Rutten, M.H., Smits, M., Peters, Y.A.S., Assendelft, W.J.J., Westert, G.P., Giesen, P. Effects of access to radiology in out-of-hours primary care in the Netherlands: a prospective observational study. Family Practice: 2018, 35(3), 253-258

Postprint Version	1.0
Journal website	https://academic.oup.com/fampra/advance-article-abstract/doi/10.1093/fampra/cmx093/4259779?redirectedFrom=fulltext
Pubmed link	https://www.ncbi.nlm.nih.gov/pubmed/29029061
DOI	10.1093/fampra/cmx093

Effects of access to radiology in out-of-hours primary care in the Netherlands: a prospective observational study

MARTIJN HENDRIK RUTTEN[A,B], MARLEEN SMITS[A,B], YVONNE ANTHONIA SEBASTIANA PETERS[A,B], WILLEM JAN JOZEF ASSENDELFT[C], GERT PIETER WESTERT[A,B] AND PAUL HENDRIKUS JOSEPHUS GIESEN[A,B]

aRadboud Institute for Health Sciences, Radboud University Medical Center, Nijmegen, The Netherlands,
bScientific Center for Quality of Healthcare (IQ Healthcare), Nijmegen, The Netherlands and
cDepartment of Primary and Community Care, Radboud University Medical Center, Nijmegen, The Netherlands.

ABSTRACT

Background. In the Netherlands, out-of-hours primary care is provided in general-practitionercooperatives (GPCs). These are increasingly located on site with emergency departments (ED), forming Emergency-Care-Access-Points (ECAP). A more efficient and economical organization of out-of-hours primary emergency care could be realized by increased collaboration at an ECAP. In this study, we compared the effects of different models with respect to access to (hospital) radiology by the GPC. We investigated patient and care characteristics, indication for diagnostics and outcomes at GPCs with and without access to radiology.

Methods. A prospective observational record review study of patients referred for conventional radiology for trauma by one of five GPCs in the period April 2014—October 2015, covering three organizational models.

Results. The mean age was 31 years and 56% was female. Extremities were predominately involved (91%). There was a medical indication for radiology in 85% and the assessed risk by requesting GPs on abnormalities was high in 66%. There was a significant difference in outcomes between models. Radiological abnormalities (fractures/luxations) were present in 51% without direct access and in 35% with partial and unlimited access. Overall, 61% of the included patients were referred to the ED; 100% in the models without access and 38% in the models with (partial) access.

Conclusions. GPC access to radiology is beneficial for patients and professionals. The diagnostics were adequately used. With access to radiology, unnecessary referrals and specialist care are prevented. This may lead to a decrease in ED attendance and overcrowding.

BACKGROUND

The Netherlands has a strong primary care system. Dutch inhabitants are registered at a general practitioner (GP), acting as a gatekeeper to hospital care. The general practice, in which the GP works is accessible on weekdays from 8 a.m. till 5 p.m. Out-of-hours primary care is provided in General Practitioner Cooperatives (GPCs) (1).

These are increasingly located on site of the accident and emergency departments (ED) of hospitals, forming a collaborative Emergency- Care-Access-Point (ECAP) (2). The aim of this out-of-hours cooperation is to provide (cost)efficient, patient-centred and safe emergency care. It helps to avoid unnecessary ED attendance. An example of such collaboration is the triage and treatment of self-referrals by the GPC instead of the ED (3). An opportunity for further cooperation is access to hospital diagnostics like radiology for GPs working in GPCs, which could reduce the number of patients referred to the ED. Patients frequently consult the GP with musculoskeletal trauma, in which case conventional radiology could be used to rule out a fracture (4). During office-hours the GP has access to hospitals radiology facilities. If an abnormality is ruled out, the patient can be treated by the GP, otherwise the patient is referred to the ED. However, during out-of-hours, most GPCs do not have this access to conventional radiology facilities, and all patients need therefore to be referred to the ED (5).

The restrained access to hospital diagnostics causes unnecessary duplication of clinical examinations, a longer length of stay (LOS) and a higher contribution from the obligatory annual deductible of the patient (6). This system is, therefore, less efficient, not patientcentred and probably not cost-effective. Additionally, it generates unnecessary attendance to the ED, that is already struggling with overcrowding (7–9). Different sources show that the main reason for patients to attend an ED is the expected need for diagnostics (often radiology) (10–12). Consequently, to strengthen their role as a gatekeeper, most Dutch GPs wish to have access to such diagnostics when working at the out-of-hours GPC.

The effects of radiology access by the GPC on the provided care and patient flows are not known. In several regions in the Netherlands, the GPCs have recently gained direct access to the radiology facilities of the hospital without a referral.

The objective of our study is to examine the effect of radiology access by the GPC on the provided care and patient flows. We investigated and compared patient- and care characteristics, indication for diagnostics and patient outcomes at GPCs with unlimited access, partial access and without direct access to radiology. This study could be relevant for decision makers and practitioners in other countries searching for optimization of the organization of out-of-hours primary care and aiming at the reduction of emergency department crowding.

METHODS

Design and population

We carried out a prospective observational record review study among all patients referred for conventional radiology for trauma by one of five GPCs in the period April 2014–October 2015, covering three organizational models: unlimited access, partial access and without direct access (Table 1).

Data collection

Patients were included by the GP on call at the GPC. Routine data from the medical records of the GPC and hospital were analysed by the researchers (anamnesis, examination, evaluation, further policy).
In addition, the GP documented for each patient their assessment of the risk of radiological abnormalities (low, high) and indication (medical, wish of patient, both) in the patients record. The GP was requested to make the risk assessment before referral, based on anamnesis and physical examination. Patients with an incomplete or unsigned informed consent form were excluded.

Ethics and privacy

The Ethical Research Committee of the Radboud University Medical Centre Nijmegen was consulted and concluded that this study does not fall within the remit of the Dutch Medical Research Involving Human Subjects Act [Wet Mensgebonden Onderzoek]. All patients signed an informed consent form allowing the researchers to analyse their medical records. To guarantee privacy, all researchers signed a declaration of confidentiality. The data were anonymized before analysis.

Statistical analyses

SPSS 22 (Statistical Package for Social Sciences) was used for data analyses. Study results are described using descriptive statistics and frequency tables. Indication and assessment, outcomes, referrals to the ED and treatment at the ED for the three models were compared using t-tests and chi-square tests.

[TABLE 1]

RESULTS

Patient characteristics

We included 657 patients within three organizational varieties with respect to radiology accessibility by the GPC; 232 patients (35.3%) in a model without access (GPCs A and B), 307 patients (46.7%) in a model with limited access (GPCs C + D + A′) and 118 (18.0%) in a model with unlimited access (GPC E). One GPC changed its policy during the study period and contributes therefore to ‘without access’ (A) and ‘limited access’ (A′). All included patients received radiological examinations (n = 657), regardless of the organizational model.
Table 2 shows the overall patient characteristics. The mean age was 31.3 years and 55.5% was female. Most patients were injured at home (28.8%) or during sports (27.0%). Extremities were predominately involved (91.0%). About 75% concerned a trauma of the distal extremities (hand, wrist, foot, ankle). The population was the same within the three organization models with respect to age, gender, injury location and affected body part.

Indication and assessment of the professional

The radiological examination was requested for 84.5% on a strict medical indication, in 4.3% on demand of the patient and in 11.2% for both reasons (Table 3). The GP assessed the risk of radiological abnormalities in 65.7% as 'high'. There were no significant differences in indications or risk assessments between the three organizational varieties.

Outcomes diagnosis

In total 40.2% of the included patients were diagnosed having a fracture or luxation (N = 263) (Table 3). There was a significant difference in outcomes between the model without access and the models with (limited) access. The percentage of radiological abnormalities (fractures and luxations) was 51.3% in the model without access to radiology, 34.6% in the model with limited access and 34.7% in the model with unlimited access.

Assessment, indication and diagnosis

When the risk assessment by the GP was 'high', there were more fractures/luxations (48.8%) compared to a low-risk assessment (24.4%). Of all fractures and luxations, 79.6% was requested with a high-risk assessment and 87.7% on a strict medical indication. Nine of the 28 patients where radiology was only requested on demand of the patient showed a fracture (32.1%) (Table 4).

Emergency department: referrals, diagnosis, treatment and follow-up

Of all patients, 60.5% was referred to the emergency department.
Logically the referral rate for GPC without access to radiology was 100% (N = 226). This was only 38.4% (N = 118) in case of limited access and 39.8% (N = 47) in case of unlimited access (Table 5) (difference statistically significant).
Models with limited access to radiology (89.8%) and unlimited access (87.2%) had a statistically significant higher percentage of radiological abnormalities (fractures and luxations) compared to those without (51.3%). Treatment at the ED consisted most often of gypsum in all three models (43.8%); in the model without GP access to radiology bandage/taping was more frequent as compared to the models with (limited) access. There were less follow-up treatments or visits planned at the hospital in the model without access (63.8%) compared to 90.4% and 93.0% in the models with (limited) access. Patients were more often referred back to the GP in the general practice at which they were registered in the model without access (16.1%) (Table 5).

DISCUSSION

Main findings

Our work shows that regardless of the model, patients referred by the GPC for radiology are mostly young of age, female and have injuries of their distal extremities. In general, the GPC professional demanded radio-diagnostics on a medical indication (85%) and estimated a high probability on abnormalities (66%). With an overall average of 40% on radiological abnormalities, there is an appropriate diagnostic outcome. The no direct access model in our study had a significantly higher percentage of radiological abnormalities (51%) compared with the novel organizations (35%–40%), but showed no differences in indications or assessment.

With GPC access to radiology referral rate was only 40% (compared with 100% in the standard model).

[TABLE 2]

Comparison with literature

A recent review of the effectiveness of primary care services located with the ED illustrates that ED physicians ordered more X-rays than GPs in the ED or adjacent services (9). GPs seem to use the resources accurately and in a restrained matter. Nevertheless, concerns were addressed about a possible increase in the use of diagnostics if at direct disposal of GPs working at the GPC.
A recent published Dutch study on referrals from the GP to ED described a fracture percentage of 41% (no GP access to radiology) (13).

[TABLE 3] [TABLE 4]

With an average of 40% radiological abnormalities in our study, there is an appropriate diagnostic outcome. The no direct access model in our study had a significantly higher percentage of radiological abnormalities compared with the novel organizations, but showed no differences in indications or assessment. We hypothesize that GPs experience a barrier to refer patients directly to the ED, probably to prevent unnecessary crowding of the ED, an increase in costs and longer length of stay for the patients. The fact that the risk assessments and indications are comparable between the models, contradicts the belief that GPs tend to misuse the diagnostics if they are at their direct disposal. Nevertheless, they should remain aware on the risk of performing unnecessary diagnostics.
The number of referrals is significantly higher in the model without direct access (100%), compared to models with (limited) direct access (approximately 40%). With GPC access to radiology, there is a decrease in referrals to the ED with an expected concomitant cost reduction. It will diminish the amount of unnecessary ED consultations, which could contribute to reduce ED overcrowding (7,8,14).
The outcomes and resulting treatment at the ED differ between the models. In the model without access to radiology, there are significantly more patients with contusions/dislocations and less with fractures compared to the novel models. As a result, there is a diversity in the most applied treatment at the ED. In the model without direct access there is more plastering and bandaging, whereas the EDs related to GPCs with (limited) direct access apply more gypsum. The treatment at the ED reflects the referred patient population and hence tends to be more specialistic in the models with (limited) access, due to GP selection. This also clarifies the higher follow-up at hospitals in the models with access to radiology (6).

Strengths and weaknesses

To our knowledge, there are no other multicenter studies on indications or risk assessment before radiology by the GPC. In addition, this prospective observational study gains insight into patient flows in the various models with respect to GPC access to radiology.
Of the 121 GPCs in the Netherlands, 68 (56%) are situated in an ECAP and 20 (17%) have access to conventional radiology. Six of those have unlimited access and 14 limited access (15). In our study, we analysed the effect of radiology in patient flows for six GPCs at an ECAP, of which two without access, three with limited access and

one with unrestrained access. Unfortunately, due to limited financial resources, an intervention study could not be committed, and the number of included GPCs was limited.
Patients were identified and included by GPs. Although we intended to include all, it is conceivable that there has been a selection of patients. Possibly, patients with an evident fracture were not included in the registries of the GPC and directly referred to the ED.
In addition, it is imaginable that during busy hours patients with minor trauma were not included. It is not known in which direction the results are influenced. In our study, only one GPC with unlimited access to radiology was included, which might not be representative of other regions.

[TABLE 5]

Implications for practice and further research

This study indicates that access to radiology by the GPC at an ECAP has obvious benefits for patients and professionals. This novel manner of the organization should, therefore, be considered by health care workers, managers and policy makers. However, the effects on patient satisfaction and LOS are not yet certain and should be a subject of further studies.
It is expected that the mean LOS for the patient will decrease by giving GPCs access to diagnostics, especially since patients without a radiological abnormality do not have to be treated at the ED.
Placement of a GP for treating low-acuity patients at the ED has already shown to reduce LOS (16,17). Patients referred to the ED by the radiology department have a shorter LOS compared with the average ED population (18). Longer LOS has shown a negative effect on patient satisfaction (19,20). Hence, reduction of LOS by giving GPCs access to radiology is expected to contribute to patientcentred care. Further research is advisable to evaluate the effects on LOS and patient satisfaction.
Care for self-referrals provided by the GPC is estimated to be more than three times cheaper compared to the care for self-referrals at the ED (3). Giving GPCs access to radiology will probably cause a cost reduction, caused by the decline in referral rates (60%) and follow-up. Furthermore, a lower contribution to the annual deductible of the patient is expected. However, actual financial figures are lacking and should be topic for further research.
Although our data and previous studies demonstrate that GPs working at emergency care settings are restrictive with the use of diagnostics, unnecessary X-rays must be prevented. We recommend to develop educational programs for GPs (in training) and further research on this topic.

CONCLUSION

Access to radiology by the GPC at an ECAP has benefits for patients and professionals. The GPC utilizes the option for access adequately, mostly with a strict medical indication and high-risk assessment. It enables professionals at the GPC to execute their role as gatekeeper more adequately. With direct access to radiology, more patients maintain under treatment of the GP, and unnecessary referrals and specialist care is prevented. This will probably lead to a decrease in ED attendance.

A reduction in costs and LOS and an increased patient satisfaction is expected, but should be analysed in further studies.

DECLARATION

Ethical approval:

the Ethical Research Committee of the Radboud university medical centre Nijmegen was consulted and concluded that this study does not fall within the remit of the Dutch Medical Research Involving Human Subjects Act [Wet Mensgebonden Onderzoek]. All patients signed an informed consent form allowing the researchers to analyse their medical records. To guarantee privacy, all researchers signing a declaration of confidentiality. The data were anonymized before analysis.

Funding:

our research was funded by the five General Practitioner Cooperatives participating in this study. They did not have any influence in the study design and description of outcomes.

Conflict of interest:

none.

REFERENCES

1. Smits M, Rutten M, Keizer E, Wensing M, Westert G, Giesen P. The development and performance of after-hours primary care in the Netherlands: a narrative review. Ann Intern Med 2017; 166: 737–42.
2. Thijssen WA, Giesen PH, Wensing M. Emergency departments in the Netherlands. Emerg Med J 2012; 29: 6–9.
3. Rutten M, Vrielink F, Smits M, Giesen P. Patient and care characteristics of self-referrals treated by the general practitioner cooperative at emergencycare- access-points in the Netherlands. BMC Fam Pract 2017; 18: 62.
4. Lisdonk EHvd. Ziekten in de Huisartsenpraktijk. [Diseases in General Practice] Utrecht: Bunge, 2008, p. 380.
5. Schols AMR, Stevens F, Zeijen CGIP, Dinant G-J, van Vugt C, Cals JWL. Access to diagnostic tests during GP out-of-hours care: A cross-sectional study of all GP out-of-hours services in the Netherlands. Eur J Gen Pract 2016; 22(3): 176–81.
6. Thijssen WA, Wijnen-van Houts M, Koetsenruijter J, Giesen P, Wensing M. The impact on emergency department utilization and patient flows after integrating with a general practitioner cooperative: an observational study. Emerg Med Int 2013; 2013: 364659.
7. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. Ann Emerg Med 2008; 52: 126–36.
8. van der Linden C, Reijnen R, Derlet RW et al. Emergency department crowding in the Netherlands: managers' experiences. Int J Emerg Med 2013; 6: 41.
9. Ramlakhan S, Mason S, O'Keeffe C, Ramtahal A, Ablard S. Primary care services located with EDs: a review of effectiveness. Emerg Med J 2016; 33: 495–503.
10. 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.
11. de Valk J, Taal EM, Nijhoff MS et al. Self-referred patients at the emergency department: patient characteristics, motivations, and willingness to make a copayment. Int J Emerg Med 2014; 7: 30.
12. van der Linden MC, Lindeboom R, van der Linden N, et al. Self-referring patients at the emergency department: appropriateness of ED use and motives for self-referral. Int J Emerg Med 2014; 7: 28.

13. Moll van Charante EP, van Steenwijk-Opdam PC, Bindels PJ. Out-of-hours demand for GP care and emergency services: patients' choices and referrals by general practitioners and ambulance services. BMC Fam Pract 2007; 8: 46.
14. Kraaijvanger N, Rijpsma D, van Leeuwen H, Edwards M. Self-referrals in the emergency department: reasons why patients attend the emergency department without consulting a general practitioner first—a questionnaire study. Int J Emerg Med 2015; 8: 46.
15. InEen. Benchmark Bulletin General Practitioner Cooperatives. Utrecht: InEen, 2016.
16. Jiménez S, de la Red G, Miró O et al. Effect of the incorporation of a general practitioner on emergency department effectiveness. Med Clin (Barc)
2005; 125: 132–7.
17. Boeke AJ, van Randwijck-Jacobze ME, de Lange-Klerk EM, Grol SM, Kramer MH, van der Horst HE. Effectiveness of GPs in accident and emergency departments. Br J Gen Pract 2010; 60: e378–84.
18. Thijssen WA, Kraaijvanger N, Barten DG, Boerma ML, Giesen P, Wensing M. Impact of a well-developed primary care system on the length of stay in emergency departments in the Netherlands: a multicenter study. BMC
Health Serv Res 2016; 16: 149.
19. Hutchison B, Østbye T, Barnsley J et al.; Ontario Walk-In Clinic Study.
Patient satisfaction and quality of care in walk-in clinics, family practices and emergency departments: the Ontario Walk-In Clinic Study. CMAJ
2003; 168: 977–83.
20. Bleustein C, Rothschild DB, Valen A, Valatis E, Schweitzer L, Jones R. Wait times, patient satisfaction scores, and the perception of care. Am J Manag
Care 2014; 20: 393–400.

TABLES

Table 1. Models of access of general practitioner cooperatives to radiology in the Netherlands ($N = 5$), period of inclusion and background information

Access to radiology		Period	Background information
None	A	April–July 2014	ECAP in the eastern part of the Netherlands. No access to conventional radiology by the GPC. Referral to the ED necessary.
	B	October–December 2014	ECAP in the south-eastern part of the Netherlands. No access to conventional radiology by the GPC. Referral to the ED necessary.
Limited	C	December 2014–April 2015	ECAP in the south-west of the Netherlands. GPC access to conventional radiology during weekends and public holidays only, possibilities between 11:00–12:00 and 17:00–18:00. Analysis under responsibility of the hospital radiologist. Outside these hours referral to the ED for conventional radiology is necessary.
	D	May–June 2015	GPC on the premises of the hospital, no ECAP. Located in the west of the Netherlands. GPC access to conventional radiology on weekdays between 17:00 and 20:00 and during weekends and public holidays between 10:00 and 20:00. Analysis under responsibility of the hospital radiologist. Outside these hours referral to the ED for conventional radiology is necessary.
	A′	June–September 2015	ECAP in the eastern part of the Netherlands. GPC access to conventional radiology on weekdays and during weekends and public holidays, with nightly exclusion. Analysis under responsibility of theradiologist in an associated hospital elsewhere. Outside these hours referral to the ED for conventional radiology is necessary.
Unlimited	E	July–October 2015	ECAP in the eastern part of the Netherlands. Unlimited access by the GPC during their opening hours. Analysis under responsibility of the hospital radiologist.

ECAP A and A′ are the same organization.

Table 2. Patient characteristics of all patients referred for conventional radiology for trauma by one of the five general practitioner cooperatives in the period April 2014–October 2015 covering three organizational models

	% (N)
Gender	N = 656
Male	44.5 (291)
Female	55.5 (363)
Average age in years (min–max) ± SD (N = 657)	31.34 (1–95) ± 22.16
Age categories in years	N = 649
0–4	4.3 (28)
5–16	30.2 (196)
17–30	22.2 (144)
31–45	16.0 (104)
46–65	18.5 (120)
>65	8.8 (57)
Injury location	N = 653
Home	28.8 (188)
Sports	27.0 (176)
Traffic	14.5 (95)
Work	5.1 (33)
School	3.2 (21)
Other	21.4 (140)
Affected body part	N = 650
Wrist	21.0 (137)
Foot/toes	20.2 (132)
Hand/fingers	19.4(127)
Ankle	14.6 (95)
Elbow/lower arm	8.1 (53)
Shoulder/clavicle	6.6 (43)
Knee/lower leg	5.5 (36)
Other	4.1(27)

Table 3. Indication for radiology documented by the referring general practitioner, risk of radiological abnormities as clinically assessed by the general practitioner and eventual diagnosis per organizational model

	No access %(N)	Limited access %(N)	Unlimited access %(N)	Total %(N)
Indication	N = 227	N = 306	N = 118	N = 651
Medical	81.5 (185)	85.6 (262)	87.3 (103)	84.5 (550)
Patient demand	4.4 (10)	3.9 (12)	5.1 (6)	4.3 (28)
Both	14.1 (32)	10.5 (32)	7.6 (9)	11.2 (73)
Risk of radiological abnormalities	N = 223	N = 304	N = 118	N = 645
Low	31.8 (71)	31.9 (97)	44.9 (53)	34.3 (221)
High	68.2 (152)	68.1 (207)	55.1 (65)	65.7 (424)
Diagnosis*	N = 226	N = 307	N = 118	N = 651
Fracture	46.9 (106)	33.6 (103)	33.9 (40)	38.2 (249)
Luxation	4.4 (10)	1.0 (3)	0.8 (1)	2.2 (14)
Distortion or contusion	45.6 (103)	64.5 (198)	65.3 (77)	58.1 (378)
Other	3.1 (7)	1.0 (3)	0.0 (0)	1.5 (10)

*$P < 0.05$.

Table 4. Indications for radiology documented by the referring general practitioner, risk of radiological abnormalities as clinically assessed by the general practitioner and location of the injury per eventual diagnosis

	Fracture/ luxation % (*N*)	Other % (*N*)	Total % (*N*)
Indication	*N* = 260	*N* = 391	*N* = 651
Medical	41.5 (228)	58.5 (322)	100 (550)
Patient demand	32.1 (9)	67.9 (19)	100 (28)
Both	31.5 (23)	68.5 (50)	100 (73)
Risk of radiological abnormalities*	*N* = 263	*N* = 384	*N* = 645
Low	24.4 (54)	75.6 (167)	100 (221)
High	48.8 (207)	51.2 (217)	100 (424)
Affected body part	*N* = 263	*N* = 390	*N* = 653
Wrist	52.6 (72)	47.4 (65)	100 (137)
Hand/fingers	47.2 (60)	52.8 (67)	100 (127)
Feet/toes	23.5 (31)	76.5 (101)	100 (132)
Ankle	23.2 (22)	76.8 (73)	100 (95)
Elbow/lower arm	54.7 (29)	45.3 (24)	100 (53)
Shoulder/clavicle	53.5 (23)	46.5 (20)	100 (43)
Knee/lower leg	38.5 (15)	61.5 (24)	100 (39)
Upper arm	56.6 (5)	44.4 (4)	100 (9)
Hip	25.0(2)	75.0 (6)	100 (8)
Spine	25.0 (1)	75.0 (3)	100 (4)
Upper leg	66.7 (2)	33.3 (1)	100 (3)
Pelvis	100 (1)	0.0(0)	100 (1)
Facial bones	0.0 (0)	100 (1)	100 (1)
Thorax	0.0 (0)	100 (1)	100 (1)

*$P < 0.05$.

Table 5. Referral rate, diagnosis, treatment and follow-up at the emergency department per organizational model

	No access % (*N*)	Limited access % (*N*)	Unlimited access % (*N*)	Total % (*N*)
Referral to ED*	*N* = 226	*N* = 307	*N* = 119	*N* = 646
	100 (226)	38.4 (118)	39.4 (47)	60.5 (391)
Diagnosis at ED*	*N* = 226	*N* = 118	*N* = 47	*N* = 391
Fracture	46.9 (106)	87.3 (103)	85.1 (40)	63.7 (249)
Distortion or contusion	45.6 (103)	7.7 (9)	13.8 (6)	30.2 (118)
Luxation percentage	4.4 (10)	2.5 (3)	2.1 (1)	3.6 (14)
Other	3.1 (7)	2.5 (3)	0.0 (0)	2.5(10)
Treatment at ED	*N* = 266	*N* = 111	*N* = 42	*N* = 379
Gypsum	34.1 (77)	60.4 (67)	71.4 (30)	43.8 (174)
Bandage/tape	29.6 (67)	14.4 (16)	4.8 (2)	22.4 (85)
None/advice	16.8 (38)	4.5 (5)	2.4 (1)	11.6 (44)
Sling	7.4 (16)	8.1 (9)	14.3 (6)	8.2 (31)
Other	8.8 (20)	9.9 (11)	0.0 (0)	8.2 (31)
Operation	3.5 (8)	2.7 (3)	7.1 (3)	3.7 (14)
Follow-up	*N* = 240	*N* = 104	*N* = 43	*N* = 371
ED	100 (224)	38 (104)	39.8 (43)	60.5 (371)
Hospital	63.8 (143)	90.4 (94)	93.0 (40)	74.7 (227)
None	20.1 (45)	6.7 (7)	4.7 (2)	14.6 (54)
Registered GP (if needed)	16.1 (36)	2.9 (3)	2.3 (1)	10.8 (40)

*$P < 0.05$.