Half of the patients with chest pain that are urgently referred are transported in unsafe conditions

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Background **Patients with an acute coronary syndrome should be referred to hospital urgently to start reperfusion therapy as soon as possible. Owing to the risks of ventricular fibrillation and pulseless ventricular tachycardia, urgent transport should be organized under safe conditions, that is, with a defibrillator at hand.**

Aim **To evaluate the type of transport of patients with chest pain referred by their general practitioner (GP).**

Design of study **Observational study.**

Setting **A sentinel network of general practices in Belgium, covering almost 1.6% of the total population.**

Patients **One thousand nine hundred and ninety-six patients with chest pain attending their GP in 2003.**

Method **Descriptive analyses reporting proportions along with their 95% confidence interval (CI).**

Results **Male patients were referred to hospital more often than female patients: 44.9% (95% CI: 41.6–47.8) versus 36.5% (95% CI: 33.4–39.6). For patients who were referred routinely, 92.7% (95% CI: 89.1–95.2) were transported by family and neighbours, 4.8% (95% CI: 2.8–7.9) by ambulance and 2.5% (95% CI: 1.2–5.1) by GPs. For patients who were referred urgently, ambulances transported 56.9% (95% CI: 51.1–62.7), family and neighbours 36.9% (95% CI: 31.4–42.7) and the GP 6.1% (95% CI: 3.7–9.5).**

Conclusion **Almost half of the patients with chest pain who require urgent referral are transported in unsafe conditions.** ***European Journal of Emergency Medicine*** **15:330–333 © 2008 Wolters Kluwer Health | Lippincott Williams & Wilkins.**

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Background

Chest pain can be a sign of an ischaemic or nonischaemic cardiac disease, gastro-oesophageal or pulmonary disease, muscular–skeletal disorders or a panic attack [1–9]. For acute myocardial infarction (AMI), urgent referral to hospital is imperative because mortality decreases if thrombolysis can be carried out quickly [10]. The national infarct angioplasty project pilot sites report (UK) reveals that 3.1% of patients with ST-segment elevation AMI who were transferred by ambulance had ventricular tachycardia or ventricular fibrillation requiring cardioversion [11]. The most important life-saving device for these patients is to get them to a defibrillator and start reperfusion therapy as soon as possible [11].

In Belgium, patients can consult their general practitioner (GP), go to the emergency department of a hospital or call the 112 services. Ambulances of the 112 service are all equipped with an automatic defibrillator and the paramedics are able to use it. The staff of the 112 helpline can also dispatch an emergency rescue team (ERT). Little was known, however, of how GPs refer patients with chest pain and which transport system is used. The aim of this study was to acquire better insight into the level of referral urgency and the type of transport that is used.

Methods

Physicians

Participating physicians were recruited from an existing Belgian network of sentinel practices, in which GPs have been voluntarily and constantly registering epidemiological data for the last 25 years.

This network is representative of all Belgian GPs with respect to sex and age. It is spread equally over all regions of the country. A detailed report of the method used to estimate the denominator in patient-years has been published previously [12]. During the registration period, the network covered almost 1.6% of the Belgian population or 169 420 inhabitants. Only those physicians who had regularly recorded patients with chest pain for

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26 or more weeks in the year 2003 participated in the study ($N = 163$). The data were recorded prospectively on special forms. Follow-up information on the referred patients was collected on another special form after 4 weeks by the GPs.

Patients

All patients with chest pain consulting their GP were consecutively included in the study. Patients with chest pain after trauma were excluded.

Management decisions

Action taken was recorded as 'no referral' (a), 'specialist advice' (except radiology) (b), 'non-urgent hospitalization' (c) and 'urgent hospitalization' (d). Three categories were used to analyse the data, 'no referral' (a), 'non-urgent referral' (b and c) and 'urgent referral' (d).

Type of transport was classified as 'transport by ambulance with 'ERT' or 'transport by ambulance without ERT', by 'neighbours or family members of the patient' or by the 'GP'.

Discharge diagnosis was recorded as 'AMI', 'unstable angina' or 'other'. Two categories were used to analyse the data, 'acute coronary syndrome' (ACS = AMI + unstable angina) and 'other'.

Analyses

The type of transport for each referral type and ACS or 'other diagnosis' was bivariately reported as proportions along with their 95% confidence interval (CI). Differences in mortality rate, defined as death within 72 h after referral, were statistically tested by means of a χ^2 for trend. The data were analysed with Epi Info, version 3.2.2 [13].

Results

General characteristics

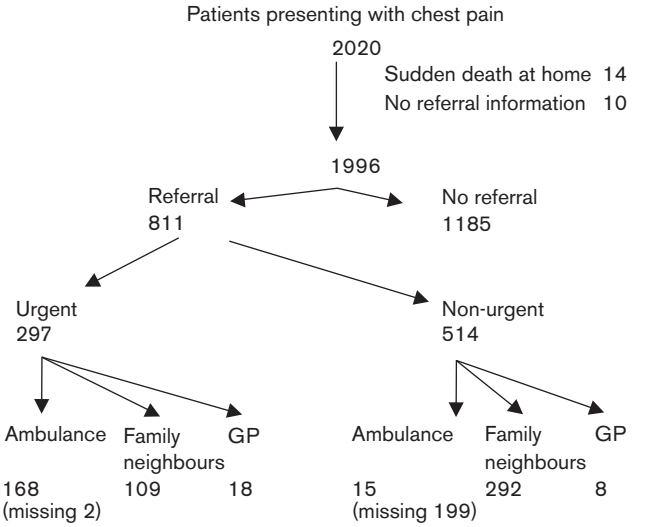
In total, 2020 patients with nontraumatic chest pain consulted their GP. Twenty-four patients were excluded from the analyses because of sudden death at home ($N = 14$) or lack of information ($N = 10$), leaving 1996 patients (Fig. 1). The mean age was 58.6 years (SD = 18.1) and 52% were males.

Nearly 40% of the patients with chest pain were referred to the hospital ($N = 811$) of which 37% ($N = 297$) needed urgent attention (Table 1).

Male patients were more often referred than female patients, 44.9 versus 36.5% ($P < 0.001$). Male patients were also more often 'urgently referred' than female patients, 17.7 versus 12.0% ($P = 0.004$) (Fig. 1).

One hundred and twenty-seven of the 295 patients who needed urgent referral were transported by family, neighbours or GPs. ACS was diagnosed in 190 patients. Of these, 68 needed non-urgent referral and 122 needed urgent referral. Family and neighbours transported 81 patients with ACS and GPs transported 11 patients with ACS. Ninety-two of 172 patients with ACS were transported in suboptimal conditions.

Fig. 1



Patients presenting with chest pain. GP, general practitioner.

The relation between referral type, transport and death within 72 h

For the patients who needed non-urgent referral, family and neighbours organized 92% of the transport, ambulance 5%, and GPs 3%. For patients requiring urgent referral, ambulances transported about 57% of patients, family and neighbours 37%, and the GPs 6% of the patients. GPs transported patients who required urgent referral (69.2%; 95% CI: 48.2–85.7) than those requiring non-urgent referral (30.8%; 95% CI: 14.3–51.8).

Type of transport was missing for 199 patients not requiring urgent referral. Most of them, 182, had a discharge diagnosis other than ACS. In the group that required urgent referral there were two misses. The transport type was missing for 18 ACS patients. The mortality within 72h of referred patients was 2.3%: 19 patients died.. Fifteen of them needed urgent referral.

A significant difference in mortality rate according to the type of transport was observed: of the 73 patients who were transported by ERT, eight (11.0%) died; of the 100 transported by ambulance, six (6.0%) died; of the 26 transported by the GP, one (3.8%) died, and of the 401 transported by neighbours or family, four (1%) died. (χ^2 for trend: $P < 0.0001$) (Table 1).

Table 1 Referral type and transport (*N*=610, missing 201)

	Nonurgent referral *N*=315 Missing 199		Urgent referral *N*=295 Missing 2	
Discharge diagnosis	Other *N*=264 Missing 182	ACS *N*=51 Missing 17	Other *N*=174 Missing 1	ACS *N*=121 Missing 1
Emergency rescue team *N*=73	*N*=0	*N*=0	*N*=32 (3+) 18.4% (12.9–25.0)	*N*=41 (5+) 33.9% (25.5–43.0)
Ambulance *N*=110	*N*=13, (1+) 4.9% (2.6–8.3)	*N*=2 3.9% (0.5–13.5)	*N*=58 (2+) 33.3% (26.4–40.9)	*N*=37 (3+) 30.6% (22.5–39.6)
Family and neighbours *N*=401	*N*=246 (2+) 93.2% (89.4–95.9)	*N*=46 (1+) 90.2% (78.6–96.7)	*N*=74 42.5% (35.1–50.2)	*N*=35 (1+) 28.9% (21.0–37.9)
GP *N*=26	*N*=5 1.9% (0.6–4.4)	*N*=3 5.9% (1.2–16.2)	*N*=10 (1+) 5.7% (2.8–10.3)	*N*=8 6.6% (2.9–12.6)

(+), died within 72 h (*N*=19).
ACS, acute coronary syndrome=acute myocardial infarction+unstable angina.
Other, all the other diagnoses.
GP, general practitioner.

Discussion

Summary of main findings

Most patients consulting with chest pain are not referred by their GP. Only 40% of these patients were referred. Almost half of the urgent referrals were transported by family, neighbours and the GP. GPs were even more likely to transport their patients themselves in urgent cases than in non-urgent cases.

Strengths and weaknesses of the study

This is one of the rare studies exploring referral decisions actually taken in a general practice setting. The long-standing experience of the Belgian network of sentinel practices and their organization made it possible to include a large number of patients. We also noticed that the number of cases was fairly constant throughout the year and that there was no dropout in the weekly number of cases towards the end of registration. Despite the participating GPs' extensive experience in recording morbidity, there may be some underrecording of non-referred patients.

A possible bias is the large number of 'missing' in the patients not requiring urgent referral. Several explanations could be provided: these patients did not go to the specialist, they did not return to the GP or the GP neglected this part of the registration. Including the 18 patients with ACS without known transport type could change the suboptimal transport from 53 to 51% (if all 18 were transported by ambulance) or to 61.1% (if no one was transported by ambulance).

Previous studies

This study, which is one of the largest studies within a general practice, confirms several results of other studies. Bleeker *et al.* [14] found that 10% of patients with AMI and first seen by a GP in Rotterdam (The Netherlands) used their own transport and 2% were brought to the hospital by the GP. Those are probably lower percentages than those in this study because of differences in study design: all Bleeker's patients had a discharge diagnosis of AMI and were probably more ill. Svenson *et al.* [15] found that in Sweden the more sick patients have more severe ischaemia and abnormal ECGs and call for an ambulance, whereas less sick patients with nonpathologic ECGs transport themselves.

Meaning of the study

About half of the urgent transport was carried out by family, neighbours and GPs in a country where 50% of the patients can be reached by ambulance within 8 min and 90% within 12 min of the call. Saving time may be an important consideration: the GP may face a difficult choice between driving a patient in a really bad condition straight to the hospital, or waiting for the ERT with its expertise and necessary equipment. For family members, the cost of the ambulance may play a role. Although the patients who were transported by family or neighbours probably had the lowest risk of a life-threatening disease, reflected in the low mortality rate (1.0%) and in no death of patients transported by GP or family during transport, transporting patients with suspected ACS without a defibrillator at hand should be discouraged.

Future research

It is not always clear which threshold GPs use to refer a patient with chest pain. Moreover, their preference for one type of transport over another is as yet unresolved. A qualitative study among GPs could help to explore this.

Conclusion

Almost half of the patients requiring urgent referral with chest pain are transported in unsafe conditions.

What was already known

Patients with chest pain with more severe ischaemia and abnormal ECG call for an ambulance, whereas less sick patients with nonpathologic ECGs reach hospital by

themselves. Transport of patients with an ACS should take place under safe conditions, that is, with a defibrillator at hand.

What this study adds

Almost half of patients with chest pain, requiring urgent referral to hospital, are transported by family, neighbours or GPs. GPs are even more likely to transport their patients themselves in urgent cases.

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Declaration

Competing interests: The authors declare that they have no conflicting interests. Authors' contributions: RB, AV, BA and FB designed the study. VV was responsible for collecting the data. RB analysed the data. RB wrote the first draft of the article. AV, BA and FB provided substantive subsequent contributions as did VV for the final draft. FB supervised the study design and analysis. RB acts as guarantor.

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