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Is patient flow more efficient in Urgent Care Collaborations?

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Objective Emergency Departments and General Practitioner co-operatives collaborate increasingly in Urgent Care Collaborations (UCCs) by sharing one combined entrance and joint triage. The aim of this study is to examine the difference between UCCs and providers who operate separately with respect to the efficiency of patient flow.

Methods This study had a cross-sectional observational design comparing three regions with UCC with three regions with usual care. Outcome measures were efficiency of patient flow, defined as a reducing length of stay (LOS), waiting time (WT) and the mean number of handovers. Data were obtained from electronic medical records.

Results LOS (median 34:00 vs. 38:52 min) and WT (median 14:00 vs. 18:43 min) were statistically significantly longer in UCCs compared with usual care. This difference is mainly explained by the prolonged LOS and WT for consulting a General Practitioner. The mean number of interunit handovers was larger in UCCs.

Conclusion The results indicate that, on average, UCCs do not enhance the efficiency of patient flow. The median LOS and WT are longer in UCCs and more handovers occur in UCCs compared with usual care. *European Journal of Emergency Medicine* 00:000–000 Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.

INTRODUCTION

Emergency Departments (EDs) generally have to deal with numerous patients who refer themselves. There is evidence that 20–40% of all ED patients could be treated at an out-of-hours General Practitioner (GP) service or do not need emergency care at all [1–6]. However, ‘appropriateness’ of ED attendance is ultimately a social construct based on access issues within an individual health care system. This so-

called inappropriate attending leads to an unnecessary burden on emergency health care and contributes towards overcrowding [7,8]. Long waiting times (WTs) jeopardize patient safety [9,10] as well as patient satisfaction [11,12]. Emergency care is provided in the Netherlands through ED and GP. Outside of normal working hours, GPs mostly collaborate in out-of-hours GP services comprising large call rotations in which they take care of each other's patients. Patients without a life-threatening health problem are expected to have a referral from a GP when attending an ED. However, in practice, many patients still attend the ED directly [13].

Urgent Care Collaborations (UCCs) are, therefore, being introduced to induce a shift from EDs to out-of-hours GP service and enhance the provision of the right care at the right place [14–16]. UCCs offer an intensified collaboration between out-of-hours GP services and EDs. They remain separate organizations with different registration systems, but work closely together. In UCCs the out-of-hours GP service and ED share one, combined entrance.

Patients contact one call centre, check in at a joint reception and are allocated to either the ED or the out-of-hours GP service based on one system for sorting patients into groups on the basis of their acuity or triage. This allocation to the out-of-hours GP service may result in advising, if possible by telephone, how the patient can care for themselves. It may also result in a consultation with a GP at the care centre or at the patient's home. The GP still refers patients to an ED if necessary. As such, UCCs offer opportunities to improve communication and to exchange expertise. UCCs can avoid the overuse and crowding of hospital EDs as they promote a redirection from the ED to the out-of-hours GP service [14,16,17].

Patients may, as a result, be served in a better and faster way. At the same time, the likely improvement in cooperation and access to specialist care may lead to more referrals from the out-of-hours GP service to the ED [18].

Patient handover involves numerous patient safety risks because poor communication can harm patients [19,20].

The handovers between different units, which is the case in UCCs, entail challenging aspects of health care such as the understanding between different specialists, interunit responsibility and control, infrequent face-to-face communication and interprofessional differences [21].

The aim of this study is to determine whether UCCs perform better on patient flow efficiency, as defined by the length of stay (LOS), WT and the mean number of handovers, compared with the setting in which out-of-hours GP services and EDs work separately, that is, 'usual care'.

METHODS

Study design In this observational study, we compared usual care with UCCs. In addition, we focused on patients with asthma/ chronic obstructive pulmonary disease (COPD) or a sprained ankle as these are typical health problems that can be treated by the ED as well as the out-of-hours GP service. This is because general results may be distorted by large groups of health problems that only, or mainly, occur, either in an out-of-hours GP service or ED.

Approval by a research ethics committee was not necessary under Dutch law as this was an observational study in which only data were used, which were recorded as a matter of routine.

All patients contacting the ED and/or GP in March–April and October–November 2011 during out-of-hours services, which are defined as those between 5 pm and 8 am on working days and around the clock on Saturday, Sunday and public holidays, were included in the study.

The focus was on out-of-hours care as emergency health care is organized differently in the Netherlands during office hours.

Three UCC settings and three usual care settings participated in this study. All EDs and out-of-hours GP services were located in the south-eastern part of the Netherlands. Both settings enclose comparable numbers of inhabitants (538 000 vs. 533 000) and the care centres were situated in rural as well as urban areas.

Study population

All 128 007 patients who contacted a participating ED or out-of-hours GP service during the study period were included. Cases that lacked a postcode, age, sex or information about the medical services obtained were excluded (n =5946; 4.6%). Contacts were structured into episodes of care using the criterion that a recurrent contact within 12 h belonged to the same episode. Episodes that crossed settings (usual care and UCC) were excluded (n =290; 0.2%). In total, 108 885 episodes were included in this study.

Data collection

Data were obtained from electronic medical records, maintained as a matter of routine, for all patients who contacted a participating out-of-hours GP service or ED during the study period. These organizations provided anonymous data. The following data were retrieved: sex, age, triage category, care provider (out-of-hours GP service/ ED), time of arrival at the care centre, the time treatment started and the time of discharge. It should be noted that one hospital could not provide data on the time the treatment started as this was not kept in the electronic medical records. The primary outcome measures were (a) LOS and WT and (b) the number of interunit handovers. The care pathways were also described.

The care pathways were determined by structuring the contacts in episodes of care. We distinguish the following pathways: ‘Medical advice out-of-hours GP service’ (medical advice given by a medical assistant, supervised by a GP), ‘consultation GP at care centre’, ‘consultation GP at home’, ‘treatment ED’, ‘Medical advice out-ofhours GP service followed by treatment ED’, ‘consultation GP at care centre followed by treatment ED’, ‘consultation GP at home followed by treatment ED’ and ‘other’ (individually less than 1% of the population). The number of contacts per episode defines the number of handovers; two contacts correspond to one handover, three contacts correspond to two handovers, etc.

Triage is the prime responsibility of the out-of-hours GP service. Therefore, this is registered in their system of electronic medical records. GP services and EDs have agreed to list triage as ‘medical advice’ when the outcome is ‘ED’. For instance, when someone with a serious sport injury attends the UCC directly and is allocated to the ED after triage, this patient is registered in the out-ofhours GP service’s system as ‘medical advice’ and subsequently also in the ED’s registration system. Consequently, an interunit handover takes place every time a patient is allocated to the ED after triage. Patients who attend the ED by ambulance or need immediate specialized emergency care are not triaged by the out-ofhours GP service, but referred directly.

The LOS and WT were only calculated for patients who actually entered the care centre. The WT outside the care centre has not been taken into account. The LOS is defined as the time that elapsed from arrival at the care centre to discharge. WT is defined as the period of time between arrival at the care centre and the start of treatment.

In the case of a GP consultation, the start of treatment is the time at which the consultation by the GP started. In the case of ED treatment, this is the time at which the nurse started treatment. When patients attended the ED and/or out-of-hours GP more than once within one episode, the WTs were summarized to compute a total WT.

Data were also collected on the following: sex, age, triage category and presenting clinical condition. Triage is used to assign a level of urgency (very urgent to less urgent, U1 to U5). The health problem, or symptom/disease, of each patient attending the ED and out-of-hours GP service was registered using the International Classification of Primary Care [22].

[TABLE1]

Data verification

To verify the data from the electronic medical records, the data on LOS and WT from the electronic medical records were compared with manually recorded data from two out of six EDs by constructing a Bland–Altman plot and estimating reliability (Cronbach's α). Both LOS and WT showed high reliability (Cronbach's α WT 0.85; LOS 0.73). LOS showed a consistent bias of + 9 min for electronic medical records compared with manually recorded data. The limits of agreement were large, indicating that the time measurements were not precise.

Data and statistical analysis

The population characteristics were analysed separately, for usual care and UCCs, using means and SD for continuous variables and numbers and percentages for categorical variables. Independent-sample t-tests and χ^2 -tests were used to verify whether population characteristics were similar in the UCC and the usual care setting. Differences in 'care pathways' were studied using χ^2 -tests. LOS and WT were analysed for the total population but also sorted by care pathway (e.g. consultation with a GP at the care centre, treatment by ED and consultation with a GP at the care centre, followed by treatment at the ED). This is because there may appear to be differences in LOS and WT between different care pathways [23]. Both LOS and WT were summarized using medians. This is because the above outliers are unlimited, which causes a skewed distribution. Mann–Whitney U-tests were used to determine differences in LOS and WTs between the usual care and the UCC setting. In addition, separate analyses were carried out for patients who presented with either a worsening of their asthma/COPD condition or with a sprained ankle.

Statistical analysis was carried out using the IBM Statistical Package for the Social Sciences (SPSS, version 20.0; IBM Corp., Armonk, New York, USA). A P-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 shows the population characteristics. The study population included 108 885 episodes of care: 57 920 in the usual care setting and 50 965 in the UCC setting. No

significant differences were found between settings on sex and age. However, χ^2 -testing showed that the distribution of triage categories was different in the usual care setting compared with the UCC setting. In UCCs, more episodes with urgent, or very urgent, health problems and fewer episodes with less urgent clinical conditions were registered.

Length of stay and waiting time

The median LOS for the total population was just over 36 min; the median WT was 16 min (Table 2). LOS and WTs were statistically significantly longer in UCCs (4:52 and 4:43 min longer, respectively). When LOS and WT were sorted by care pathways (Table 3), it was found that they differed considerably between the pathways. LOS was longest for patients who attended the ED after a consultation by a GP. Next came patients treated at the ED, and shortest were patients consulting a GP at the care centre. In UCCs, LOS and WT were significantly longer compared with usual care in cases where patients only attended a GP at the care centre. LOS was significantly shorter in UCCs for patients who were treated at the ED after consultation with a GP at the care centre.

Handovers

Table 2 indicates the greater number of interunit handovers in the UCC setting. Fig. 1 shows a schematic view of the care pathways, including the figures per step within the pathway, both in the usual care setting and in the UCCs. This shows that more patients attended the out-of-hours GP service either for advice or consultation, at care centre or at home, before attending the ED within UCCs, compared with usual care. The proportion of patients who attended the ED after consultation of the on-call GP at the care centre was 1.6 times greater in UCCs than usual care (5.9 vs. 3.7%); the percentage of patients who consulted an ED after ‘Medical advice outof- hours GP service’ was three times greater (3.5 vs. 1.2%). However, it should be taken into account that ‘medical advice’ is also listed when a patient is allocated to the ED after triage.

[TABLE2]

Patient flow in asthma/COPD and sprained ankle

The focus on patients attending the out-of-hours GP service or ED with clinical conditions related to asthma/ COPD or a sprained ankle showed that for both clinical conditions, the distribution of patients among care pathways differed significantly between settings (Table 4).

However, there are distinct differences between patients with asthma/COPD or a sprained ankle in terms of the care pathways: asthma/COPD patients are treated more often by the ED in UCCs, whereas patients with a sprained ankle are treated more often by the on-call GP compared with usual care. Asthma/COPD patients were not only more often directed to the ED immediately but also more often referred to the ED by the out-of-hours GP service. This was in contrast to patients with a sprained ankle who were eventually directed more often to the GP at the care centre and treated less often at the ED. Patients attending the health centre with clinical conditions related to asthma/COPD more often experienced an interunit handover in the UCC setting compared with usual care. The results for these specific patient groups showed a significantly longer LOS for asthma/COPD patients in UCCs than in usual care and significantly longer WTs for patients with a sprained ankle.

DISCUSSION

The aim of this study was to determine whether UCCs perform better on patient flow efficiency, as defined by the LOS, WT and the mean number of handovers, compared with the setting in which out-of-hours GP services and EDs work separately, that is, 'usual care'.

We hypothesized that in UCCs, patients will be served faster (shorter LOS and WT) and that the number of handovers will be higher because of more referrals from the GP to the ED.

Differences in the distribution of patients among care pathways may cause differences in LOS and WT. In UCCs, more patients only consult a GP at the care centre and fewer patients are treated solely by the ED.

However, in contrast to the hypothesis, this resulted in a longer LOS and WT in UCCs compared with usual care.

The differences were small; both were less than five minutes longer. An explanation is that the observed LOS within 'Consultation GP at care centre' was significantly longer in UCCs. This care pathway is predominant, as a result of which it contributes towards an overall longer WT. The longer LOS and WT within 'Consultation GP at care centre' might be because of the higher numbers of self-referrals identified by the out-of-hours GP service, who needed physical triage first, and thus delayed the process at the care centre. In usual care, patients mainly attend the GP after telephone triage. We recommend studying, for clinical practice, the causes of longer LOS and WTs within out-of-hours GP service and EDs in UCCs. Future research could address whether the entire care pathway or just part of it can be understood as a chain of linked activities. If any bottlenecks can be identified, the process can be streamlined.

The number of handovers between organizations is higher in UCCs compared with usual care. This seems to be a natural consequence of the UCC policy, which states that all self-referred patients be triaged at the care centre by the out-of-hours GP service. Also, our results show that more patients consulted a GP at the care centre before being treated by the ED, which means that more patients were referred to the ED by the GP in the UCC setting. This could be a consequence of the intensified co-operation between the ED and the out-of-hours GP service [18]. These referrals might increase patient safety as patients can be referred easily if advanced diagnostics or specialized care is necessary. Because the out-of-hours GP service and ED were still separate organizations,

[TABLE3]

using different medical record systems, but within one UCC, handover between organizations remained necessary.

This can lead to increased numbers of adverse events [19,24] as patient handover involves many patient safety risks. Because of the UCCs' choices to remain separate organizations with different registration systems, the number of interunit handovers is high. This is particularly true for all patients who attend the UCC directly, are triaged by the out-of-hours GP service and allocated to the ED. Their registration in the out-of-hours GP service registration system and handover is required only because of the choice not to integrate. We point out that clinical practice should be aware of this handover, as it remains a vulnerable step in patient care.

The focus on patients attending the out-of-hours GP service or ED with asthma/COPD or a sprained ankle showed that differences in care pathways between UCCs and usual care largely depend on the type of clinical condition. In UCCs, asthma/COPD patients were more often treated at the ED, whereas patients with a sprained ankle were more often treated at the out-of-hours GP service. This indicates that patients who presented with relatively minor trauma were more likely to be treated by the out-of-hours GP service in UCCs than patients with chronic diseases. This is described in a previous study on differences in patient populations between UCCs and usual care [16].

We show here that the symptom/disease is associated with the pathway that is mainly used for that particular clinical condition, which in its turn is related to LOS and WT. LOS and WT differ considerably between patient flows: if patients are treated at the ED, LOS is longer than when consulting a GP, as opposed to WT, which is shorter in EDs. More specifically, asthma/COPD patients were more often treated at the ED and consequently showed a significantly longer LOS; patients with a sprained ankle were more often treated at the out-ofhours GP service and showed significantly longer WTs.

LOS is shorter – although not significantly – in UCCs for patients who attend the care centre with a sprained ankle.

This suggests that these patients may have to wait longer until treatment starts, but that their total LOS is shorter because they are more often treated by a GP instead of the ED.

We believe that this study has many strengths. This is the first study of patient flows in UCCs that covers the description of care pathways, LOS, WTs and handovers, the first study looking at more than one UCC and the first study to look at patient flow in terms of successive medical services within one episode. Other major strengths of this study are the large study population and the fact that all data were obtained from medical records maintained as a matter of routine and as such comprise a uniform source of information.

[FIGURE1] [TABLE4]

The study design is a limitation. A comparison between two settings is made. It would have been better to include a baseline measurement before the UCCs were established. Also, although the populations were large, the sample size of this study was limited: three UCCs were compared with three usual care settings.

Results showed that UCC patients were more often referred to the ED after a consultation with a GP. This leads to questions about triage. The Netherlands Triage System [25] is developed to be used by out-of-hours GP service, EDs and ambulance services, but is it suitable for allocation to either care provider? And are there differences in outcome between caregivers depending on their professional background? Therefore, we suggest that future research should focus on triage in UCCs.

Furthermore, we suggest examining whether the differences in LOS, WT and the amount of handovers in UCCs affect patient experience and patient safety.

CONCLUSION

Our results indicate that although there appears to be a major shift from ED to out-of-hours GP service, UCCs do not generally enhance the efficiency of patient flow. The median LOS and WT were significantly longer in UCCs.

It seems that out-of-hours GP services and EDs have done all that is possible to fine-tune an already wellworking emergency health care organization.

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Author contributions: E.S.J. van Gils-van Rooij, D.H. de Bakker, C.J. Yzermans and B.R. Meijboom designed the study and obtained research funding. E.S.J. van Gils-van Rooij recruited the emergency departments and GP cooperatives, who participated, and collected, managed and analysed the data. D.H. de Bakker, C.J. Yzermans, B.R.

Meijboom and S.M. Broekman provided advice on data management, analysis and interpretation of the data.

E.S.J. van Gils-van Rooij wrote the manuscript, and all authors contributed towards its revision. D.H. de Bakker, C.J. Yzermans and B.R. Meijboom supervised the study.

All authors approved this final version. D.H. de Bakker takes responsibility for the paper as a whole.

CONFLICTS OF INTEREST

E.S.J. van Gils van Rooij carried out this research as a science practitioner at Tranzo, Tilburg University. She was also employed by one of the study participants. For the remaining authors there are no conflicts of interest.

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TABLES AND FIGURES

Table 1 Population characteristics for the total population, comparing usual care and UCCs

	Total (n=108 885)	Usual care (n=57 920)	UCCs (n=50 965)	P-value ^a
Sex				0.397
Male	52 236 (48.0)	27 856 (48.1)	24 380 (47.8)	
Female	56 649 (52.0)	30 064 (51.9)	26 585 (52.2)	
Age (mean±SD)	37.95±26.82	38.05±26.73	37.84±26.91	0.214
Triage category				<0.001
Very urgent	13 318 (12.7)	5 349 (9.9)	7 969 (15.7)	^b
Medium urgency	36 925 (35.3)	16 669 (30.9)	20 256 (39.9)	^b
Less urgent	54 491 (52.0)	32 004 (59.2)	22 487 (44.3)	^b

Data are n, followed by the distribution within the column (%).

UCCs, Urgent Care Collaborations.

^aP-values for the comparison usual care – UCCs, derived from the t-test or the χ^2 -test, as appropriate.

^bStatistically significant difference between settings within variables.

Table 2 Handovers, length of stay and waiting time in usual care and UCCs

Characteristics	Total	Usual care	UCCs	P-value ^a
Interunit handovers				<0.001
No handovers	97 010 (89.1)	53 191 (91.8)	43 819 (86.0)	*
One or more handover	11 875 (10.9)	4 729 (8.2)	7 146 (14.0)	*
Total care pathway				<0.001
Medical advice out-of-hours GP service	31 567 (29.0)	17 580 (30.4)	13 987 (27.4)	*
Consultation GP at care centre	40 243 (37.0)	19 246 (33.2)	20 997 (41.2)	*
Consultation GP at home	4 792 (4.4)	2 720 (4.7)	2 072 (4.1)	*
Treatment ED	20 408 (18.7)	13 645 (23.6)	6 763 (13.3)	*
Medical advice out-of-hours GP service followed by treatment ED ^b	2 485 (2.3)	696 (1.2)	1 789 (3.5)	*
Consultation GP at care centre, followed by treatment ED	5 150 (4.7)	2 124 (3.7)	3 026 (5.9)	*
Consultation GP at home, followed by treatment ED	1 191 (1.1)	668 (1.2)	523 (1.0)	*
Other (individually <1%)	30 49 (2.8)	12 41 (2.1)	1 808 (3.5)	*
Length of stay (median; IQR)	0:36:08–0:48:14	0:34:00–0:39:09	0:38:52–0:54:50	<0.001
Waiting time (median; IQR)	0:16:00–0:25:00	0:14:00–0:21:00	0:18:43–0:28:47	<0.001

Data are n, followed by the distribution within the column (%).

EDs, Emergency Departments; GP, General Practitioner; IQR, interquartile range; UCCs, Urgent Care Collaborations.

^aP-values for the comparison usual care – UCCs, derived from the χ^2 -test or the Mann-Whitney U-test, as appropriate.

^bIn UCCs, patients who are allocated to the ED after triage are also listed as 'medical advice'.

*Statistically significant difference between settings within variables.

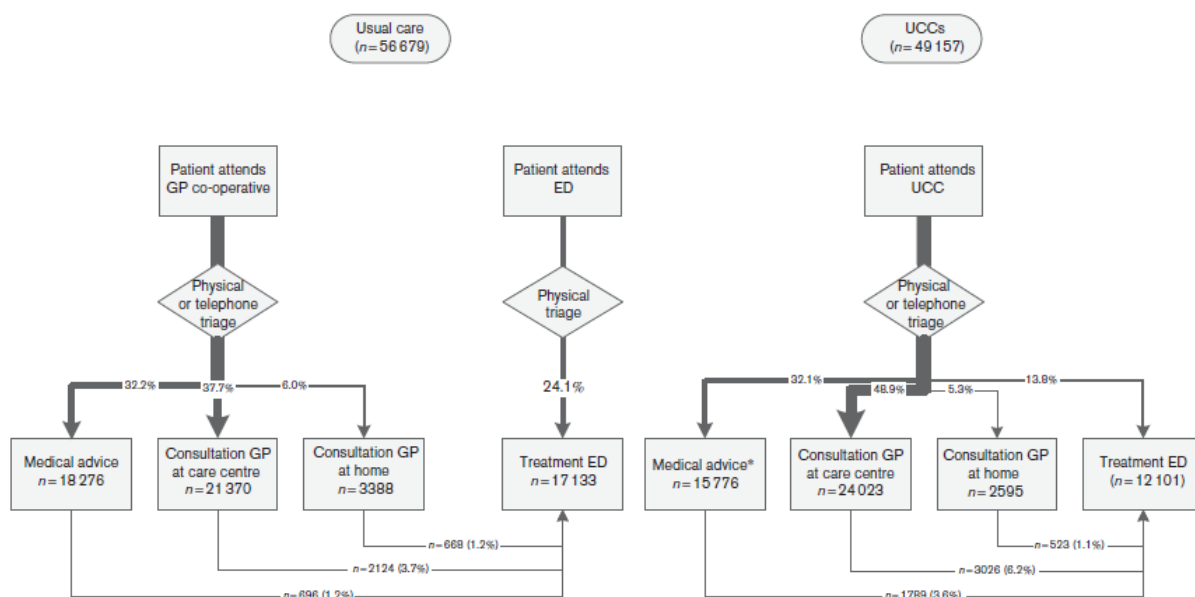
Table 3 Length of stay and waiting times in usual care and UCCs sorted by care pathways

	Consultation GP at care centre			Treatment ED			Consultation GP at care centre, followed by treatment ED		
	Usual care	UCCs	P-value ^a	Usual care	UCCs	P-value ^a	Usual care	UCCs	P-value ^a
Length of stay [median (IQR)]	0:21:00–0:18:00	0:27:21–0:27:21	<0.001	1:45:26–1:32:25	1:47:00–1:29:43	0.450	2:28:45–1:34:45	2:16:17–1:32:05	<0.001
Waiting time [median (IQR)]	0:15:00–0:19:00	0:19:00–0:25:55	<0.001	0:08:00–0:18:56	0:08:00–0:22:00	<0.001	0:35:26–0:28:00	0:35:33–0:44:01	0.893

EDs, Emergency Departments; GP, General Practitioner; IQR, interquartile range; UCCs, Urgent Care Collaborations.

^aP-values for the comparison usual care – UCCs, derived from the Mann-Whitney U-test.

Fig. 1



Care pathways in usual care and UCCs. Percentages correspond to the total number of patients (out-of-hours GP service and EDs); line weight corresponds to the percentage of patients following that care pathway. EDs, Emergency Departments; GP, General Practitioner; UCCs, Urgent Care Collaborations.

Table 4 Characteristics, length of stay and waiting time in usual care and UCCs sorted by asthma/COPD and ankle distortion

Characteristics	Asthma/COPD (n = 1217)			Sprained ankle (n = 1222)		
	Usual care (n = 690)	UCCs (n = 527)	P-value ^a	Usual care (n = 714)	UCCs (n = 508)	P-value ^a
Interunit handovers			0.001			0.631
No handovers	607 (88.0)	428 (81.2)	*	621 (87.0)	437 (86.0)	
One or more handover	83 (12.0)	99 (18.8)	*	93 (13.0)	71 (14.0)	
Total care pathway			<0.001			<0.001
Medical advice out-of-hours GP service	89 (12.9)	23 (4.4)	*	134 (18.8)	69 (13.6)	*
Consultation GP at care centre	255 (37.0)	207 (39.3)		260 (36.4)	354 (69.7)	*
Consultation GP at home	139 (20.1)	82 (15.6)	*	NA	NA	
Treatment ED	124 (18.0)	116 (22.0)		225 (31.5)	14 (2.8)	*
Medical advice out-of-hours GP service (or triage) followed by treatment ED	6 (0.9)	4 (0.8)		7 (1.0)	12 (2.4)	*
Consultation GP at care centre followed by treatment ED	23 (3.3)	35 (6.6)	*	82 (11.5)	56 (11.0)	
Consultation GP at home followed by treatment ED	35 (5.1)	36 (6.8)		NA	NA	
Other (individually < 1%)	19 (2.8)	24 (4.6)		4 (0.6)	3 (0.6)	
Length of stay [median (IQR)]	0:33:07–0:57:34	0:43:36–0:54:39	0.009	0:32:00–0:38:00	0:30:14–0:41:02	0.802
Waiting time [median (IQR)]	0:14:00–0:20:15	0:17:16–0:25:14	0.132	0:14:00–0:19:00	0:21:00–0:28:28	<0.001

Data are n, followed by the distribution within the column (%). Length of stay and waiting times are only computed for the care pathways 'consultation GP at care centre', 'treatment by ED' and 'consultation GP at care centre, followed by treatment ED'. COPD, chronic obstructive pulmonary disease; EDs, Emergency Departments; GP, General Practitioner; IQR, interquartile range; NA, not applicable; UCCs, Urgent Care Collaborations.

^aP-values for the comparison usual care – UCCs, derived from the χ^2 -test or the Mann-Whitney U-test, as appropriate.

*Statistically significant difference between settings within variables.