


BMJ Open Intended healthcare utilisation in cases of severe COVID-19 and inflammatory gastrointestinal disease: results of a population survey with vignettes

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ABSTRACT

Objectives To examine variations in intended healthcare utilisation in severe cases of COVID-19 and inflammatory gastrointestinal disease (IGD).

Design Representative cross-sectional telephone survey.

Setting and participants 1207 randomly drawn adults of the city of Hamburg, Germany, between November 2020 and January 2021.

Outcome measures Different vignettes with severe symptoms were presented varying in sex, age (child, middle-aged person, older person), daytime (Tuesday morning or Tuesday evening) and disease (COVID-19 or IGD), while the degree of urgency was equivalent for all cases. The respondents were asked for the intended healthcare utilisation resulting in three different alternatives: general practitioner (GP)/paediatrician, medical on-call service ('116117') and emergency care (accident and emergency department, emergency practice, rescue service). In multivariate analyses, associations of characteristics of the vignettes and participants (sex, age, education, migration background) with intended healthcare utilisation were tested. In a further step, analyses were conducted separately for IGD and COVID-19.

Results Regarding the vignettes' characteristics, intended utilisation of GP/paediatrician is associated with female sex, higher age, daytime (morning) and COVID-19 symptoms, the medical on-call service with male sex, daytime (evening) and COVID-19 symptoms and the emergency medicine with younger age, daytime (evening) and IGD. Women chose more often the GP/paediatrician, men preferred emergency medicine. Only in case of IGD, higher educated persons more often chose the medical on-call service while people with a migration background decided less often for medical on-call service and emergency medicine.

Conclusions Despite comparable urgency, the findings suggest variations of intended healthcare utilisation depending on various characteristics of the vignettes and respondents. Depending on the type of disease inequalities vary. Overall, information about healthcare alternatives in severe cases has to be improved and clear pathways to facilitate healthcare utilisation has to be further developed.

Strengths and limitations of this study

- The vignette design provides a standardised stimulus and comparability between symptoms and urgency.
- Data are weighted based on official statistics and can be seen as representative in terms of sociodemographic characteristics.
- No observed or reported behaviour was measured, but exclusively intended utilisation.
- The vignettes introduce symptoms in a brief form potentially neglecting the complexity of the diseases.

INTRODUCTION

In the past decade, utilisation of urgent and emergency care services became an important topic in various countries.¹⁻⁴ The reasons to visit emergency departments (ED) are multi-layered and, next to lower access barriers, convenience and the belief in higher care quality, the subjective perception of urgency is one of the main causes for the utilisation of emergency care.³⁻⁹ However, the vast majority of the studies analysed characteristics and behaviour of patients, which already entered emergency care facilities. Studies among the general population that surveyed the knowledge, beliefs and intended utilisation when severe symptoms occur are very rare. Moreover, various studies have shown a tremendous impact of the COVID-19 pandemic on healthcare utilisation among all age groups.^{10 11} A systematic review of 81 studies across 20 countries found out that healthcare utilisation decreased by about a third during the pandemic in the first 6 months of 2020.¹¹ A further systematic overview reported reductions of hospitalisations for cardiovascular diseases and their management ranging from 20% to 73% until February 2021 in numerous countries.¹² This decline of healthcare utilisation was also prevalent in Germany in various

outpatient, inpatient and emergency care facilities indicating a changed behaviour even when severe symptoms occur.^{11–16} Hence, the increasing morbidity and mortality leads to an ongoing debate about changed utilisation pattern and the avoiding of ED due to fear of contracting COVID-19, although acute treatment is mandatory.¹⁷

Generally, in the German healthcare system, three options are provided when severe symptoms occur¹⁸: (1) to contact the general practitioner (GP)/paediatrician (or in some cases a specialist), (2) to contact the medical on-call service or (3) to use emergency medicine (accident and EDs, emergency practices, rescue service). In 2012, a nationwide telephone number (116117) was introduced to provide a medical on-call service for treatment outside normal appointment times. Even in acute cases and within normal appointment times, patients can receive medical treatment here. They can use this service to ask for advice and to make medical appointments, and alternatively, a home visit by the doctor can be arranged. The present study is focused on two types of diseases: inflammatory gastrointestinal diseases (IGD) and COVID-19. While COVID-19 symptoms are currently a major reason for help-seeking in case of acute health problems, symptoms of gastrointestinal diseases are generally a prevalent driver of ED visits in various countries including Germany.^{19 20}

The well-established Behavioural Model of Health Services Use by Ronald Andersen distinguishes between predisposing, enabling and need factors of healthcare use on individual and contextual level.^{21 22} It aims to explain disparities in ambulatory and hospital services use by including various factors in the conceptual model. Major individual predisposing factors are sex, age, education and ethnicity. Enabling is characterised by income, health insurance status and the organisation of health services for the individual. Need factors comprise the self-perception and the objective measurement of health and functional status. Over the years, the healthcare system was included into the model to give recognition to the importance of national health policy, the resources and their organisation.²² Against the background of the current organisation of urgent and emergency care services in Germany, the present study introduces the individual predisposing factors sex, age, education, migration background and having children into the analyses of utilisation. Predisposing factors as lower education and a migration background are often associated with more frequent or inadequate prehospital and hospital emergency care utilisation in Germany and further European countries,^{7 23–26} although some current findings for Germany did not confirm these inequalities.^{27–29} Moreover, higher age predicts increased ED use while sex does not seem to play a significant role.^{7 24 27 28} Furthermore, the navigation within the healthcare system and the decision making concerning healthcare in everyday life is a major domain in the conceptual models of health literacy.³⁰ Thus, a major recommendation of The German National Action Plan Health Literacy is to facilitate navigation

within the healthcare system including emergency medicine.³¹ Studies have shown associations between low health literacy and more frequent as well as inadequate healthcare use, including emergency care.^{32–34}

Against this background, three research questions are addressed: (1) How does the intended healthcare utilisation in severe cases vary depending on predisposing factors (sex and age of the afflicted person), on symptoms (COVID-19 vs IGD) and daytime (Tuesday, 08:00 hours; Tuesday, 20:00 hours) of the vignettes? (2) How does the intended healthcare utilisation in severe cases vary depending on predisposing factors of the respondents (sex, age, education, migration background, having children)? (3) What differences occur when analysing the intended utilisation separately for symptoms of IGD and COVID-19?

METHODS

Study design and sample

Cross-sectional data were assessed via computer-assisted telephone interviews between November 2020 and January 2021 in Hamburg, Germany. The sample was randomly drawn using all possible telephone numbers in Hamburg, including non-registered numbers via random digital dialling.³⁵ Only landline numbers could be included as mobile telephone numbers are not provided on regional level. Participants were eligible when their age was ≥18 years, they were German-speaking and the place of residence was Hamburg. On different weekdays, repeated calls were made by trained interviewers. The Kish selection grid was used to randomly choose the target person in the respected household.³⁶ In this method, the interviewer collected the age and gender of every household member that was eligible for the survey and then randomly selected one person from that list. To analyse decisions for utilisation, 24 different vignettes (case stories) were used. Based on former research projects,^{37 38} a number of about n=50 participants per vignette (ie, total n=1200) was considered sufficient to identify medium-sized differences. The net sample included 2756 randomly selected persons. Of these, 961 (34.9 %) could not be reached and 588 (21.3 %) refused to participate leading to a total number of 1207 participants (response rate: 43.8 %).

Vignettes

Vignettes were used as a stimulus at the beginning of the survey (please see online supplemental file 1). They were designed in cooperation with primary care physicians, emergency physicians, geriatricians, paediatricians and nursing staff. Two groups of prevalent diseases were selected for the vignettes: COVID-19 and IGD. Additionally, vignettes were varied according to sex (female, male), age (12 years (child), 49 years (middle-aged person), 72 years (older person)) and daytime (Tuesday, 08:00 hours; Tuesday, 20:00 hours) resulting in n=24 vignettes randomly assigned to the respondents. Presented

symptoms of both diseases were severe and comparable regarding a higher urgency of treatment. However, it does not imply that the recommended utilisation is the same for both types of diseases. In terms of inflammatory gastrointestinal symptoms, typical and frequent diseases for the different age groups were selected: appendicitis (child), cholecystitis (middle-aged person) and diverticulitis (older person). According to our clinical cooperation partners, this was more realistic than to choose the same disease for all age groups. Inspired by the Manchester-Triage-Score,³⁹ a higher urgency of treatment was indicated by fever or elevated temperature and severe pain in all three gastrointestinal vignettes. A hospitalisation (own initiative or referral by a physician) for further diagnostics or treatment is required in all three cases. Symptoms of the COVID-19 vignette were based on guidelines and information provided by the Robert Koch Institute.⁴⁰ The recommended proceeding when COVID-19 symptoms occur is given by the Federal Ministry of Health⁴¹: affected people should stay at home, reduce contacts to a bare minimum and get in touch with a doctor by phone. Outside of surgery opening hours, one can also call the medical on-call service by dialling the nationwide number 116117 and wait for further instructions. In case of an emergency, it is recommended to dial '112' for rescue service. In terms of the COVID-19 case scenarios of higher urgency in the study, the correct procedure is to contact the GP/paediatrician (ideally via telephone) or to dial the permanently available medical on-call service (116117), and to wait for further instructions. All vignettes were audio-recorded by a clearly speaking trained person. The audio files were directly played to the respondents followed by a standardised questionnaire (total interview time: about 15 min).

Measures

In the beginning of the interview, one of the vignettes was presented to the respondents. To assess intended utilisation behaviour in the presented case, the respondents were requested to answer following open-ended question: "Who would you turn to first for help in the place of Mrs X/Mr X/in the place of the parents of...?" The interviewers were provided with a list of possibilities to facilitate the documentation. Three major options of intended utilisation could be categorised after data collection: GP/paediatrician, medical-on call service ('116117') and emergency medicine facilities (accident and ED, emergency practice, rescue service). These three categories were recoded as dummy variables (yes/no). A residual category ('other') sums up further responses (eg, friends or family members, watchful waiting, complementary medicine or pharmacy). Furthermore, the following characteristics of the respondents were introduced: age (age groups: 18–40, 41–60, ≥60 years), sex, education (years of schooling: ≤9, 10, ≥12), having children (yes/no) and migration background (no/second generation/first generation). A person has a migration background, if he/she or one of his/her parents was

born abroad. Respondents with a migration background who were born abroad and migrated to Germany were classified as first-generation migrants, while German-born descendants of first-generation migrants were considered as second-generation migrants.⁴² Finally, respondents were asked whether they ever had been affected by such complaints (yes/no). The sample was weighted for sex, age and educational level on the basis of official statistics of the population in Hamburg in 2020.^{43 44} The χ^2 tests have shown an effective weighting indicating no significant differences between the study sample and the population in Hamburg in terms of sex, age and education.

Analyses

Bivariate analyses of intended utilisation of the different care facilities were calculated using crosstabs including Pearson's χ^2 test. For multivariate analyses, binary logistic regressions were conducted. Dependent variables were the three options of utilisation: (1) GP/paediatrician, (2) medical on-call service, (3) emergency medicine (accident and ED, emergency practice, rescue service). As predictor variables, characteristics of the vignettes (disease, sex, age and daytime) and of the respondents (sex, age, education, migration status, children and personal affliction) were entered simultaneously into the models, so that all variables are adjusted for each other. In a further step, the multivariate analyses were conducted separately for the case scenarios of IGD and COVID-19. Analyses were carried out using the Statistical Package for the Social Sciences V.26⁴⁵ and the R statistical package.⁴⁶

Patient and public involvement

Patients and public were not involved.

RESULTS

Sample characteristics are shown in [table 1](#). The sample consisted of 52% female respondents while nearly half of the participants had a higher educational level (≥12 years of schooling) and 23% had a migration background (first and second generation). In terms of the intended utilisation, more than half of the respondents (54%) would choose the GP or paediatrician as first contact after vignette presentation. The medical on-call service ('116117') was preferred by 18% and emergency care (accident and ED/emergency practice/rescue service) mentioned 26% (other options like friends and family, pharmacy or complementary medicine: 5%).

Bivariate analyses are shown in [table 2](#). In terms of characteristics of the vignettes, there were significant differences ($p<0.05$) in intended utilisation according to sex and symptoms. Respondents to whom a COVID-19 vignette was presented more frequently have chosen the GP/paediatrician or medical on-call service than emergency medicine as first option for medical support. Regarding characteristics of the respondents, significant differences emerged for sex, age, education, migration background and personal affection.

Table 1 Sample characteristics (n=1207)*: n (%)

Sex (1)	
Female	621 (51.5)
Male	585 (48.5)
Age (years) (1)	
18–40	455 (37.8)
41–60	419 (34.7)
≥60	332 (27.5)
Education (years) (43)	
≤9	316 (27.1)
10	275 (23.6)
≥12	574 (49.3)
Migration background (22)	
No	915 (77.3)
Second generation	129 (10.9)
First generation	141 (11.7)
Children (18)	
Yes	546 (45.9)
No	643 (54.1)
Personally affected by such complaints (4)	
Yes	238 (19.8)
No	965 (80.2)
Intended utilisation (1)	
General practitioner/paediatrician	646 (53.6)
Medical on-call service ('116117')	182 (15.1)
Emergency medicine†	316 (26.2)
Other	62 (5.1)

*Number of missing data in brackets in italics.

†Accident and emergency department/emergency practice/rescue service.

Results of the multivariate regression analysis show that the GP/paediatrician was chosen significantly more often when the afflicted person in the vignette was female, middle aged or older, and had been affected by COVID-19 symptoms (table 3). There was a more than 2-fold likelihood of choosing the GP/paediatrician when COVID-19 was presented in the vignette (OR: 2.15, 95% CI: 1.67 to 2.77). Moreover, this option was less favoured when symptoms occurred in the evening. In contrast, the option of medical on-call service was more prevalent in male case vignettes and when the symptoms occurred in the evening. Similar to GP/paediatrician, the medical on-call service was chosen more often when the COVID-19 vignette was presented (OR: 2.88, 95% CI: 2.01 to 4.18). Emergency medicine (accident and ED/emergency practice/rescue service) was mentioned more often when children were affected, when symptoms were gastrointestinal, and occurred in the evening. Regarding respondents' characteristics, women favoured the GP/paediatrician while men rather preferred emergency medicine. Furthermore, higher educated persons

favoured the medical on-call service compared with the lowest status group (OR: 2.15, 95% CI: 1.34 to 3.52). People with migration background (especially second generation) less often chose medical on-call service and emergency medicine than non-migrants.

When examining intended utilisation separately for IGD and COVID-19 cases, further important differences emerged (tables 4 and 5). In terms of vignettes' characteristics, even in the evening, emergency medicine was not chosen more often than in the morning when the COVID-19 vignette was presented (OR: 1.00, 95% CI: 0.59 to 1.68). Regarding the respondents' characteristics, predisposing factors showed considerable differences in some cases. Particularly, there was a significant social gradient in the association between the on-call service use and educational level in case of IGD. Elevated ORs were found for higher educated groups (OR: 3.85, 95% CI: 1.39 to 11.10 to OR: 4.65, 95% CI: 1.68 to 12.85). This social gradient does not exist regarding COVID-19. Moreover, higher age groups much more often preferred emergency medicine when COVID-19 symptoms occur, while age does not matter for IGD. Finally, only in case of IGD, the migration background (second generation) indicated significant differences favouring the GP/paediatrician and less on-call service and emergency care.

DISCUSSION

In this study, the intended utilisation of different care facilities in a German metropolis was examined using varied case vignettes of severe COVID-19 and IGD. Following Andersen's Behavioural Model of Health Services Use, the study analysed different predisposing factors (sex, age, education, migration background) for the utilisation of GP/paediatrician, medical on-call service ('116117') and emergency care (accident and ED, emergency practice, rescue service). Moreover, daytime and symptoms were additionally included as predictors into the model. First of all, the majority of the respondents chose the GP/paediatrician as first option to get help. Furthermore, multivariate results show that both the characteristics of the vignettes and the characteristics of the respondents are associated with the intended utilisation. In terms of the vignettes' characteristics, the intended utilisation of GP/paediatrician is associated with female sex, higher age, daytime (morning) and COVID-19 symptoms, the medical on-call service with male sex, daytime (evening) and COVID-19 symptoms and the emergency medicine with young age, daytime (evening) and gastrointestinal symptoms. Regarding the respondents' characteristics, women chose more often the GP/paediatrician, men preferred emergency medicine. Higher educated persons more often chose the medical on-call service while people with a migration background decided less often for medical on-call service and emergency medicine. Thus, although case stories were similar regarding urgency of treatment, results suggest variations of intended health-care utilisation according to various characteristics of the

Table 2 Intended utilisation of different care facilities according to characteristics of the vignettes and the respondents (n=1207): bivariate analysis (%)‡

		General practitioner/ Paediatrician (%)	Medical on-call service ('116117') (%)	Emergency medicine* (%)
Vignettes				
Sex	Male	49.4	19.0	25.8
	Female	57.6	11.1	26.4
	P value†	0.004	<0.001	0.804
Age	Child	48.8	16.5	31.8
	Adult middle aged	55.1	13.1	25.6
	Adult aged	56.7	16.1	20.8
	P value	0.058	0.317	0.002
Time	Tuesday morning	65.7	7.4	22.2
	Tuesday evening	41.8	22.5	30.0
	P value	<0.001	<0.001	0.002
Symptoms	Gastrointestinal	44.9	9.5	39.4
	COVID-19	62.3	20.7	12.7
	P value	<0.001	<0.001	<0.001
Respondents				
Sex	Male	49.9	16.6	29.1
	Female	56.8	13.7	23.5
	P value	0.016	0.161	0.029
Age (years)	18–40	57.9	17.4	18.7
	41–60	47.5	16.2	32.7
	>60	55.1	10.6	28.3
	P value	0.007	0.024	<0.001
Education (years)	≤9	57.5	8.9	26.7
	10	50.9	14.9	33.5
	≥12	54.5	17.9	22.0
	P value	0.280	0.001	0.002
Migration background	No	52.0	16.8	28.5
	Second generation	59.4	7.8	14.8
	First generation	57.4	12.8	22.7
	P value	0.172	0.020	0.003
Own children	No	53.5	14.3	26.6
	Yes	54.1	15.4	25.7
	P value	0.825	0.592	0.712
Personally affected by such complaints	No	52.0	16.0	27.5
	Yes	60.1	11.8	20.5
	P value	0.025	0.106	0.028

*Accident and emergency department/emergency practice/rescue service.

†Pearson's χ^2 (statistically significant values ($p < 0.05$) in bold).

‡The percentages do not sum to 100 due to missing data.

case vignettes and the respondents. Separate analyses for IGD and COVID-19 cases show that the utilisation behaviour differs between the types of diseases. The associations between daytime and emergency medicine, and education and medical on-call service as well as associations between respondents' age and emergency medicine were solely significant in case of IGD.

Only a few studies analysed intended utilisation among the general population using case vignettes. A German study with a similar vignette design focused on intended behaviour and judgement of urgency, but did not analyse any predisposing factors.⁴⁷ Another study with case scenarios conducted in the Netherlands, Switzerland and Denmark examined the intended help-seeking behaviour

Table 3 Intended utilisation of different care facilities (n=1170): multivariate analysis (ORs and 95% CIs)

	General practitioner/Paediatrician		Medical on-call service ('116117')		Emergency medicine*	
	OR (95% CI)†	P value	OR (95% CI)	P value	OR (95% CI)	P value
<i>Vignettes</i>						
Sex (male)	1		1		1	
Sex (female)	1.34 (1.04 to 1.72)	0.024	0.48 (0.34 to 0.68)	<0.001	1.16 (0.86 to 1.56)	0.328
Age (child)	1		1		1	
Age (middle aged)	1.37 (1.01 to 1.86)	0.045	0.94 (0.62 to 1.44)	0.786	0.60 (0.42 to 0.85)	0.004
Age (older)	1.47 (1.08 to 2.02)	0.016	1.19 (0.78 to 1.83)	0.415	0.47 (0.33 to 0.69)	<0.001
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.35 (0.27 to 0.44)	<0.001	3.65 (2.53 to 5.34)	<0.001	1.61 (1.20 to 2.16)	0.002
Symptoms (gastrointestinal)	1		1		1	
Symptoms (COVID-19)	2.15 (1.67 to 2.77)	<0.001	2.88 (2.01 to 4.18)	<0.001	0.20 (0.15 to 0.28)	<0.001
<i>Respondents</i>						
Sex (male)	1		1		1	
Sex (female)	1.46 (1.13 to 1.88)	0.003	0.83 (0.59 to 1.17)	0.279	0.70 (0.52 to 0.95)	0.022
Age (18–40 years)	1		1		1	
Age (41–60 years)	0.71 (0.52 to 0.96)	0.026	0.81 (0.53 to 1.21)	0.297	1.85 (1.29 to 2.66)	<0.001
Age (>60 years)	0.87 (0.61 to 1.24)	0.446	0.73 (0.44 to 1.20)	0.220	1.34 (0.87 to 2.06)	0.178
Education (≤9 years)	1		1		1	
Education (10 years)	0.70 (0.49 to 0.99)	0.047	1.75 (1.02 to 3.01)	0.043	1.54 (1.02 to 2.32)	0.040
Education (≥12 years)	0.80 (0.58 to 1.10)	0.180	2.15 (1.34 to 3.52)	0.002	0.84 (0.58 to 1.24)	0.384
No migration background	1		1		1	
Migration background (second generation)	1.29 (0.87 to 1.95)	0.212	0.49 (0.23 to 0.93)	0.042	0.38 (0.21 to 0.65)	<0.001
Migration background (first generation)	1.31 (0.89 to 1.93)	0.167	0.64 (0.36 to 1.09)	0.114	0.70 (0.43 to 1.10)	0.128
Own children (no)	1		1		1	
Own children (yes)	0.84 (0.64 to 1.11)	0.227	1.15 (0.78 to 1.69)	0.480	1.09 (0.78 to 1.51)	0.626
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	1.15 (0.83 to 1.58)	0.401	0.63 (0.39 to 1.00)	0.051	0.89 (0.60 to 1.32)	0.581
R ² (Nagelkerke)	0.155		0.182		0.222	

*Accident and emergency department/emergency practice/rescue service.

†Statistically significant values (p<0.05) in bold.

exclusively in terms of acute out-of-hours healthcare.⁴⁸ Parents or adults who were lower educated, older or had a migration background were more inclined to contact out-of-hours care, whereas women were less inclined.⁴⁸ A survey among the German general population about its utilisation of prehospital emergency care revealed a higher use among lower educated persons and migrants.²⁵ Two more overviews—mostly including patient samples—indicated similar findings.^{24 26} However, a significantly higher use of emergency medicine among people with lower education and migrant background is not shown in the present study, which is supported by some current findings from Germany.^{27–29} As in previous studies, a higher age of the respondents (particularly in case of

IGD) is associated with increased ED use.²⁴ The results also show that female sex predicts lower ED use and a preference for GP/paediatrician. Although women still show a different healthcare utilisation than men and use healthcare more frequently in general,⁴⁹ there is no clear evidence that female patients more often visit the GP in Germany.^{50–52} The more frequent choice of the comparatively new nationwide medical on-call service ('116117') among higher educated people (in case of IGD) reflects the evidence about social inequalities in healthcare use,^{53 54} and could be due to a generally better health literacy among higher socioeconomic status groups.^{55 56} Overall, the knowledge about this service increased in the past years,⁵⁷ and other data from the present study project

Table 4 Intended utilisation of different care facilities in case of inflammatory gastrointestinal diseases (n=603): multivariate analysis (ORs and 95% CIs)

	General practitioner/Paediatrician		Medical on-call service ('116117')		Emergency medicine*	
	OR (95% CI)†	P value	OR (95% CI)	P value	OR (95% CI)	P value
<i>Vignettes</i>						
Sex (male)	1		1		1	
Sex (female)	1.24 (0.87 to 1.77)	0.243	0.45 (0.24 to 0.85)	0.013	1.35 (0.93 to 1.94)	0.110
Age (child)	1		1		1	
Age (middle aged)	1.29 (0.83 to 2.01)	0.255	1.31 (0.59 to 2.90)	0.511	0.63 (0.41 to 0.97)	0.036
Age (older)	1.81 (1.15 to 2.83)	0.010	1.85 (0.85 to 4.03)	0.121	0.36 (0.23 to 0.57)	<0.001
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.31 (0.22 to 0.44)	<0.001	3.20 (1.64 to 6.27)	0.001	2.02 (1.41 to 2.90)	<0.001
<i>Respondents</i>						
Sex (male)	1		1		1	
Sex (female)	1.32 (0.93 to 1.90)	0.127	1.10 (0.60 to 2.03)	0.751	0.75 (0.52 to 1.08)	0.123
Age (18–40 years)	1		1		1	
Age (41–60 years)	0.67 (0.43 to 1.04)	0.071	1.11 (0.54 to 2.33)	0.765	1.35 (0.87 to 2.10)	0.183
Age (61 years and older)	0.89 (0.53 to 1.49)	0.658	1.46 (0.59 to 3.60)	0.409	0.95 (0.56 to 1.61)	0.840
Education (≤9 years)	1		1		1	
Education (10 years)	0.56 (0.33 to 0.93)	0.024	3.85 (1.39 to 11.10)	0.012	1.84 (1.10 to 3.07)	0.020
Education (≥12 years)	0.68 (0.43 to 1.07)	0.096	4.65 (1.68 to 12.85)	0.003	1.04 (0.65 to 1.66)	0.869
No migrant background	1		1		1	
Migrant background (second generation)	2.01 (1.17 to 3.46)	0.012	0.16 (0.29 to 0.87)	0.034	0.35 (0.19 to 0.66)	0.001
Migrant background (first generation)	1.19 (0.69 to 2.07)	0.534	0.33 (0.87 to 1.29)	0.111	0.68 (0.39 to 1.20)	0.182
Own children (no)	1		1		1	
Own children (yes)	0.90 (0.60 to 1.34)	0.605	0.77 (0.38 to 1.55)	0.459	1.24 (0.82 to 1.86)	0.310
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	0.83 (0.49 to 1.39)	0.470	2.58 (1.17 to 5.67)	0.019	0.73 (0.42 to 1.26)	0.261

*Accident and emergency department/emergency practice/rescue service.

†Statistically significant values (p<0.05) in bold.

confirm the increasing popularity of the medical on-call service.⁵⁸ Interestingly, further analyses solely among the respondents which were presented a COVID-19 case showed no more inequalities between utilisation and educational level as well as migration history, while inequalities increased in case of IGD.

Regarding the case vignettes' characteristics, sex plays another significant role. In this case, it is not about different answers from females or males, but the reaction when a woman or a man is affected in the case story. In the present study, a female vignette leads to significantly more GP/paediatrician consultations and less on-call service. This suggests a less urgent perception when a female is affected, and is supported by findings that symptoms of female patients were more often underestimated compared with males.⁵⁹ The result that emergency care is more often preferred when a child was affected is supported by findings that the perception of urgency is increased in

case of ill children, and parents prefer to visit ED before contacting the primary care provider.^{60 61} The significant preference of medical on-call service and emergency care in the evening is obvious due to restricted opening hours of practices. Concerning the disease-related intended utilisation, significant differences are shown. While the GP/paediatrician and the medical on-call service was significantly more chosen in case of a COVID-19 vignette, emergency facilities were more preferred when an IGD vignette was presented. The respondents' preference of GP/paediatrician and medical on-call service ('116117') in acute cases of COVID-19 indicates an adequate navigation within the healthcare system as it is in line with the official national recommendations when symptoms of COVID-19 occur.⁴¹ This pathway of utilisation is correct in terms of the presented case scenarios of a COVID-19 infection and suggests an improved information due to widespread campaigns about COVID-19 symptoms and

Table 5 Intended utilisation of different care facilities in case of COVID-19 (n=604): multivariate analysis (ORs and 95% CIs)

	General practitioner/Paediatrician		Medical on-call service ('116117')		Emergency medicine*	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
<i>Vignettes</i>						
Sex (male)	1		1		1	
Sex (female)	1.44 (0.99 to 2.07)	0.052	0.52 (0.33 to 0.82)	0.005	0.84 (0.50 to 1.43)	0.525
Age (child)	1		1		1	
Age (middle aged)	1.43 (0.92 to 2.23)	0.111	0.89 (0.52 to 1.52)	0.672	0.49 (0.25 to 0.95)	0.033
Age (older)	1.14 (0.73 to 1.78)	0.564	1.07 (0.62 to 1.84)	0.814	0.73 (0.39 to 1.35)	0.318
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.38 (0.27 to 0.55)	<0.001	3.92 (2.46 to 6.25)	<0.001	1.00 (0.59 to 1.68)	0.993
<i>Respondents</i>						
Sex (male)	1		1		1	
Sex (female)	1.68 (1.17 to 2.41)	0.005	0.70 (0.45 to 1.08)	0.106	0.56 (0.33 to 0.95)	0.033
Age (18–40 years)	1		1		1	
Age (41–60 years)	0.74 (0.48 to 1.14)	0.174	0.70 (0.42 to 1.17)	0.176	3.93 (1.93 to 8.00)	<0.001
Age (61 years and older)	0.87 (0.52 to 1.46)	0.600	0.50 (0.26 to 0.96)	0.039	3.22 (1.46 to 7.10)	0.004
Education (≤9 years)	1		1		1	
Education (10 years)	0.88 (0.53 to 1.49)	0.642	1.22 (0.62 to 2.41)	0.563	1.14 (0.59 to 2.23)	0.698
Education (≥12 years)	0.89 (0.56 to 1.40)	0.607	1.65 (0.92 to 2.97)	0.093	0.58 (0.30 to 1.10)	0.099
No migrant background	1		1		1	
Migrant background (second generation)	0.70 (0.38 to 1.29)	0.254	0.76 (0.34 to 1.73)	0.514	0.35 (0.92 to 1.30)	0.116
Migrant background (first generation)	1.44 (0.83 to 2.51)	0.198	0.76 (0.39 to 1.46)	0.405	0.73 (0.32 to 1.65)	0.444
Own children (no)	1		1		1	
Own children (yes)	0.79 (0.53 to 1.12)	0.242	1.42 (0.88 to 2.33)	0.160	0.91 (0.52 to 1.59)	0.728
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	1.42 (0.93 to 2.17)	0.110	0.36 (0.20 to 0.65)	0.001	1.08 (0.60 to 1.96)	0.801

*Accident and emergency department/emergency practice/rescue service.

†Statistically significant values (p<0.05) in bold.

healthcare use. A German study about COVID-19-related health literacy showed that, despite some confusion about COVID-19 information, the vast majority felt well informed.⁶² To differ between adequate or inadequate utilisation in terms of the IGD vignettes is hardly possible as all three healthcare options would be adequate. In this case, hospitalisation could be organised through self-referral, referral by a physician or after consultation with the medical on-call service. Additionally, the daytime plays an important role for symptoms like that. Overall, measurement of adequate utilisation is very diverse and remains difficult.^{7 23 47 63} Thus, interpretations should be done carefully.

Generally, it is still a challenge to work out the reasons behind differences in healthcare utilisation. Different utilisation behaviour could be due to differences in need, to differences in expectations and preferences (eg, individual/cultural preferences or health beliefs), to differences in information (eg, about service availability, navigation in the healthcare system or wrong assumption of costs) or to formal access barriers (eg, charges, waiting

times, travel distances or lost wages when using healthcare during work hours).⁶⁴ To figure out the reasons behind the patient's behaviour is highly relevant for implications in terms of possible interventions. The results suggest differences in information (eg, about the medical-on-call-service or further options), preferences (eg, directly visiting ED on own initiative or expecting higher expertise in ED) and perceived need due to sociodemographic characteristics. It is likely that the campaigns regarding healthcare seeking during the COVID-19 pandemic had an impact on utilisation behaviour in our study. The use of the medical on-call service and primary care provider in case of symptoms of a COVID-19 infection conforms to the official recommendations. However, among people with lower education and with a migration background, information about healthcare options needs to be more disseminated. In Germany, the ongoing establishment of out-of-hours primary care centres ('Portalpraxen') located at hospitals aims at improving coordination between emergency and urgent care, and at improving availability of urgent primary care.⁶⁵ In further European

countries, similar approaches of out-of-hours services, walk-in and primary care centres are established.⁶⁵ Moreover, there is a challenge to tackle the unmet needs of patients with severe diseases which increased since the beginning of the pandemic. Suggestions include a division of the ED into respiratory and non-respiratory section and targeted messaging.¹⁷

Limitations

First, a response rate of about 44% can be considered as adequate, however, a potential selection bias due to non-response and due to only using landline numbers cannot be ruled out. Nevertheless, the comparison of our weighted data with official statistics of the population in Hamburg regarding some sociodemographic variables (sex, age, education) supports the external validity as significant differences between our data and official statistics did not exist. Second, despite various strengths of a vignette design (comparability between symptoms and urgency, standardised stimulus), the vignettes are an artificial stimulus that necessarily introduce symptoms in a brief form potentially neglecting the complexity of some diseases. The extensive involvement of various experts in the development of the case vignettes aimed to minimise these limits. The development of the COVID-19 vignette was based on the state of research in summer 2020. The evidence about COVID-19 morbidity among different age groups is subject to change over time. Additionally, the comparability between the age groups of IGD was limited as three different diseases were introduced. Third, no observed or reported behaviour was analysed, but exclusively intended utilisation. Fourth, our data are supposed to be representative for a metropolis in Germany, the healthcare situation and behaviour could be different in more rural regions which are not represented in this study.

CONCLUSIONS

To our knowledge, this is one of the first studies that analyse intended healthcare utilisation among the German general population using case vignettes of severe symptoms. It could be shown that different characteristics of vignettes and characteristics of the respondents lead to different healthcare utilisation, although urgency is equal in the presented vignettes. These variations in intended healthcare use suggest a potential need for interventions. Even though the respondents mostly followed the official recommendations in case of COVID-19, the communication of healthcare alternatives has to be improved, and clear pathways to facilitate healthcare utilisation should be further developed.

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made an essential contribution to drafting the manuscript and interpreting the data. SK, AS and IS critically revised and approved the final manuscript.

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Supplement 1 Case vignettes

Symptoms: COVID-19
<p>Age group: children</p> <p><i>It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Paula S./Lukas P., 12 years old, schoolgirl/schoolboy,</i></p> <p>...has had a headache for three days. She has developed a dry cough since yesterday. She feels tired and lacks the drive to do something which is unusual for the girl). She did not go to school today. Her mother took her temperature, it is 38.7 °C. Additionally, since today, Paula has trouble breathing when climbing stairs. Her parents are very worried because this has never happened before.</p>
<p>Age group: adults, middle-aged</p> <p><i>It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Melanie P./Stefan D., 49 years, administration officer,</i></p> <p>...has had a headache for three days. She has developed a dry cough since yesterday. She feels tired and lacks the drive to do something which is unusual for her. She did not go to work today. Mrs. P.'s temperature is at 38.7 °C today. Additionally, since today, she has trouble breathing when climbing stairs. She is very worried because this has never happened before.</p>
<p>Age group: adults, older</p> <p><i>It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Hildegard S./ Helmut K., 72 years, retired,</i></p> <p>...has had a headache for three days. She has developed a dry cough since yesterday. She feels tired and lacks the drive to do something which is unusual for her. Mrs. S.'s temperature is at 38.7 °C today. Additionally, since today, she has trouble breathing when climbing stairs. Seeing that her heart and lungs are actually in good condition, this worries her very much.</p>

Symptoms: Inflammatory gastrointestinal diseases
<p>Age group: children (appendicitis)</p> <p><i>It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Paula S./Lukas P., 12 years old, schoolgirl/schoolboy,</i></p> <p>...complains about a bad tummy ache. The trouble started the evening before with sickness and pain at the center of the stomach. In the morning she had to vomit. Since the evening before the pain has become worse and has moved to the right lower side of the stomach. The otherwise so active girl feels weak, has no appetite and would rather not move at all. Her temperature was 37.4 °C. When Paula's parents tried to palpate her tummy, she screamed of pain. This worries her parents very much.</p>
<p>Age group: adults, middle-aged (cholecystitis)</p> <p><i>It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Melanie P./Stefan D., 49 years, administration officer,</i></p> <p>...has sudden, severe pain in his right upper abdomen which radiates right up to his back and the right shoulder. Besides, she feels sick but so far did not have to vomit. Because of her bad condition she took her temperature: 38.6 °C. Her pain started about two hours ago. Mrs. P. does not know (has not experienced) pain like this. This worries her very much.</p>
<p>Age group: adults, elder (diverticulitis)</p> <p><i>It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Hildegard S./ Helmut K., 72 years, retired,</i></p> <p>...has had pain in the lower left abdomen for three days. For a few weeks she has occasionally suffered from diarrhea, constipation also occurs. She feels less productive than usual and is often tired. Because of her bad condition she took her temperature: 38.5 °C. She noticed a streak of fresh blood on her stool since yesterday. Today the pain has reached a strength she had not experienced before. This very much worries her.</p>