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How time consuming are general practitioners' home visits? Insights from a cross-sectional study in Switzerland

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Summary

BACKGROUND: Worldwide, the number of home visits has been decreasing over past decades. Lack of time and long journeys have been reported to hinder general practitioners (GPs) from conducting home visits. In Switzerland also, home visits have declined. Time constraints in a busy GP practice could be one reason. Therefore, the aim of this study was to analyse the time requirements of home visits in Switzerland.

METH ODS: A one-year cross-sectional study involving GPs from the Swiss Sentinel Surveillance System (Sentinella) was conducted in 2019. GPs provided basic information on all home visits performed throughout the year and additionally detailed reports of up to 20 consecutive home visits. Univariable and multivariable logistic regression analyses were run to identify factors affecting journey and consultation duration.

RESULTS: In total, 95 GPs conducted 8489 home visits in Switzerland, 1139 of which have been characterised in detail. On average, GPs made 3.4 home visits per week. Average journey and consultation duration were 11.8 and 23.9 minutes, respectively. Prolonged consultations were provided by GPs working part-time (25.1 minutes), in group practice (24.9 minutes) or in urban regions (24.7 minutes). Rural environments and short journey to patient's home were both found to lower the odds of performing a long consultation compared to a short consultation (odds ratio [OR] 0.27, 95% confidence interval [CI] 0.16–0.44 and OR 0.60, 95% CI 0.46–0.77, respectively). Emergency visits (OR 2.20, 95% CI 1.21–4.01), out-of-hours appointments (OR 3.06, 95% CI 2.36–3.97) and day care involvement (OR 2.78, 95% CI 2.13–3.62) increased the odds of having a long consultation. Finally, patients in their 60s had markedly higher odds of receiving long consultations than patients in their 90s (OR 4.13, 95% CI 2.27–7.62), whereas lack of chronic conditions lowered the odds of a long consultation (OR 0.09, 95% CI 0.00–0.43).

CONCLUSION: GPs perform rather few but long home visits, especially for multimorbid patients. GPs working part-time, in group practice or in urban regions devote more time to home visits.

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Background

There has been a long-term decline in home visits in many countries [1–5]. Time constraints were reported to be major obstacles to providing primary care to homebound patients. Lack of time and long travel distances are the most frequently reported barriers to home visits [6–9]. The importance of time issues is also stressed by the recent motion of UK's general practitioners (GPs) to remove home visits from their work contracts [10]. Indeed, home visits account for a substantial amount of workload, as shown in a recent study from Germany [11]. Similarly, increased geographical distance has been associated with decreased frequency of primary care supply including home visits in other countries [12, 13]. Besides long journeys, the consultation itself might be long. The consultation duration seem to primarily depend on patients' health status, i.e., their age, number of comorbidities and medical problem [14–16]. With the population growing older, GPs might encounter exactly those patients who are elderly, frail and complex [17] and therefore need a high investment of time.

There is some research on home visits in Switzerland. Most studies are based on the analysis of billing data. Mirroring the global trend, home visits are declining in Switzerland. In the canton of Vaud, home visits per physician dropped by 40% between 2006 and 2015. In the same time span, the number of home visits per patient increased by 7.8% [18]. The majority of home visits in Switzerland have been scheduled as routine appointments without additional investigation [19]. The beneficiaries of home visits were older and showed increased hospitalisation and mortality rates compared with the matched patient population not receiving home visits [20].

In summary, knowledge on time requirements in relation to home visits is limited. Internationally, a few analyses were performed. Nonetheless, which factors influence consultation duration during home visits remains unknown. In Switzerland, time issues have never been investigated in detail. The aim of this study was to analyse this pivotal factor affecting home visits based on systematic reports by GPs.

Methods

Study design and ethics

The study is based on a one-year data collection performed by the Swiss Sentinel Surveillance System (Sentinella) between 1 January and 31 December 2019. Sentinella is a Swiss-wide, voluntary and representative network of GPs, internists and paediatricians serving in primary care [21]. The network is operated and funded by the Swiss Federal Office of Public Health. Physicians are grouped into six geographical regions. The network is organised on the practice level, encompassing single-handed as well as group practices. Sentinella physicians routinely report surveillance data weekly (mainly concerning infectious diseases) and are invited to take part in various additional studies (mainly concerning health services). They receive a small amount of financial compensation for participation and data collection.

During the entire year 2019, participating physicians were asked to record two datasets on home visits by means of a digital questionnaire in German or French [22]. The first dataset (referred to as the basic dataset) includes basic information only. For details, see the Variables subsection below. The second dataset (extended dataset) was obtained from up to 20 consecutive home visits and contains additional variables. To cover the entire year and prevent seasonal bias, study physicians were randomly assigned to a starting point throughout the year from which the extended data collection began.

Sample and exclusion criteria

All Sentinella physicians, i.e., 200 physicians employed in 169 practices, were invited to participate in the present study (see fig. 1).

Routine visits to nursing homes, i.e., ward rounds where GPs consecutively see multiple patients, were not considered eligible. Home visits conducted while on public emergency service were excluded as well because these patients are unknown to the GP and have to be visited as part of the service (no choice of visiting available). GPs who did not conduct home visits or reported <10 weeks per year were excluded. Since the study focuses on GPs, paediatricians were removed from the dataset as well. Finally, 152 datasheets, each corresponding to a single home visit, were removed due to incomplete data entries with missing key variables.

To test for data robustness, sensitivity analyses were run with more stringent exclusion criteria to remove both rare and frequent responders from the data set. For this purpose, GPs reporting <10 weeks throughout the year and those reporting <10 or >120 home visits were excluded.

Variables

The basic dataset consisted of the following variables: patient's year of birth and sex, place of visit (i.e., private home, nursing home, workplace or other), journey duration to the place of visit as well as information regarding repeated visits to the same patient within the study period.

The extended dataset included additional variables to characterise home visits. To analyse the temporal domain of home visits, we focused on two main variables: (1) journey duration in minutes, which accounts for the travel time to the patient's home (primary outcome) and (2) consultation duration in minutes, which accounts for the time spent with the patient (secondary outcome). Temporal variables were dichotomised as follows: journey duration – long (>10 min) vs short (≤10 min) and consultation duration – long (>25 min) vs medium (16–25 min) or short (≤15 min). The dichotomisation was based on data distribution to yield groups of comparable size.

Further variables to characterise home visits included: urbanisation level (urban, intermediate [dense semi-urban space and rural centres], rural) as defined by the Swiss Federal Statistical Office [23], urgency level (regular, urgent and emergency) as defined by the Swiss Tarmed reimbursement system [24], reasons for home visit (impaired mobility, lack of transport, infectivity, poor general condition, patient's request, GP absent from doctor's office owing to conducting another home visit, attending further education courses, or other), out-of-hours home visits, GP-dependent hospitalisation during/after home visit and GP-independent hospitalisation within 24 hours after conducting the home visit. The patient population was characterised by the following variables: age, sex, type of household, private/public day care, patient's condition at doctor's arrival (chronically ill with/without acute problem, healthy with acute problem, palliative care, recovering from medical interventions, or other), number of chronic conditions and finally the actual health problem (musculoskeletal, respiratory, neurological, digestive, cardiovascular, endocrine/metabolic/nutritional, general, psychological, social, other, unclear or no obvious diagnosis) defined by the main chapters of the International Classification of Primary Care 2 [22, 25].

Statistical analysis and graphical display

Descriptive statistics including percentages, mean, standard deviation (SD), median, interquartile range (IQR), minimum to maximum (min–max) and 95% confidence interval (95% CI) were used to report patient and home visit characteristics. Data distribution was analysed by the Shapiro-Wilk test. Since data were not distributed normally, the Kruskal-Wallis rank sum test was used to compare between groups. The Wilcoxon test with Bonferroni correction was applied to account for multiple testing. A p-value <0.05 was considered statistically significant. Univariable and multivariable logistic regression analyses were performed to identify potential predictors for long travel and long consultation duration and were expressed as odds ratios (ORs). The independent variables in the multivariable regression model were patients' age and sex as well as GPs' working time (full or part-time) and practice type (single or group practice). For logistic regression analysis, medium and short consultation duration were pooled to compare the odds of having long vs. non-long (i.e. short and medium) consultation.

All analyses were carried out using the open-source software RStudio (RStudio, Inc.) version 1.2.5033. Standard R-functions were used for data analysis and no new analytical code has been created. The map representing the geographical distribution of GPs in Switzerland was generated with the open-source software QGIS Desktop version

3.6.3. The map shapefile was obtained from the Swiss Federal Office of Topography.

Ethics approval and consent to participate

The current study (Req-2020-01088) was approved by the ethics committees of Bern (KEK) and central and northwestern Switzerland (EKNZ). All data were collected anonymously, thus patient consent was not required. A study protocol has not been published.

Results

Participants

Out of the 200 physicians participating in the study, we excluded 32 paediatricians and 73 GPs (fig. 1). The 95 GPs included in our sample were located all over Switzerland with the fewest GPs present in the central region (fig. 2). Most GPs reported from urban areas (n = 63; 66.3%), followed by intermediate (n = 18; 18.9%) and rural environments (n = 14; 14.7%). In total, 23 GPs were female (24.2%) and the proportion of women varied between 14.3% and 41.7% across Sentinella regions (table 1 and figure 2). About one third of GPs worked part-time (n = 33; 34.7%) (table 1). Slightly more than half of the GPs worked in group practices (n = 55; 57.9%). Among the GPs working in group practice, 34.5% were female and 52.7% worked part-time (supplementary table 1 in the appendix); 43% of GPS were 60 years old or older (table 1). GPs working solo and full time were older than their colleagues working in group practices and part-time (supplementary table 1). GPs performing home visits tended to be male, older, work solo and full time, compared with GPs who did not conduct home visits or with low frequency only (supplementary table 2).

Characteristics of home visits

The characteristics of home visits are summarised in tables 1 and 2 and supplementary tables 1 and 3.

In total, GPs conducted 8489 home visits and provided 7350 basic and 1139 detailed reports (table 1). On average, 3.4 ± 3.5 (mean ± SD) visits were performed per GP per week. GPs spent on average 11.8 ± 7.2 minutes travelling to the patient's place and 23.9 ± 12.9 minutes on consultation (table 2). Consultation duration was prolonged for GPs working part-time (25.1 ± 12.3 minutes) or in a group practice (24.9 ± 13.8 minutes) (supplementary table 1) and by practicing in urban regions (24.7 ± 13.4 minutes) (supplementary table 3). In total, 824 visits (72.3%) were of a

Figure 1: Flow diagram of the Sentinella study on home visits. The Sentinella network is organised on practice level with an individual identification number assigned to each registered practice. Practices are run either by single or multiple physicians. Both the number of practices and physicians are given. The 95 GPs provided in total 1291 detailed reports, 152 of which were incomplete and thus removed, yielding 1139 reports included in the extended dataset.

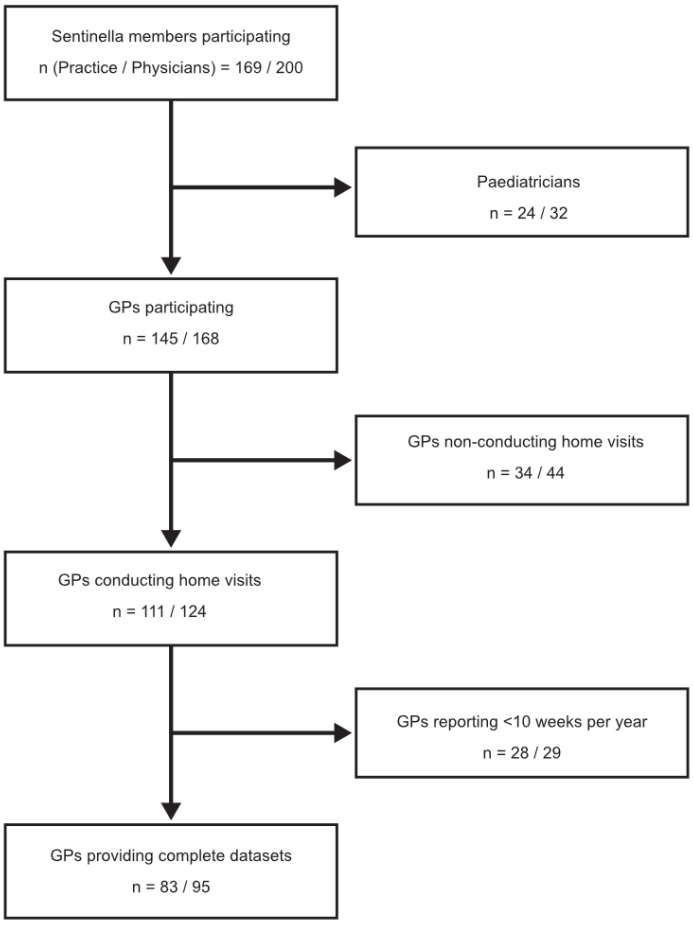

Table 1:
GP and dataset characteristics.

		n (%)*
Practice		83 (100.0)
Group practice		43 (51.8)
GPs		95 (100.0)
GPs working in group practice		55 (57.9)
GPs working part-time		33 (34.7)
Female GPs		23 (24.2)
GPs' age	30–39 years	11 (11.8)
	40–49 years	15 (16.1)
	50–59 years	27 (29.0)
	60–69 years	35 (37.6)
	>69 years	5 (5.4)
Total home visits		8489
Home visits per GP per week	Mean ± SD	3.4 ± 3.5
	Median / IQR / min–max	2.3 / 2.0 / 1.1–26.9
Home visits per practice per year	Mean ± SD	104.1 ± 110.5
	Median / IQR / min–max	57.0 / 105.5 / 13–619
Home visits with short reports (basic dataset)**		7350
Home visits per GP per week	Mean ± SD	3.6 ± 3.9
	Median / IQR / min–max	2.3 / 2.4 / 0–30.1
Home visits with detailed reports (extended dataset)**		1139
Home visits per GP per week	Mean ± SD	2.8 ± 2.0
	Median / IQR / min–max	2.2 / 1.8 / 1–11

GP: general practitioner; IQR: interquartile range; SD: Standard deviation; * if not otherwise specified; ** for variables included in each dataset see Methods section.

regular character without urgency or emergency (table 2). Accordingly, only a minority of visits resulted in immediate hospitalisation or hospitalisation within 24 hours after the visit (n = 44; 3.8%). A total of 426 visits (37.4%) were out-of-hours. Main reasons for home visits were impaired mobility (n = 784; 68.8%) and poor general condition (n = 155; 13.6%). About 75% of all home visits were to patients older than 80 years (n = 854). Patients' mean age was 83 ± 13 years. The majority of home visits were for women (n =743; 65.2%). Private or public day care was involved in 347 (30.5%) cases. Chronic illness without an acute disease was the condition most often encoun-

Figure 2: Regional distribution of participating GPs. The numbers of participating practices and Sentinella GPs are shown per geographical region. GPs are further divided according to sex and urbanisation level. Square brackets denote the number of physicians providing primary care including GPs and paediatricians according to statistics provided by the Swiss Federal Statistical Office [32]. The corresponding figures on country level are shown in the box to the left.

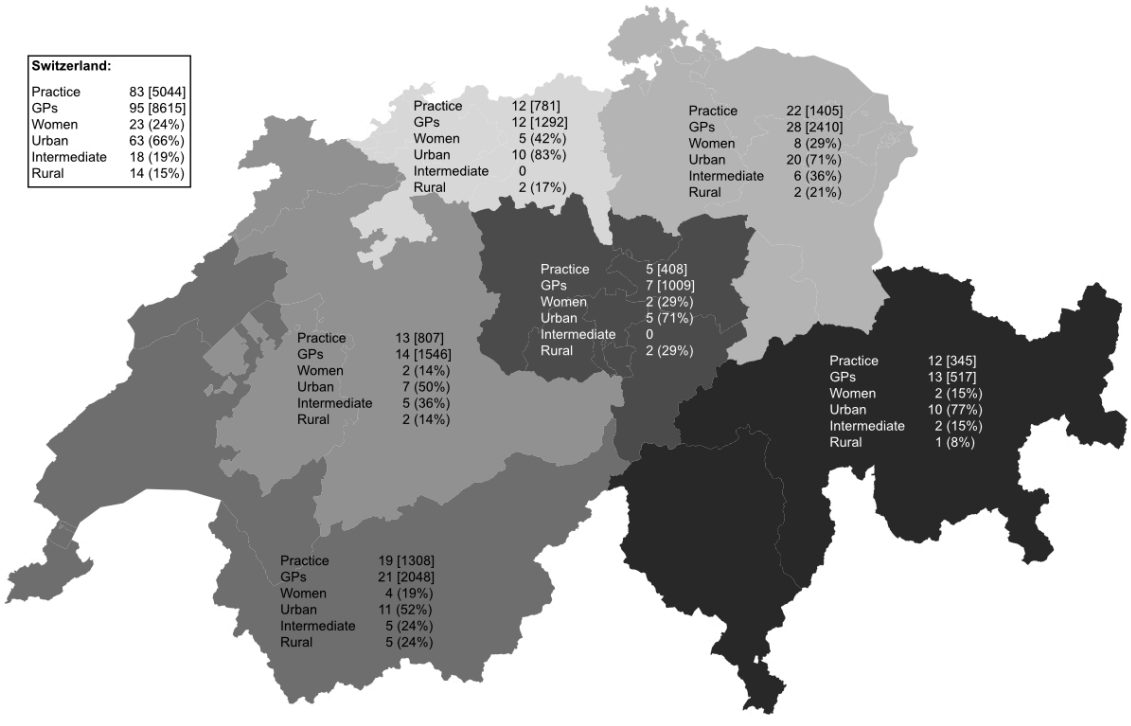

Table 2:
Characteristics of home visits (n = 1139).

Main variables		**n (%)***
Journey duration (min)	Mean ± SD	11.8 ± 7.2
	Median / IQR / min–max	10 / 8 / 1–60
Journey duration	Long: >10 min	456 (40.0)
	Short: ≤10 min	683 (60.0)
Consultation duration (min)	Mean ± SD	23.9 ± 12.9
	Median / IQR / min-max	20 / 15 / 5–120
Consultation duration	Long: >25 min	360 (31.6)
	Medium: 16–25 min	375 (32.9)
	Short: ≤15 min	404 (35.5)
Visit characteristics		
Level of urbanisation	Urban	835 (73.3)
	Intermediate	159 (14.0)
	Rural	145 (12.7)
Urgency**	Regular	824 (72.3)
	Urgent	269 (23.6)
	Emergency	46 (4.0)
Reasons for house visit***	Impaired mobility	784 (68.8)
	Lack of private or public transport	60 (5.3)
	Infectivity	6 (0.5)
	Poor general condition	155 (13.6)
	Patient's request	39 (3.4)
	GP absent from doctor's office	3 (0.3)
	Other reason	92 (8.1)
Out-of-hours house visits		426 (37.4)
Hospitalisations during/after house visit		30 (2.6)
GP-independent hospitalisations within 24 hours after house visit		14 (1.2)
Patient characteristics		
Age (years)	Mean ± SD	83.0 ± 13.0
	Median / IQR / min–max	86 / 11.5 / 0–104
Age categories (years)	≥90	372 (32.7)
	80–89	482 (42.3)
	70–79	169 (14.8)
	60–69	51 (4.5)
	<60	65 (5.7)
Woman		743 (65.2)
Single-handed household		238 (20.9)
Public or private day care		347 (30.5)
Patients' condition on doctor's arrival***	Chronically ill patients	638 (56.0)
	Chronically ill patients with acute disease	317 (27.8)
	Palliative care patients	63 (5.5)
	Recovering patients (e.g., from surgery)	25 (2.2)
	Healthy patients with acute disease	56 (4.9)
	Other condition	40 (3.5)
Number of chronic conditions	≥5	435 (38.2)
	2–4	610 (53.6)
	1	59 (5.2)
	0	20 (1.8)
	Unknown	15 (1.3)
Diagnostic class or problem area***	Musculoskeletal	209 (18.3)
	Respiratory	116 (10.2)
	Neurological	102 (9.0)
	Digestive	50 (4.4)
	Cardiovascular	172 (15.1)
	Endocrine, metabolic and nutritional	24 (2.1)
	General	95 (8.3)
	Psychological	86 (7.6)
	Social problems	15 (1.3)
	Other diagnosis or problem	142 (12.5)
	No obvious diagnosis or problem	97 (8.5)
	Diagnosis unclear	31 (2.7)

GP: general practitioner; IQR: interquartile range; SD: Standard deviation; * if not otherwise specified; ** according to Tarmed reimbursement system [24]; *** multiple answers possible.

tered (n = 638; 56.0%), followed by chronic illness with an acute disease (n = 317; 27.8%). Correspondingly, 610 (53.6%) and 435 (38.2%) home visits were for patients suffering from more than two and more than five chronic conditions, respectively. Musculoskeletal and cardiovascular complaints were most frequently reported (n = 209; 18.3% and 172; 15.1%, respectively).

Logistic regression analysis of factors impacting the duration of home visits

Associations of temporal variables, i.e., journey and consultation duration, with further home visit characteristics are reported in table 3, which shows the crude ORs.

Compared with long consultations, the odds of long journeys were reduced by 33% for medium consultations (OR 0.67, 95% CI 0.50–0.90) and by 47% for short consultations (OR 0.53, 95% CI 0.40–0.71). Compared with urban environments, the odds of long journeys decreased by 65% (OR 0.35; 95% CI 0.24–0.52) and 64% (OR 0.36; 95% CI 0.24–0.53) in intermediate and rural regions, respectively. The odds of long consultations were diminished by 73% in rural places (OR 0.27, 95% CI 0.16–0.44), by 59% due to patients' requests as a reason for home visit (OR 0.41, 95% CI 0.15–0.93) and by 91% in the case of patients lacking chronic conditions (OR 0.09, 95% CI 0.00–0.43).

Home visits classified as emergencies showed 1.2-fold increased odds of long consultations (OR 2.20, 95% CI 1.21–4.01). Compared with patients older than 90 years, the odds of long consultations rose by 37% for patients in their 80s (OR 1.37, 95% CI 1.01–1.87), by 127% for patients in their 70s (OR 2.27, 95% CI 1.54–3.34) and by 313% in patients in their 60s (OR 4.13, 95% CI 2.27–7.62). In the case of out-of-hours home visits, the odds of long consultations were increased by 206% (OR 3.06, 95% CI 2.36–3.97). The involvement of private or public day care enhanced the odds of long journeys by 61% (OR 1.61, 95% CI 1.25–2.09) and of long consultations by 178% (OR 2.78, 95% CI 2.13–3.62).

No major classes of healthcare problems affected the duration of home visits. Visits not clustering into the main diagnostic classes (no or other diagnostic class or problem area) diminished the odds of having long consultations by 41% (OR 0.59, 95% CI 0.36–0.96). On the other hand, situations with an unclear diagnosis raised the odds almost seven-fold (OR 6.96, 95% CI 3.00–18.21).

Table 4 presents the adjusted ORs for age and sex.

This multivariable logistic regression yielded very similar results and showed a significant trend for increasing odds of having a long consultation with rising level of urabanisation. Moreover, sensitivity analysis run on the more confined dataset lacking rarely and frequently reporting GPs, showed similar trends with more pronounced outcomes (table 4 and supplementary tables 4 and 5 in the appendix). Further adjustment of logistic regression for GPs' working time and practice type did not grossly affect the outcomes (supplementary table 6).

Discussion

This study provides insights into the temporal aspects of home visits and identifies factors that influence both journey and consultation duration. We now discuss the results in the context of evidence derived from studies in the specific setting of home visits but often have to resort to the office setting as studies on home visits are scarce. For some parts, we found information from neither home nor office settings but hypothesise what the underlying mechanisms might be.

Consultation duration during home visits

The mean consultation duration in our study was 24 minutes, which agrees well with recently published results from Switzerland [19]. Compared with Germany, consultations in the context of home visits lasted about 9 minutes longer [11]. Since 73% of home visits were in urban environments and consultation time was the longest in urban regions, this variable may strongly influence our overall consultation duration.

The consultation duration can potentially be explained by workload, as well as by medical and social issues. The most apparent explanation might be that scheduling many home visits comes at a price of shorter consultations. The German GPs mentioned above made about four times more home visits per week than GPs in Switzerland [11]. Our data indicate that high workload, as reflected by working full time and in single practice, results in a shorter consultation time. From the medical point of view, the duration of consultations in the office setting is affected by the patient's acute condition and comorbidities as well as by the type of tasks performed during the appointment [14–16]. Most probably, other important factors are on a system level, with different time constraints and reimbursement rules for home visits across countries [16]. In our study, the majority of homebound patients were suffering from multiple chronic conditions, which may necessitate a prolonged consultation time to be properly addressed. Also, physical examinations, laboratory tests or surgical procedures extend consultation time [14]. This type of information cannot be extracted from our dataset, but a recent study showed that manual or laboratory tasks are performed in no more than 15% of home visits in Switzerland [19]. One may assume a similar proportion to be found in home visits reported by Sentinella GPs in our study. This in turn suggests that consultation time is mainly based on the conversation between GPs and patients, and may also cover psychological and social issues, which require more time to be discussed. Indeed, psychological problems have been associated with long consultations in the office [16, 26].

Additionally, conditions of the healthcare market may also influence the duration of home visits. Urban environments were found to raise the odds for having long consultations. This may be explained by differences in workload across urbanisation levels, i.e., the more patients are seen in the office, the fewer patients can be visited at home. Urban GPs saw fewer patients than rural ones. However, the difference did not reach statistical significance and seemed

Table 3:
Associations of characteristics of home visits and visited patients with journey duration and consultation duration. 95% CIs not including zero are presented in bold.

		Journey duration		Long journey (vs. short), crude OR (95% CI)	Consultation duration			Long consultation (vs. short/medium) crude OR (95% CI)
		Long, n (%)	Short, n (%)		Long, n (%)	Medium, n (%)	Short, n (%)	
Main variables								
Journey duration	Long: >10 min	456 (100.0	0 (0.0)	–	175 (38.4)	146 (32.0)	135 (29.6)	1
	Short: ≤10 min	0 (0.0)	683 (100.0)	–	185 (27.1)	229 (33.5)	269 (39.4)	**0.60 (0.46–0.77)**
Consultation duration	Long: >25 min	175 (48.6)	185 (51.4)	1	360 (100.0)	0 (0.0)	0 (0.0)	–
	Medium: 16–25 min	146 (38.9)	229 (61.1)	**0.67 (0.50–0.90)**	0 (0.0)	375 (100.0)	0 (0.0)	–
	Short: ≤15 min	135 (33.4)	269 (66.6)	**0.53 (0.40–0.71)**	0 (0.0)	0 (0.0)	404 (100.0)	–
Visit characteristics								
Level of urbanisation	Urban	385 (46.1)	450 (53.9)	1	297 (35.6)	249 (29.8)	289 (34.6)	1
	Intermediate	37 (23.3)	122 (76.7)	**0.35 (0.24–0.52)**	44 (27.7)	68 (42.8)	47 (29.5)	0.69 (0.47–1.00)
	Rural	34 (23.4)	111 (76.6)	**0.36 (0.24–0.53)**	19 (13.1)	58 (40.0)	68 (46.9)	**0.27 (0.16–0.44)**
Urgency*	Regular	338 (41.0)	486 (59.0)	1	242 (29.4)	262 (31.8)	320 (38.8)	1
	Urgent	101 (37.5)	168 (62.5)	0.86 (0.65–1.15)	96 (35.7)	95 (35.3)	78 (29.0)	1.33 (1.00–1.78)
	Emergency	17 (37.0)	29 (63.0)	0.84 (0.45–1.54)	22 (47.8)	18 (39.1)	6 (13.1)	**2.20 (1.21–4.01)**
Reasons for house visit**	Impaired mobility	317 (40.4)	467 (59.6)	1	240 (30.6)	266 (33.9)	278 (35.5)	1
	Lack of private or public transport	25 (41.7)	35 (58.3)	1.05 (0.61–1.78)	15 (25.0)	30 (50.0)	15 (25.0)	0.76 (0.4–1.35)
	Infectivity	2 (33.3)	4 (66.7)	0.74 (0.10–3.80)	0 (0.0)	5 (83.3)	1 (16.7)	NA
	Poor general condition	60 (38.7)	95 (61.3)	0.93 (0.65–1.32)	60 (38.7)	44 (28.4)	51 (32.9)	1.43 (1.00–2.04)
	Patient's request	17 (43.6)	22 (56.4)	1.14 (0.59–2.17)	6 (15.4)	7 (17.9)	26 (66.7)	**0.41 (0.15–0.93)**
	GP absent from doctor's office	1 (33.3)	2 (66.7)	0.74 (0.03–7.72)	0 (0.0)	1 (33.3)	2 (66.7)	NA
	Other reason	34 (37.0)	58 (63.0)	0.86 (0.55–1.34)	39 (42.4)	22 (23.9)	31 (33.7)	**1.67 (1.07–2.58)**
Out-of-hours house visits		185 (43.4)	241 (56.6)	1.25 (0.98–1.60)	200 (46.9)	135 (31.7)	91 (21.4)	**3.06 (2.36–3.97)**
Hospitalisations during/after house visit		16 (53.3)	14 (46.7)	1.74 (0.84–3.64)	13 (43.3)	13 (43.3)	4 (13.4)	1.68 (0.79–3.48)
GP-independent hospitalisations within 24 hours after house visit		7 (50.0)	7 (50.0)	1.51 (0.51–4.43)	4 (28.6)	5 (35.7)	5 (35.7)	0.86 (0.24–2.60)
Patient characteristics								
Age categories (years)	≥90	151 (40.6	221 (59.4)	1	90 (24.2)	134 (36.0	148 (39.8)	1
	80–89	189 (39.2)	293 (60.8)	0.94 (0.72–1.24)	147 (30.5)	167 (34.6)	168 (34.9)	**1.37 (1.01–1.87)**
	70–79	59 (34.9)	110 (65.1)	0.79 (0.54–1.14)	71 (42.0)	44 (26.0)	54 (32.0)	**2.27 (1.54–3.34)**
	60–69	24 (47.1)	27 (52.9)	1.30 (0.72–2.34)	29 (56.9)	12 (23.5)	10 (19.6)	**4.13 (2.27–7.62)**
	<60	33 (50.8)	32 (49.2)	1.51 (0.89–2.57)	23 (35.4)	18 (27.7)	24 (36.9)	1.72 (0.97–2.99)
Woman		302 (40.6)	441 (59.4)	1.08 (0.84–1.38)	229 (30.8)	241 (32.4)	273 (36.8)	0.90 (0.69–1.17)
Single-handed household		101 (42.4)	137 (57.6)	1.13 (0.85–1.51)	83 (34.9)	89 (37.4)	66 (27.7)	1.21 (0.89–1.63)
Public or private day care		167 (48.1)	180 (51.9)	**1.61 (1.25–2.09)**	165 (47.6)	101 (29.1)	81 (23.3)	**2.78 (2.13–3.62)**
Patients' conditions on doctor's arrival**	Chronically ill patients	265 (41.5)	373 (58.5)	1	186 (29.2)	202 (31.7)	250 (39.1)	1
	Chronically ill patients with acute disease	120 (37.9)	197 (62.1)	0.86 (0.65–1.13)	109 (34.4)	112 (35.3	96 (30.3)	1.27 (0.95–1.70)
	Palliative care patients	21 (33.3)	42 (66.7)	0.70 (0.40–1.20)	29 (46.0)	16 (25.4)	18 (28.6)	**2.07 (1.22–3.50)**
	Recovering patients (e.g., from surgery)	7 (28.0)	18 (72.0)	0.55 (0.21–1.28)	4 (16.0)	16 (64.0)	5 (20.0)	0.46 (0.13–1.24)
	Healthy patients with acute disease	28 (50.0)	28 (50.0)	1.41 (0.81–2.44)	16 (28.6)	17 (30.4)	23 (41.0)	0.97 (0.52–1.75)
	Other condition	15 (37.5)	25 (62.5)	0.84 (0.43–1.61)	16 (40.0)	12 (30.0)	12 (30.0)	1.62 (0.83–3.10)
Number of chronic conditions	≥5	164 (37.7)	271 (62.3)	1	164 (37.7)	147 (33.8)	124 (28.5)	1
	2–4	251 (41.1	359 (58.9)	1.16 (0.90–1.49)	172 (28.2)	194 (31.8)	244 (40.0)	**0.65 (0.50–0.84)**
	1	27 (45.8)	32 (54.2)	1.39 (0.80–2.41)	16 (27.1)	22 (37.3)	21 (35.6)	0.61 (0.33–1.11)
	0	11 (55.0)	9 (45.0)	2.02 (0.82–5.11)	1 (5.0)	6 (30.0)	13 (65.0)	**0.09 (0.00–0.43)**
	Unknown	3 (20.0)	12 (80.0)	0.41 (0.09–1.32)	7 (46.7)	6 (40.0)	2 (13.3)	1.45 (0.50–4.10)
Diagnostic class or problem area**	Musculoskeletal	87 (41.6)	122 (58.4)	1	69 (33.0)	73 (34.9)	67 (32.1)	1
	Respiratory	54 (46.6)	62 (53.4)	1.22 (0.77–1.93)	36 (31.0)	40 (34.5)	40 (34.5)	0.91 (0.56–1.48)
	Neurological	42 (41.2)	60 (58.8)	0.98 (0.60–1.59)	26 (25.5)	28 (27.5)	48 (47.0)	0.69 (0.40–1.17)
	Digestive	25 (50.0)	25 (50.0)	1.40 (0.75–2.61)	15 (30.0)	22 (44.0)	13 (26.0)	0.87 (0.43–1.67)
	Cardiovascular	70 (40.7)	102 (59.3)	0.96 (0.64–1.45)	47 (27.3)	60 (34.9)	65 (37.8)	0.76 (0.49–1.18)
	Endocrine, metabolic and nutritional	12 (50.0)	12 (50.0)	1.40 (0.60–3.30)	11 (45.8)	10 (41.7)	3 (12.5)	1.72 (0.72–4.04)
	General	32 (33.7)	63 (66.3)	0.71 (0.43–1.18)	40 (42.1)	30 (31.6)	25 (26.3)	1.48 (0.89–2.43)
	Psychological	34 (39.5)	52 (60.5)	0.92 (0.55–1.53)	36 (41.9)	24 (27.9)	26 (30.2)	1.46 (0.87–2.45)
	Social problems	7 (46.7)	8 (53.3)	1.23 (0.42–3.54)	5 (33.3)	4 (26.7)	6 (40.0)	1.01 (0.31–2.97)
	Other diagnosis or problem	42 (29.6)	100 (70.4)	**0.59 (0.37–0.92)**	32 (22.5)	42 (29.6)	68 (47.9)	**0.59 (0.36–0.96)**
	No obvious diagnosis or problem	44 (45.4)	53 (54.6)	1.16 (0.72–1.89)	19 (19.6)	38 (39.2)	40 (41.2)	**0.49 (0.27–0.87)**
	Diagnosis unclear	7 (22.6)	24 (77.4)	**0.41 (0.16–0.95)**	24 (77.4)	4 (12.9	3 (9.7)	**6.96 (3.00–18.21)**

CI: confidence interval; GP: general practitioner; NA: not available; OR: odds ratio; * according to Tarmed reimbursement system [24]; ** multiple answers possible.

too small to fully explain the differences in consultation length between levels of urbanisation, and additional factors may play a role. For instance, heath problems may differ across urbanisation levels. Also, patients living in urban areas may request longer consultations than those in rural ones. Our finding is contrary to data from Germany, where urban regions were reported to be associated with shorter home visits [11]. In Germany, patients in urban regions had fewer comorbidities than those in rural regions and thus might require less time during the home visit.

In our study, long consultations were also associated with long journeys. Journey duration and urbanisation level may be interdependent since journey duration was highest in urban regions. Furthermore, growing number of chronic conditions was found to raise the odds of having a long consultation, which is most likely owing to multiple health issues that need to be covered during home visit. Notably, the odds of long consultations were strongly elevated in patients of middle age. This is surprising for one would assume that more comorbidities with growing age result in extended consultation times. One explanation might be that older patients may suffer from different health problems than younger ones and thus require less consultation time. Also, chronic conditions in older patients may be well known to GP and thus require less time for management, whereas younger patients may rather suffer from new health problems, potentially evoking fear and sorrow, which necessitates longer consultations. Interestingly, age and comorbidities did not influence consultation duration in the German study [11]. The reason for this remains elusive.

Day care involvement was found to raise the odds of a long consultation. As one possible explanation, patients in day care usually show multiple chronic conditions, which itself is positively associated with long consultations. Also, patients assisted by day care might become highly dependent on home visits as the only way of receiving primary care. They may receive fewer but longer consultations. Further, patients on day care may be accompanied by nurses who may direct specific questions to GPs. Emergency and out-of-hours appointments strongly favoured long consultations, too. This may be explained by complex and unexpected cases encountered in emergency home visits, which may require extended medical intervention and may eventually also lead to hospitalisation. A recent study from Switzerland revealed that physical examination, medication prescription and medical report preparation were more frequent during emergency home visits [19]. Some of the out-of-hours home visits would certainly have an emergency character and thus necessitate longer consultations. GPs may also schedule complex patients with many comorbidities out-of-hours, to be able to fully address all medical problems and cover psychological and social aspects without time pressure.

Journey duration during home visits

The time spent on journeys to the visit was slightly less than that reported in Germany (11.8 ± 7.2 minutes vs 13.0 ± 14.3 minutes) [11]. It is known from previous studies that distance influences the willingness to make home visits. A survey of GPs in Ontario, Canada, revealed that 29% of doctors making home visits accepted a journey duration of up to 15 minutes, whereas 61% were inclined to travel 15 to 29 minutes [8]. In Northern Ireland, so called outside-area patients who live >5 km away from the doctor's practice in urban environments (or >11 km in rural ones), have a high probability to be declined 24-hour cover by GPs [13]. In Switzerland, the distance between patients and doctors are much shorter than in Canada, Northern Ireland – or Norway, where home visits are offered for patients residing even 50 km away [12]. The average distance between patients and primary care providers in Switzerland is 1.1 km [27]. Thus, distance itself probably has a minor impact on the willingness to offer home visits.

Interestingly, travel was most time consuming in urban areas. Time expenditure does not seem to be caused by the distance itself, since the average distance between patient and point of primary care equals 0.7 km in urban, 1.2 km in intermediate and 2.8 km in rural regions [27]. Likely, the mode of transport and traffic volume might determine effective journey duration instead.

Frequency of home visits

The GPs in our study performed 3.4 home visits per week with an annual number of 104 visits per practice. This agrees with data published earlier [18, 28]. From a European perspective, the frequency of home visits in Switzerland is low [29]. In Germany, for instance, home visits are four times more frequent than in Switzerland [11]. Advanced patient age and multimorbidity, as well as female sex, have previously been associated with higher chances of obtaining home visits [4, 11, 29–31]. None of these factors is likely to explain the observed low home visit frequency, since the patient population described in the present analysis resembles the one reported from Germany [11]. Additional factors, which are not accessible through our analysis, may contribute. For instance, patients may be more often accompanied by relatives to reach emergency departments or walk-in practices in Switzerland. They may also prefer in-practice consultations over home visits.

Female GPs, young GPs and group practices have been correlated with a decreasing number of home visits [29, 30]. In line with these reports, our results reveal that GPs who did not conduct home visits were rather female, of younger age and worked more often in a group practice compared with their colleagues conducting home visits.

Strengths and limitations

This study relied on a large statistical sample. Representative numbers of GPs collaborated in the six Sentinella regions, except for the underrepresented central and overrepresented south-eastern region. Overall, 124 out of 168 GPs (74%) conducted home visits, which is a little higher than the national average of 67% [27]. After excluding rarely visiting GPs, there remain 95 GPs or 57% who performed home visits on a regular basis. Clearly, women are underrepresented among the Sentinella GPs contributing to this study (24% vs 46% on the national level) [32]. This may influence our results because, according to the comparison

Table 4:
Multivariate logistic regression adjusted for age and sex based on full (95 GPs, 1139 home visits) and confined (70 GPs, 842 home visits) datasets. 95% CIs not including zero are presented in bold.

		Full dataset, adjusted OR (95% CI)		Confined dataset, adjusted OR (95% CI)	
		Long journey (vs short)	Long consultation (vs short/medium)	Long journey (vs short)	Long consultation (vs short/medium)
Main variables					
Journey duration	Long: >10 min	–	1	–	1
	Short: ≤10 min	–	**0.61 (0.47–0.78**)	–	**0.44 (0.33–0.58**)
Consultation duration	Long: >25 min	1	–	1	–
	Medium: 16–25 min	**0.68 (0.50–0.91)**	–	**0.49 (0.35–0.67)**	–
	Short: ≤15 min	**0.54 (0.40–0.72)**	–	**0.38 (0.26–0.54)**	–
Visit characteristics					
Level of urbanisation	Urban	1	1	1	1
	Intermediate	**0.32 (0.21–0.47)**	**0.59 (0.40–0.86)**	**0.19 (0.10–0.33)**	**0.54 (0.34–0.84)**
	Rural	**0.36 (0.23–0.53)**	**0.26 (0.15–0.42)**	**0.54 (0.36–0.80)**	**0.38 (0.25–0.58)**
Urgency*	Regular	1	1	1	1
	Urgent	0.84 (0.63–1.12)	1.29 (0.96–1.73)	0.93 (0.67–1.29)	1.02 (0.73–1.40)
	Emergency	0.80 (0.42–1.47)	**2.06 (1.12–3.78)**	1.52 (0.78–2.96)	**2.44 (1.23–5.03)**
Reasons for house visit**	Impaired mobility	1	1	1	1
	Lack of private or public transport	1.05 (0.61–1.78)	0.77 (0.40–1.40)	1.02 (0.52–1.97)	1.06 (0.53–2.07)
	Infectivity	0.70 (0.10–3.73)	NA	1.14 (0.04 – 29.0)	NA
	Poor general condition	0.93 (0.65–1.32)	**1.48 (1.02–2.12)**	**0.65 (0.43–0.99)**	1.16 (0.77–1.74)
	Patient's request	1.14 (0.59–2.17)	**0.39 (0.14–0.90)**	1.23 (0.60–2.49)	**0.30 (0.11–0.71)**
	GP absent from doctor's office	0.73 (0.03–7.65)	NA	1.14 (0.05–29.09)	NA
	Other reason	0.78 (0.49–1.23)	1.50 (0.95–2.35)	**0.55 (0.32–0.94)**	1.52 (0.92–2.53)
Out-of-hours house visits		1.24 (0.97–1.58)	**2.99 (2.31–3.89)**	0.96 (0.73–1.27)	**2.43 (1.83–3.23)**
Hospitalisations during/after house visit		1.84 (0.88–3.86)	1.81 (0.85–3.77)	**3.15 (1.31–8.35)**	1.15 (0.48–2.71)
GP-independent hospitalisations within 24 hours after house visit		1.54 (0.52–4.55)	0.91 (0.25–2.74)	1.82 (0.54–6.41)	0.76 (0.20–2.56)
Patient characteristics					
Age categories (years)	≥90	1	1	1	1
	80–89	0.94 (0.72–1.25)	**1.39 (1.02–1.89)**	1.10 (0.80–1.52)	1.32 (0.95–1.84)
	70–79	0.82 (0.55–1.20)	**2.22 (1.49–3.30)**	0.99 (0.63–1.54)	**2.05 (1.32–3.18)**
	60–69	1.30 (0.72–2.35)	**4.11 (2.26–7.60)**	1.47 (0.78–2.77)	**3.28 (1.71–6.48)**
	<60	1.45 (0.82–2.55)	1.74 (0.94–3.18)	0.88 (0.41–1.82)	1.57 (0.77–3.20)
Woman		1.14 (0.88–1.48)	1.01 (0.77–1.33)	1.39 (1.03–1.88)	1.03 (0.76–1.39)
Single-handed household		1.11 (0.83–1.49)	1.17 (0.86–1.58)	1.31 (0.94–1.84)	1.16 (0.82–1.62)
Public or private day care		**1.63 (1.26–2.11)**	**2.78 (2.13–3.64)**	**1.79 (1.34–2.39)**	**2.44 (1.82–3.28)**
Patients' conditions on doctor's arrival**	Chronically ill patients	1	1	1	1
	Chronically ill patients with acute disease	0.86 (0.65–1.13)	1.19 (0.89–1.60)	1.07 (0.77–1.47)	1.17 (0.85–1.62)
	Palliative care patients	0.72 (0.41–1.23)	**2.14 (1.25–3.64)**	0.65 (0.33–1.21)	**1.92 (1.05–3.55)**
	Recovering patients (e.g., from surgery)	0.54 (0.21–1.26)	0.44 (0.13–1.18)	1.00 (0.38–2.53)	0.47 (0.15–1.28)
	Healthy patients with acute disease	1.26 (0.70–2.25)	0.71 (0.35–1.36)	1.53 (0.80–2.92)	1.44 (0.75–2.79)
	Other condition	0.83 (0.42–1.60)	1.50 (0.76–2.90)	0.86 (0.41–1.74)	1.22 (0.60–2.44)
Number of chronic conditions	≥5	1	1	1	1
	2–4	1.14 (0.89–1.47)	**0.66 (0.50–0.86)**	1.15 (0.86–1.55)	**0.74 (0.55–0.99)**
	1	1.43 (0.82–2.47)	0.56 (0.29–1.03)	**2.25 (1.25–4.12)**	0.57 (0.30–1.04)
	0	1.98 (0.62–6.54)	**0.01 (0.00–0.08)**	0.85 (0.04–8.99)	**0.05 (0.00–0.64)**
	Unknown	0.41 (0.09–1.32)	1.45 (0.49–4.18)	0.58 (0.16–1.74)	0.91 (0.31–2.64)
Diagnostic class or problem area**	Musculoskeletal	1	1	1	1
	Respiratory	1.18 (0.74–1.86)	0.86 (0.52–1.40)	0.88 (0.53–1.47)	0.69 (0.40–1.16)
	Neurological	1.00 (0.62–1.62)	0.71 (0.41–1.20)	0.70 (0.39–1.26)	0.67 (0.36–1.23)
	Digestive	1.44 (0.77–2.70)	0.89 (0.44–1.71)	2.09 (0.96–4.75)	0.93 (0.42–1.99)
	Cardiovascular	0.98 (0.64–1.49)	0.80 (0.51–1.26)	0.88 (0.55–1.41)	0.68 (0.42–1.09)
	Endocrine, metabolic and nutritional	1.29 (0.54–3.06)	1.61 (0.67–3.82)	0.76 (0.24–2.31)	0.87 (0.27–2.78)
	General	0.71 (0.42–1.17)	1.46 (0.88–2.41)	**0.44 (0.24–0.78)**	1.09 (0.62–1.89)
	Psychological	0.86 (0.51–1.44)	1.43 (0.85–2.41)	0.68 (0.38–1.20)	1.06 (0.59–1.87)
	Social problems	1.24 (0.42–3.62)	1.02 (0.31–3.02)	1.35 (0.34–5.71)	1.34 (0.32–5.88)
	Other diagnosis or problem	**0.57 (0.36–0.90**)	**0.56 (0.34–0.91)**	**0.42 (0.24–0.72)**	**0.51 (0.29–0.87)**
	No obvious diagnosis or problem	1.21 (0.74–1.97)	**0.52 (0.29–0.92)**	0.99 (0.53–1.83)	0.58 (0.30–1.12)
	Diagnosis unclear	0.46 (0.17–1.07)	**7.64 (3.23–20.38)**	**0.36 (0.13–0.86)**	**6.97 (2.64–22.1)**

CI: confidence interval; GP: general practitioner; NA: not available; OR: odds ratio; * according to Tarmed reimbursement system [24]; ** multiple answers possible.

between GPs performing and not performing home visits, the proportion of women was higher among non-visiting doctors. Also, as mentioned above, gender affects home visits [29, 30].

The robustness of our results is supported by the sensitivity analysis comparing the original dataset with the confined one, which omits rarely and frequently reporting GPs. Exclusion of these 25, representing 26% of the entire sample, did not markedly influence our results.

Sentinella physicians are well trained in data collection as they regularly participate in various Sentinella studies. Nonetheless, reports are potentially subject to selection and recall bias. In fact, detailed home visits were reported less frequently than home visits in the basic dataset (2.8 ± 2.0 vs 3.6 ± 3.9 reports per week), most probably because of time constraints. Also, time was estimated rather than measured since data entries centred around common values of 5, 10, 15 etc. minutes.

Finally, our dataset does not provide any information on patients' social status, which was reported to influence home visits [3, 33]. Thus, the influence of socioeconomic level on our outcome cannot be measured and may confound our results.

Implications

Despite making fewer home visits per week on European average, Swiss GPs offer longer consultations to their patients. The majority of home visits are routine appointments and an integral part of GPs work. The forthcoming shortage of GPs and the aging population in Switzerland will most certainly increase GPs' time burden and negatively affect home visits in the future. Increasing the number of GPs through improved training, better work-life balance and higher financial attractiveness [34–36], as well as delegation of home visits to advanced practice nurses [37, 38] or private home healthcare agencies [39] are possible options to face the upcoming challenges in primary care in Switzerland.

Conclusion

On average, GPs conduct rather few but long home visits, especially for multimorbid patients. GPs working part-time, in group practice or in urban regions devote more time to home visits.

Availability of data and materials

Datasets are available upon request (stefan.essig[at]unilu.ch).

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Appendix: supplementary tables

Supplementary Table 1: GP characteristics, physician-patient interactions and characteristics of home visits among GPs working full or part-time and in single-handed or group practices.

		Working time		Practice type	
		Full time n (%) *	**Part-time n (%)**	**Single n (%)**	**Group n (%)**
GPs		61 (100.0)	33 (100.0)	40 (100.0)	55 (100.0)
Female GPs		7 (11.5)	16 (48.5)	4 (10.0)	19 (34.5)
Part-time working GPs		-	-	6 (15.0)	29 (52.7)
Part-time working female GPs		-	-	1 (2.5)	15 (27.3)
GPs' Age:	30– 39 years	7 (11.7)	2 (6.3)	3 (7.5)	6 (11.3)
	40– 49 years	9 (15.0)	7 (21.9)	3 (7.5)	13 (24.5)
	50– 59 years	17 (28.3)	12 (37.5)	9 (22.5)	20 (37.7)
	60– 69 years	23 (38.3)	11 (34.4)	20 (50.0)	14 (26.4)
	>69 years	4 (6.7)	0 (0.0)	5 (12.5)	0 (0.0)
Physician-patient interactions per practice per year (Mean ± SD)		3930.6 ± 1777.4	2885.2 ± 1143.4	3760.9 ± 1885.7	3498.9 ± 1467.3
P-value**			0.642		0.01
Home visits per practice per year (Mean ± SD)		3.8 ± 4.4	3.0 ± 2.6	3.4 ± 2.7	3.8 ± 4.9
P-value**			0.486		0.948
Consultation length (min; Mean ± SD)		23.4 ± 13.2	25.1 ± 12.3	22.8 ± 11.9	24.9 ± 13.8
P-value**			0.002		0.044

* If not otherwise specified.
** Kruskal-Wallis rank sum test to compare between full and part-time or single and group practices.
Abbreviations: GP: general practitioner; SD: Standard deviation

Supplementary Table 2: Comparison of GPs included (i.e. conducting home visits) and excluded (i.e. non-conducting home visits or with low frequency) in the dataset.

		GPs conducting home visits n (%) *	**GPs non-conducting home visits or reporting <10 weeks/year n (%)**
GPs		95 (100.0)	73 (100.0)
GPs Working in group practice		55 (57.9)	50 (68.5)
GPs working part-time		33 (34.7)	43 (58.9)
Female GPs		23 (24.2)	34 (46.6)
GPs' Age:	30– 39 years	11 (11.8)	15 (20.5)
	40– 49 years	15 (16.1)	17 (23.3)
	50– 59 years	27 (29.0)	21 (28.8)
	60– 69 years	35 (37.6)	16 (21.9)
	>69 years	5 (5.4)	4 (5.5)
Urban		63 (66.3)	53 (72.6)
Intermediate		18 (18.9)	11 (15.1)
Rural		14 (14.7)	9 (12.3)
Physician-patient interactions per practice per year (Mean ± SD)		3628.3 ± 1681.8	3302.9 ± 2187.2
P-value**			0.101

* If not otherwise specified.
** Kruskal-Wallis rank sum test
Abbreviations: GP: general practitioner; IQR: interquartile range; SD: Standard deviation

Supplementary Table 3: Characteristics of home visits and physician-patient interactions across urbanity levels.

		Urban	Intermediate	Rural
Journey duration (min)	Mean ± SD	12.7 ± 7.2	8.7 ± 4.8	9.9 ± 7.7
	Median / IQR / min-max	10 / 7 / 2-60	8 / 5 / 1-25	7 / 5 / 2-40
	P-Value *		5.4e-13	4.0e-10
Consultation duration (min)	Mean ± SD	24.7 ± 13.4	24.1 ± 13.8	19.1 ± 7.2
	Median / IQR / min-max	20 / 15 / 5-120	20 / 15 / 5-90	18 / 5 / 10-60
	P-Value *		ns	3.6e-05
Physician-patient interactions per practice per year (Mean ± SD)		3520.2 ± 1653.0	4076.6 ± 2110.9	3628.0 ± 1215.4
P-Value **		0.665		

* Wilcoxon rank sum test with Bonferroni correction for multiple pairwise comparisons against the urban environment.
** Kruskal-Wallis rank sum test for comparison between regions.
Abbreviations: IQR: interquartile range; ns: not significant; SD: Standard deviation

Supplementary Table 4: Characteristics of home visits (confined dataset consisting of 70 GPs).

		Total (n = 842), n (%) *
Main variables		
Journey duration (min)	Mean ± SD	12.8 ± 7.8
	Median / IQR / min-max	10 / 8 / 1-60
Journey duration	Long: >10 min	351 (41.7)
	Short: ≤10 min	491 (58.3)
Consultation duration (min)	Mean ± SD	26.7 ± 13.5
	Median / IQR / min-max	25 / 15 / 5-120
Consultation duration	Long: >25 min	367 (43.6)
	Medium: 16-25 min	257 (30.5)
	Short: ≤15 min	218 (25.9)
Visit characteristics		
Level of urbanity	Urban	613 (72.8)
	Intermediate	100 (11.9)
	Rural	129 (15.3)
Urgency **	Regular	598 (71.0)
	Urgent	205 (24.3)
	Emergency	39 (4.6)
Reasons for house visit ***	Impaired mobility	580 (68.9)
	Lack of private or public transport	38 (4.5)
	Infectivity	2 (0.2)
	Poor general condition	117 (13.9)
	Patient's request	33 (3.9)
	GP absent from doctor's office	2 (0.2)
	Other reason	70 (8.3)
Out-of-hours house visits		359 (42.6)
Hospitalizations during/after house visit		22 (2.6)
GP-independent hospitalizations within 24h after house visit		11 (1.3)
Patient characteristics		
Age (years)	Mean ± SD	83.1 ± 11.9
	Median / IQR / min-max	85 / 12 / 0-104

Age categories (years)	≥90	259 (30.8)
	80-89	366 (43.5)
	70-79	131 (15.6)
	60-69	46 (5.5)
	<60	40 (4.8)
Woman		560 (66.5)
Single-handed household		175 (20.8)
Public or private day care		288 (34.2)
Patients' conditions at doctor's arrival ***	Chronically ill patients	461 (54.8)
	Chronically ill patients with acute disease	236 (28.0)
	Palliative care patients	49 (5.8)
	Recovering patients (e.g. from surgery)	19 (2.3)
	Healthy patients with acute disease	42 (5.0)
	Other condition	35 (4.2)
Number of chronic conditions	≥5	337 (40.0)
	2-4	433 (51.4)
	1	53 (6.3)
	0	4 (0.5)
	Unknown	15 (1.8)
Diagnostic class or problem area ***	Musculoskeletal	159 (18.9)
	Respiratory	97 (11.5)
	Neurological	66 (7.8)
	Digestive	33 (3.9)
	Cardiovascular	135 (16.0)
	Endocrine, metabolic and nutritional	14 (1.7)
	General	77 (9.1)
	Psychological	70 (8.3)
	Social problems	9 (1.1)
	Other diagnosis or problem	98 (11.6)
	No obvious diagnosis or problem	55 (6.5)
	Diagnosis unclear	29 (3.4)

* If not otherwise specified.
** According to Tarmed reimbursement system [24].
*** Multiple answers possible.
Abbreviations: GP: general practitioner; IQR: interquartile range; SD: Standard deviation

Supplementary Table 5: Associations of characteristics of home visits and visited patients with journey duration and consultation (confined dataset without low and frequent reporters consisting of 70 GPs and 842 home visits).

		Journey duration		**Long journey (vs. short) Crude OR (95% CI)**	**Consultation duration**			**Long consultation (vs. short/medium) Crude OR (95% CI)**
		Long n (%)	Short n (%)		Long n (%)	Medium n (%)	Short n (%)	
Main variables								
Journey duration	Long: >10 min	351 (100.0)	0 (0.0)	-	193 (55.0)	91 (25.9)	67 (19.1)	1
	Short: ≤10 min	0 (0.0)	491 (100.0)	-	174 (35.4)	166 (33.8)	151 (30.8)	**0.45 (0.34–0.59)**
Consultation duration	Long: >25 min	193 (52.6)	174 (47.4)	1	367 (100.0)	0 (0.0)	0 (0.0)	-
	Medium: 16-25 min	91 (35.4)	166 (64.6)	**0.49 (0.36–0.68)**	0 (0.0)	257 (100.0)	0 (0.0)	-
	Short: ≤15 min	67 (30.7)	151 (69.3)	**0.40 (0.28–0.57)**	0 (0.0)	0 (0.0)	218 (100.0)	-
Visit characteristics								
Level of urbanity	Urban	294 (48.0)	319 (52.0)	1	296 (48.3	160 (26.1)	157 (25.6)	1
	Intermediate	15 (15.0)	85 (85.0)	**0.19 (0.10–0.33)**	37 (37.0)	46 (46.0)	17 (17.0)	**0.63 (0.40–0.97)**
	Rural	42 (32.6)	87 (67.4)	**0.52 (0.35–0.78)**	34 (26.4)	51 (39.5)	44 (34.1)	**0.38 (0.25–0.58)**
Urgency *	Regular	249 (41.6)	349 (58.4)	1	251 (42.0)	179 (29.9)	168 (28.1)	1
	Urgent	82 (40.0)	123 (60.0)	0.93 (0.67–1.29)	90 (43.9)	70 (34.1)	45 (22.0)	1.08 (0.78–1.49)
	Emergency	20 (51.3)	19 (48.7)	1.48 (0.77–2.84)	26 (66.7)	8 (20.5)	5 (12.8)	**2.76 (1.42–5.65)**
Reasons for house visit **	Impaired mobility	255 (44.0)	325 (56.0)	1	252 (43.4)	182 (31.4	146 (25.2)	1
	Lack of private or public transport	17 (44.7)	21 (55.3)	1.03 ≤(0.53–1.99)	17 (44.7)	17 (44.7)	4 (10.6)	1.05 (0.54–2.04)
	Infectivity	1 (50.0)	1 (50.0)	1.27 (0.05–32.33)	0 (0.0)	2 (100.0)	0 (0.0)	NA
	Poor general condition	40 (34.2)	77 (65.8)	0.66 (0.43–1.00)	54 (46.2)	32 (27.4)	31 (26.4)	1.12 (0.75–1.66)
	Patient's request	16 (48.5)	17 (51.5)	1.20 (0.59–2.43)	6 (18.2)	4 (12.1)	23 (69.7)	**0.29 (0.11–0.67)**
	GP absent from doctor's office	1 (50.0)	1 (50.0)	1.27 (0.05–32.33)	0 (0.0)	0 (0.0)	2 (100.0)	NA
	Other reason	21 (30.0)	49 (70.0)	**0.55 (0.31–0.92)**	38 (54.3)	20 (28.6)	12 (17.1)	1.55 (0.94–2.56)
Out-of-hours house visits		147 (40.9)	212 (59.1)	0.95 (0.72–1.25)	203 (56.5)	96 (26.7)	60 (16.8)	**2.53 (1.91–3.36)**
Hospitalizations during/after house visit		15 (68.2)	7 (31.8)	**3.09 (1.29–8.16)**	10 (45.5)	10 (45.5)	2 (9.0)	1.08 (0.45–2.53)
GP-independent hospitalizations within 24h after house visit		6 (54.5)	5 (45.5)	1.69 (0.51–5.91)	4 (36.4)	2 (18.2)	5 (45.4)	0.74 (0.19–2.46)
Patient characteristics								
Age categories (years)	≥90	106 (40.9)	153 (59.1)	1	93 (35.9	85 (32.8)	81 (31.3)	1
	80-89	157 (42.9)	209 (57.1)	1.08 (0.79–1.50)	154 (42.1)	115 (31.4)	97 (26.5)	1.30 (0.94–1.80)
	70-79	51 (38.9)	80 (61.1)	0.92 (0.60–1.41)	71 (54.2)	33 (25.2)	27 (20.6)	**2.11 (1.38–3.25)**
	60-69	23 (50.0)	23 (50.0)	1.44 (0.77–2.72)	30 (65.2)	11 (23.9)	5 (10.9)	**3.35 (1.76–6.59)**
	<60	14 (35.0)	26 (65.0)	0.78 (0.38–1.54)	19 (47.5)	13 (32.5)	8 (20.0)	1.61 (0.82–3.16)

Woman		248 (44.3)	312 (55.7)	**1.38 (1.03–1.86)**	240 (42.9)	170 (30.4)	150 (26.7)	0.92 (0.69–1.22)
Single-handed household		82 (46.9)	93 (53.1)	1.30 (0.93–1.82)	83 (47.4)	60 (34.3)	32 (18.3)	1.22 (0.87–1.70)
Public or private day care		146 (50.7)	142 (49.3)	**1.75 (1.31–2.34**)	168 (58.3)	72 (25.0)	48 (16.7)	**2.50 (1.87–3.35)**
Patients' conditions at doctor's arrival **	Chronically ill patients	192 (41.6)	269 (58.4)	1	187 (40.6)	135 (29.3)	139 (30.1)	1
	Chronically ill patients with acute disease	101 (42.8)	135 (57.2)	1.05 (0.76–1.44)	109 (46.2)	78 (33.1)	49 (20.7)	1.26 (0.92–1.73)
	Palliative care patients	15 (30.6)	34 (69.4)	0.62 (0.32–1.15)	28 (57.1)	11 (22.4)	10 (20.5)	**1.95 (1.08–3.58**)
	Recovering patients (e.g. from surgery)	8 (42.1)	11 (57.9)	1.02 (0.39–2.56)	5 (26.3)	13 (68.4)	1 (5.3)	0.52 (0. 17–1.39)
	Healthy patients with acute disease	22 (52.4)	20 (47.6)	1.54 (0.82–2.92)	22 (52.4)	11 (26.2)	9 (21.4)	1.61 (0.85–3.06)
	Other condition	13 (37.1)	22 (62.9)	0.83 (0.40–1.66)	16 (45.7)	9 (25.7)	10 (28.6)	1.23 (0.61–2.46)
Number of chronic conditions	≥5	130 (38.6)	207 (61.4)	1	164 (48.7	108 (32.0)	65 (19.3)	1
	2-4	185 (42.7)	248 (57.3)	1.19 (0.89–1.59)	176 (40.6)	123 (28.4)	134 (31.0)	**0.72 (0.54–0.96)**
	1	31 (58.5)	22 (41.5)	**2.24 (1.25–4.08)**	19 (35.8)	18 (34.0)	16 (30.2)	0.59 (0.32–1.06)
	0	1 (25.0)	3 (75.0)	0.53 (0.03–4.19)	1 (25.0)	2 (50.0)	1 (25.0)	0.35 (0.02–2.78)
	Unknown	4 (26.7)	11 (73.3)	0.58 (0.16–1.73)	7 (46.7)	6 (40.0)	2 (13.3)	0.92 (0.32–2.63)
Diagnostic class or problem area **	Musculoskeletal	77 (48.4	82 (51.6)	1	75 (47.2)	54 (34.0)	30 (18.8	1
	Respiratory	44 (45.4)	53 (54.6)	0.88 (0.53–1.47)	40 (41.2)	29 (29.9)	28 (28.9)	0.79 (0.47–1.31)
	Neurological	26 (39.4)	40 (60.6)	0.69 (0.38–1.24)	24 (36.4)	16 (24.2)	26 (39.4)	0.64 (0.35–1.15)
	Digestive	22 (66.7)	11 (33.3)	2.13 (0.99–4.83)	15 (45.5)	13 (39.4)	5 (15.1)	0.93 (0.43–1.98)
	Cardiovascular	61 (45.2)	74 (54.8)	0.88 (0.55–1.39)	49 (36.3)	47 (34.8)	39 (28.9)	0.64 (0.40–1.02)
	Endocrine, metabolic and nutritional	6 (42.9)	8 (57.1)	0.80 (0.25–2.40)	7 (50.0)	7 (50.0)	0 (0.0)	1.12 (0.37–3.41)
	General	22 (28.6)	55 (71.4)	**0.43 (0.23–0.76)**	39 (50.6)	24 (31.2)	14 (18.2)	1.15 (0.67–1.98)
	Psychological	28 (40.0)	42 (60.0)	0.71 (0.40–1.25)	35 (50.0)	18 (25.7)	17 (24.3)	1.12 (0.64–1.97)
	Social problems	5 (55.6)	4 (44.4)	1.33 (0.34–5.55)	5 (55.6)	3 (33.3)	1 (11.1)	1.40 (0.36–5.84)
	Other diagnosis or problem	27 (27.6)	71 (72.4)	**0.40 (0.23–0.69)**	34 (34.7)	31 (31.6)	33 (33.7)	0.60 (0.35–1.00)
	No obvious diagnosis or problem	26 (47.3)	29 (52.7)	0.95 (0.51–1.76)	20 (36.4)	13 (23.6)	22 (40.0)	0.64 (0.34–1.19)
	Diagnosis unclear	7 (24.1)	22 (75.9)	**0.34 (0.13–0.80)**	24 (82.8)	2 (6.9)	3 (10.3)	**5.38 (2.10–16.60)**

* According to Tarmed reimbursement system [24].
** Multiple answers possible.
Abbreviations: CI: confidence interval; GP: general practitioner; NA: not available; OR: odds ratio.
95% CIs not including zero are presented in bold.

Supplementary Table 6: Multivariate logistic regression adjusted for patient's age and sex, GPs' part-time working and practice type based on the full dataset encompassing 95 GPs and 1139 home visits.

		Long journey (vs. short), Adjusted OR (95% CI)	**Long consultation (vs. short/medium), Adjusted OR (95% CI)**
Main variables			
Journey duration	Long: >10 min	-	1
	Short: ≤10 min	-	**0.62 (0.48–0.80)**
Consultation duration	Long: >25 min	1	-
	Medium: 16-25 min	**0.64 (0.48–0.87)**	-
	Short: ≤15 min	**0.56 (0.42–0.76)**	-
Visit characteristics			
Level of urbanity	Urban	1	1
	Intermediate	**0.32 (0.21–0.47)**	**0.61 (0.41–0.90)**
	Rural	**0.32 (0.21–0.48)**	**0.27 (0.16–0.44)**
Urgency *	Regular	1	1
	Urgent	0.85 (0.64–1.13)	1.33 (0.99–1.79)
	Emergency	0.83 (0.44–1.53)	**2.23 (1.21–4.11)**
Reasons for house visit **	Impaired mobility	1	1
	Lack of private or public transport	1.07 (0.62–1.82)	0.83 (0.43–1.52)
	Infectivity	0.76 (0.10–3.95)	NA
	Poor general condition	0.94 (0.65–1.33)	**1.60 (1.10–2.32)**
	Patient's request	1.05 (0.54–2.02)	**0.33 (0.12–0.75)**
	GP absent from doctor's office	0.81 (0.04–8.48)	NA
	Other reason	0.79 (0.49–1.25)	1.54 (0.97–2.43)
Out-of-hours house visits		1.23 (0.96–1.58)	**3.10 (2.38–4.05)**
Hospitalizations during/after house visit		1.84 (0.88–3.87)	1.88 (0.88–3.94)
GP-independent hospitalizations within 24h after house visit		1.52 (0.52–4.49)	0.89 (0.24–2.70)
Patient characteristics			
Age categories (years)	≥90	1	1
	80-89	0.95 (0.72–1.25)	**1.39 (1.03–1.90)**
	70-79	0.81 (0.55–1.19)	**2.19 (1.47–3.26)**
	60-69	1.40 (0.76–2.55)	**3.78 (2.05–7.09)**
	<60	1.68 (0.94–3.00)	1.79 (0.95–3.33)
Woman		1.13 (0.87–1.46)	0.97 (0.74–1.28)
Single-handed household		1.14 (0.85–1.53)	1.22 (0.89–1.65)
Public or private day care		**1.61 (1.24–2.09)**	**2.84 (2.16–3.74)**
Patients' conditions at doctor's arrival **	Chronically ill patients	1	1
	Chronically ill patients with acute disease	0.86 (0.65–1.14)	1.22 (0.90–1.64)
	Palliative care patients	0.72 (0.41–1.23)	**2.17 (1.26–3.73)**
	Recovering patients (e.g. from surgery)	0.54 (0.21–1.26)	0.45 (0.13–1.24)
	Healthy patients with acute disease	1.25 (0.70–2.24)	0.71 (0.35–1.35)
	Other condition	0.86 (0.43–1.66)	1.63 (0.81–3.19)
Number of chronic conditions	≥5	1	1
	2-4	1.14 (0.88–1.47)	**0.65 (0.50–0.85)**
	1	1.49 (0.85–2.61)	0.58 (0.30–1.08)
	0	2.17 (0.67–7.17)	**0.01 (0.00–0.07)**
	Unknown	0.35 (0.08–1.14)	1.14 (0.38–3.34)

Diagnostic class or problem area **	Musculoskeletal	1	1
	Respiratory	1.18 (0.74–1.88)	0.88 (0.52–1.45)
	Neurological	1.02 (0.62–1.65)	0.71 (0.41–1.21)
	Digestive	1.46 (0.78–2.75)	0.91 (0.45–1.78)
	Cardiovascular	0.98 (0.64–1.50)	0.79 (0.50–1.25)
	Endocrine, metabolic and nutritional	1.37 (0.57–3.30)	1.97 (0.80–4.82)
	General	0.70 (0.42–1.16)	1.49 (0.89–2.49)
	Psychological	0.85 (0.50–1.42)	1.39 (0.82–2.37)
	Social problems	1.33 (0.44–3.93)	1.10 (0.32–3.36)
	Other diagnosis or problem	**0.57 (0.36–0.91)**	**0.59 (0.35–0.96)**
	No obvious diagnosis or problem	1.20 (0.73–1.98)	0.58 (0.32–1.05)
	Diagnosis unclear	0.47 (0.18–1.13)	**9.76 (3.97–26.91)**

* According to Tarmed reimbursement system [24].
** Multiple answers possible.
Abbreviations: CI: confidence interval; GP: general practitioner; NA: not available; OR: odds ratio.
95% CIs not including zero are presented