. Emerg Med J. 2006;23:731–4.

[8] Huibers L, Giesen P, Wensing M, et al. Out-of-hours care in western countries: Assessment of different organizational models. BMC Health Serv Res. 2009;9:105.

[9] Thijsse WA, Giesen PH, Wensing M. Emergency departments in the Netherlands. Emerg Med J. 2012;29:6–9.

[10] Howick J, Cals JW, Jones C, et al. Current and future use of point-of-care tests in primary care: An international survey in Australia, Belgium, The Netherlands, the UK and the USA. BMJ Open. 2014;4:e005611.

[11] Huibers L, Philips H, Giesen P, et al. EuroOOhnet-the European research network for out-of-hours primary health care. Eur J Gen Pract. 2014;20:229–32.

[12] Cowling TE, Harris MJ, Watt HC, et al. Access to general practice and visits to accident and emergency departments in England: Cross-sectional analysis of a national patient survey. Br J Gen Pract. 2014;64:e434–9.

[13] Ismail SA, Gibbons DC, Gnani S. Reducing inappropriate accident and emergency department attendances: A systematic review of primary care service interventions. Br J Gen Pract. 2013;63:e813–20.

[14] Siminski P, Cragg S, Middleton R, et al. Primary care patients’ views on why they present to Emergency Departments: Inappropriate attendances or inappropriate policy? Aust J Prim Health 2005;11:87–95.

[15] Coleman P, Irons R, Nicholl J. Will alternative immediate care services reduce demands for non-urgent treatment at accident and emergency? Emerg Med J. 2001;18:482–7.

[16] van Uden CJ, Winkens RA, Wesseling GJ, et al. Use of out of hours services: A comparison between two organisations. Emerg Med J. 2003;20:184–7.

[17] Sturme JJ, Hirsh DA, Lee EK, et al. Practice characteristics that influence nonurgent pediatric emergency department utilization. Acad Pediatr. 2010;10:70–4.

[18] Murphy AW, Bury G, Plunkett PK, et al. Randomised controlled trial of general practitioner versus usual medical care in an urban accident and emergency department: Process, outcome, and comparative cost. Br Med J. 1996;312:1135–42.

[19] Dale J, Lang H, Roberts JA, et al. Cost effectiveness of treating primary care patients in accident and emergency: A comparison between general practitioners, senior house officers, and registrars. Br Med J. 1996;312:1340–4.

[20] Bosmans JE, Boeke AJ, van Randwijck-Jacobze ME, et al. Addition of a general practitioner to the accident and emergency department: A cost-effective innovation in emergency care. Emerg Med J. 2012;29:192–6.

[21] Rebnord IK, Thue G, Hunskar S. Equipment for diagnostics, laboratory analyses and treatment in out-of-hours services (in Norwegian). Tidsskr Nor Laegeforen. 2009;129:987–90.

[22] Cals JW, Schols AM, van Weert HC, et al. Point-of-care testing in family practices: present use and need for tests in the future (in Dutch). Ned Tijdschr Geneeskd. 2014;158:A8210.

[23] Cals JW, Geersing GJ. Near-patient testing holds most promise for acute conditions. Br J Gen Pract. 2010;60:450–1.

[24] Laurence CO, Gialamas A, Bubner T, et al. Patient satisfaction with point-of-care testing in general practice. Br J Gen Pract. 2010;60:e98–104.

[25] Gialamas A, Yelland LN, Ryan P, et al. Does point-of-care testing lead to the same or better adherence to medication? A randomised controlled trial: The PoCT in general practice trial. Med J Aust. 2009;191:487–91.

[26] NHG. NHG-standpunt huisarts en spoedzorg [Internet]. Utrecht: Nederlands Huisartsen Genootschap; 2013 [cited 2016 March 14]. Available from: https://www.nhg.org/nhg-standpunt-huisarts-en-spoedzorg-juni-2013

[27] NHG-Standaarden [Internet]. Utrecht: Nederlands Huisartsen Genootschap [cited 2016 March 14]. Available from: https://www.nhg.org/nhg-standaarden

[28] Rebnord IK, Sandvik H, Hunskar S. Use of laboratory tests in out-of-hours services in Norway. Scand J Prim Health Care 2012;30:76–80.