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Intended health care utilisation in cases of severe COVID-19 and inflammatory gastrointestinal disease – results of a population survey with vignettes

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Title:

Intended health care 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 health care utilisation in severe cases of COVID-19 and inflammatory gastrointestinal disease (IGD).

Design: Representative cross-sectional telephone survey.

Setting and participants: 1,207 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 health care utilisation resulting in three different alternatives: general practitioner (GP)/paediatrician, medical on-call service ("116117"), and emergency care (accident & emergency department, emergency practice, rescue service). In multivariate analyses, associations of characteristics of the vignettes and participants (sex, age, education, migration background) with intended health care utilisation were tested.

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. 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 health care utilisation depending on characteristics of the vignettes and respondents. Information about health care alternatives has to be improved among vulnerable groups and clear pathways for adequate health care utilisation has to be further developed.

Strengths and Limitations of this study

- This is one of the first studies that analyse intended health care utilisation among the German general population using case vignettes of severe symptoms (COVID-19 and inflammatory gastrointestinal diseases).
- The vignette design provides a standardised stimulus and comparability between symptoms and urgency.
- The survey was conducted during the second peak of the COVID-19 pandemic and provides information about health care utilisation under extraordinary conditions.
- No observed or reported behaviour was analysed, but intended utilisation.

Introduction

In the past decade, utilization 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 utilization 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 utilization when severe symptoms occur are very rare. Moreover, various studies have shown a tremendous impact of the COVID-19 pandemic on health care utilisation among all age groups [10,11]. A systematic review of 81 studies across 20 countries found out that health care utilisation decreased by about a third during the pandemic in the first six 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 health care utilization 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 health care system, three options are provided when severe symptoms occur [18]: (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 utilize emergency medicine (accident and emergency departments, 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

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3 arranged. The present study is focused on two types of diseases: inflammatory gastrointestinal diseases
4 (IGD) and COVID-19. In terms of a potential COVID-19 infection, the following recommendations are given
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6 in Germany by the Federal Ministry of Health [19]: Affected people should stay at home, reduce contacts to
7
8 a bare minimum and get in touch with a doctor by phone. Outside of surgery opening hours, one can also
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10 call the medical on-call service by dialling the nationwide number 116117 and wait for further instructions.
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12 In case of an emergency, it is recommended to dial “112” for rescue service. Regarding gastrointestinal
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14 diseases, international data show that these symptoms are a prevalent driver of ED visits [20], and
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16 moreover, they are the most common reasons for visiting ED in Germany in 2019 while ED consultations
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18 due to acute upper respiratory tract infections highly increased in 2020 [21].
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24 The well-established Behavioral Model of Health Services Use by Ronald Andersen (6th revision)
25
26 distinguishes between predisposing, enabling and need factors of health care use on individual and
27
28 contextual level [22,23]. It aims to explain disparities in ambulatory and hospital services use by including
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30 various factors in the conceptual model. Major individual predisposing factors are sex, age, education and
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32 ethnicity. Enabling is characterised by income, health insurance status and the organisation of health
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34 services for the individual. Need factors comprise the self-perception and the objective measurement of
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36 health and functional status. Over the years, the health care system was included into the model to give
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38 recognition to the importance of national health policy, the resources and their organisation [23]. Against
39
40 the background of the current organisation of urgent and emergency care services in Germany, the present
41
42 study introduces the individual predisposing factors sex, age, education and ethnicity into the analyses. Self-
43
44 perceived and objective need is represented by the use of vignettes (please see Methods). The evaluated
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46 need is equivalent by introducing the same urgency in every case vignette. In contrast, the perceived need
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48 is varied by changing the patient’s characteristics in the vignettes. A further concern of the study is the
49
50 adequate navigation within the health care system when utilising health services with severe symptoms. In
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52 the conceptual models of health literacy, a major domain is the navigation within the health care system
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3 and the decision making concerning health care in everyday life [24]. Thus, a major recommendation of The
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5 German National Action Plan Health Literacy is to facilitate navigation within the health care system
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7 including emergency medicine [25]. Studies have shown associations between low health literacy and more
8
9 frequent as well as inadequate health care use, including emergency care [26,27]. In addition, predisposing
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11 factors as lower education and a migration background are associated with more frequent or inadequate
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13 emergency care utilization [7,28–30], even though findings are in some cases ambiguous [31,32].

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17 Against this background, three research questions are addressed: (1) How does the intended health care
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19 utilisation in severe cases vary depending on the characteristics of the cases (symptoms (COVID-19 vs.
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21 inflammatory gastrointestinal disease (IGD)), daytime as well as sex and age of the afflicted person)? (2)
22
23 How does the intended health care utilisation in severe cases vary depending on the characteristics of the
24
25 respondents (sex, age, education, migration background, parenthood, personal affection)? (3) Does the
26
27 intended health care utilization follow the official national recommendations for a COVID-19 infection?
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31 32 **Methods**

33 34 *Study design and sample*

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36 Cross-sectional data was assessed via computer assisted telephone interviews (CATI) between November
37
38 2020 and January 2021 in Hamburg, Germany. The sample was randomly drawn using all possible telephone
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40 numbers in Hamburg, including non-registered numbers via random digital dialling [33]. On different
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42 weekdays, repeated calls were made by trained interviewers. The Kish selection grid was used to randomly
43
44 choose the target person in the respected household [34]. To analyse decisions for utilization, 24 different
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46 vignettes (case stories) were used. Based on former research projects [35,36], a number of about n=50
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48 participants per vignette (i.e. total N=1,200) was considered sufficient to identify medium sized differences.
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50 The gross sample included 2,756 randomly selected persons. Of these, 961 (34.9 %) could not be reached
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52 and 588 (21.3 %) refused to participate leading to a total number of 1,207 participants (response rate: 43.8
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57 %). The study was approved by the Local Psychological Ethics Committee at the Center for Psychosocial
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3 Medicine, University Medical Center Hamburg (No. LPEK-0200). Respondents gave their informed consent
4 for the participation and the use of their data. Consents and refusals were documented by the interviewers.
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8 *Vignettes*

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10 Vignettes were used as a stimulus at the beginning of the survey (please see Supplement 1). They were
11 designed in cooperation with primary care physicians, emergency physicians, geriatricians, paediatricians
12 and nursing staff. Two groups of prevalent diseases were selected for the vignettes: COVID-19 and
13 inflammatory gastrointestinal diseases (IGD). Additionally, vignettes were varied according to sex (female,
14 male), age (12 years (child), 49 years (middle-aged person), 72 years (older person)), and daytime (Tuesday,
15 8 a.m.; Tuesday, 8 p.m.) resulting in N=24 vignettes randomly assigned to the respondents. Presented
16 symptoms of both diseases were severe and comparable regarding urgency of treatment. In terms of
17 inflammatory gastrointestinal symptoms, typical and frequent diseases for the different age groups were
18 selected: appendicitis (child), cholecystitis (middle-aged person), and diverticulitis (older person). Inspired
19 by the Manchester-Triage-Score [37], urgency of treatment was indicated by fever or elevated temperature
20 and severe pain in all three gastrointestinal vignettes. A hospitalization (own initiative or referral by a
21 physician) for further diagnostics or treatment is required in all three cases. Symptoms of the COVID-19
22 vignette were based on guidelines and information provided by the Robert Koch Institute [38]. The
23 recommended proceeding when these symptoms occur is described above. All vignettes were audio-
24 recorded by a clearly speaking trained person. The audio files were directly played to the respondents
25 followed by a standardized questionnaire (total interview time: about 15 min.).
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46 *Measures*

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48 In the beginning of the interview, one of the vignettes was presented to the respondents. To assess intended
49 utilization behaviour in the presented case, the respondents were requested to answer following open
50 ended question: "Who would you turn to first for help in the place of Mrs. X. / Mr. X / in the place of the
51 parents of...?" The interviewers were provided with a list of possibilities to facilitate the documentation.
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3 Three major options of intended utilization could be categorised: general practitioner (GP/paediatrician),
4 medical-on call service (“116117”), and emergency medicine facilities (accident and emergency department,
5 emergency practice, rescue service). These three categories were recoded as dummy variables (yes/no).
6
7 Furthermore, the following characteristics of the respondents were introduced: age (age groups: 18- 40, 41-
8 60, ≥ 60 years), sex, education (years of schooling: ≤ 9, 10, ≥ 12), having children (yes/no), and migration
9 background (no/2nd generation/1st generation). A person has a migration background, if he/she or one of
10 his/her parents was born abroad. Respondents with an migration background who were born abroad and
11 migrated to Germany were classified as 1st generation migrants, while German-born descendants of 1st
12 generation migrants were considered as 2nd generation migrants [39]. Finally, respondents were asked
13 whether they ever had been affected by such complaints (yes/no). Sample characteristics are shown in Table
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28 *(Table 1 here)*
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31 The sample was weighted for sex, age and educational level on the basis of official statistics of the
32 population in Hamburg in 2020 [40,41]. Chi²-tests have shown an effective weighting indicating no
33 significant differences between the study sample and the population in Hamburg in terms of sex, age and
34 education.
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40 *Analyses*

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43 Bivariate analyses of intended utilisation of the different care facilities were calculated using crosstabs
44 including Person’s Chi²-test. For multivariate analyses, binary logistic regressions were conducted.
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47 Dependent variables were the three options of utilization: (1) GP/paediatrician, (2) medical on-call service,
48 (3) emergency medicine (accident & emergency department, emergency practice, rescue service). As
49 predictor variables, characteristics of the vignettes (disease, sex, age, and daytime) and of the respondents
50 (sex, age, education, migration status, children, and personal affliction) were entered simultaneously into
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3 the models. Analyses were carried out using the Statistical Package for the Social Sciences SPSS 26 [42] and
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5 the R statistical package [43].
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8 **Results**

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10 Bivariate analyses are shown in Table 2. In terms of characteristics of the vignettes, there were significant
11
12 differences ($p < 0.05$) in intended utilization according to sex and symptoms. Respondents to whom a COVID-
13
14 19 vignette was presented more frequently have chosen the GP/paediatrician or medical on-call service
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16 than emergency medicine as first option for medical support. Regarding characteristics of the respondents,
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18 significant differences emerged for sex, age, education, migration background, and personal affection.
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22 *(Table 2 here)*
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25 Results of the multivariate regression analysis show that the GP/paediatrician was chosen significantly more
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27 often when the afflicted person in the vignette was female, middle aged or older, and had been affected by
28
29 COVID-19 symptoms (Table 3). There was a more than 2-fold likelihood of choosing the GP/paediatrician
30
31 when COVID-19 was presented in the vignette (OR: 2.15, CI: 1.67-2.77). Moreover, this option was less
32
33 favoured when symptoms occurred in the evening. In contrast, the option of medical on-call service was
34
35 more prevalent in male case vignettes and when the symptoms occurred in the evening. Similar to
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37 GP/paediatrician, the medical on-call service was chosen more often when the COVID-19 vignette was
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39 presented (OR: 2.88, CI: 2.01-4.18). Emergency medicine (accident and emergency department/emergency
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41 practice/rescue service) was more often mentioned when children were affected, when symptoms were
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43 gastrointestinal, and occurred in the evening. Regarding respondents' characteristics, women favoured the
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45 GP/paediatrician while men rather preferred emergency medicine. Furthermore, higher educated persons
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47 favoured the medical on-call service compared to the lowest status group (OR 2.15, CI 1.34-3.52). People
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49 with migration background (especially 2nd generation) less often chose medical on-call service and
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51 emergency medicine than non-migrants.
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3 *(Table 3 here)*
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6 **Discussion**

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8 In this study, the intended utilisation of different care facilities in a German metropolis was examined using
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10 varied case vignettes of severe COVID-19 and inflammatory gastrointestinal diseases (IGD). The results show
11
12 that both, the characteristics of the vignettes and the characteristics of the respondents are associated with
13
14 the intended utilisation. In terms of the vignettes' characteristics, the intended utilisation of
15
16 GP/paediatrician is associated with female sex, higher age, daytime (morning) and COVID-19 symptoms, the
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18 medical on-call service with male sex, daytime (evening) and COVID-19 symptoms, and the emergency
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20 medicine with young age, daytime (evening) and gastrointestinal symptoms. Regarding the respondents'
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22 characteristics, women chose more often the GP/paediatrician, men preferred emergency medicine. Higher
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24 educated persons more often chose the medical on-call service while people with a migration background
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26 decided less often for medical on-call service and emergency medicine. Thus, although case stories were
27
28 similar regarding urgency of treatment, results suggest variations of intended health care utilisation
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30 according to characteristics of the afflicted person and the respondents.
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36 Symptoms of COVID-19 were correctly identified by 64% of the 599 respondents to whom the respective
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38 vignette was presented (a correct answer was given when "COVID" or "Corona" was mentioned, data not
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40 shown in detail). This suggests an improved information due to widespread campaigns about COVID-19
41
42 symptoms. A German study about coronavirus-related health literacy showed that, despite some confusion
43
44 about coronavirus information, the vast majority felt well informed [44]. In terms of a correct navigation
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46 within the health care system, more than 80% of the respondents follow the official national
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48 recommendations when symptoms of a COVID-19 infection occur by choosing the contact to an
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50 GP/paediatrician (ideally via telephone) or to the medical on-call service ("116117"). Although emergency
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52 care was more often chosen when symptoms of an IGD were presented, the first choice for the majority of
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3 the respondents also in this case was the GP/paediatrician potentially suggesting a reservation to
4 immediately visit the ED.
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8 Generally, comparisons with previous literature are difficult as there are only few studies that analysed the
9 intended utilization among the general population using case vignettes. A German study with data from
10 2018 and a similar vignette design found out that 50% of the respondents knew the medical on-call service.
11
12 When explicitly asked for, 75% knew the service, but only 18% the correct number [45]. Further Data from
13 2015 to 2016 has shown similar results or even more lack of knowledge about the health care supply
14 including the medical on-call service [7,46,47]. In the present study, nearly 75% of the participants knew the
15 medical on-call service (data not shown). It can be assumed that the degree of popularity of this service
16 increased due to the pandemic and the connected campaigns regarding health care seeking. The result that
17 emergency care is more often preferred when a child was affected is supported by findings that the
18 perception of urgency is increased in case of ill children, and parents prefer to visit ED before contacting the
19 primary care provider [48,49]. The significant preference of medical on-call service and emergency care in
20 the evening is obvious due to restricted opening hours of practices. In the present study, a female vignette
21 lead to significantly more GP/paediatrician consultations and less on-call service utilization. A recent study
22 has shown that female patients' pain was more often underestimated compared with male patients' pain
23 [50]. Also, further treatment was differently estimated, as the respondents in the study believed that female
24 patients would more likely benefit from psychotherapy and male patients more likely from pain medicine.
25
26 There is no clear reference why female respondents more often chose the GP/paediatrician. Even though
27 women more often utilise health care in general, there is no evidence that female patients more often visit
28 the GP than men in Germany [51,52]. Actually, a recent study found a higher commitment to use the GP
29 among men [53]. A better knowledge about the comparatively new nationwide medical on-call service
30 ("116117") among higher educated people could be due to a generally better health literacy among higher
31 SES groups [54,55]. However, a significantly higher use of emergency medicine among lower educated
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3 people is not shown [30]. The evidence in the literature about ED use among migrants is ambiguous
4 [7,28,31]. Our findings do not indicate that people with migration background more frequently tend to use
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6 the ED.
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10 Following Andersen's Behavioural Modell of Health Care Use [22], the findings indicate associations of
11 predisposing factors and perceived need with the choice of health service. Sex, age, education and migration
12 background are significantly related to individual health care utilisation. Moreover, the perception of need
13 varies depending on the different characteristics that are presented in the vignettes, even though urgency
14 is the same. However, it is still a challenge to figure out the reasons behind differences in health care
15 utilisation. Different utilisation behaviour could be due to differences in need, to differences in expectations
16 and preferences (e.g. individual/cultural preferences or health beliefs), to differences in information (e.g.
17 about service availability, navigation in the health care system, or wrong assumption of costs), or to formal
18 access barriers (e.g. charges, waiting times, travel distances, or lost wages when using health care during
19 work hours) [56]. To figure out the reasons behind the patient's behaviour is highly relevant for implications
20 in terms of possible interventions. The results suggest differences in information (e.g. about the medical-
21 on-call-service or further options), preferences (e.g. directly visiting ED on own initiative or expecting higher
22 expertise in ED) and perceived need due to sociodemographic characteristics.
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41 It is likely that the campaigns regarding health care seeking during the COVID-19 pandemic had an impact
42 on utilisation behaviour in our study. The use of the medical on-call service and primary care provider in
43 case of symptoms of a COVID-19 infection conforms to the official recommendations. However, among
44 people with lower education and with a migration background, information about health care options as
45 the medical on-call service need to be more disseminated. On the other hand, there is a challenge to tackle
46 the unmet needs of patients with severe diseases which increased since the beginning of the pandemic.
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3 [17], a prior proposal before pandemic introduced a 7-day opening of GP practices for a better regulation
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5 of health care utilisation [57].
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8 **Limitations**

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10 First, a response rate of about 44% can be considered as adequate, however, a potential selection bias due
11
12 to nonresponse cannot be ruled out. Nevertheless, the comparison of our weighted data with official
13
14 statistics regarding some sociodemographic variables supports the external validity. Second, despite various
15
16 strengths of a vignette design (comparability between symptoms and urgency, standardised stimulus), the
17
18 vignettes are an artificial stimulus that necessarily introduce symptoms in a brief form potentially neglecting
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20 the complexity of some diseases. The extensive involvement of various experts in the development of the
21
22 case vignettes aimed to minimize these limits. Third, no observed or reported behaviour was analysed, but
23
24 exclusively intended utilisation. Fourth, our data is supposed to be representative for a metropolis in
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26 Germany, the health care situation and behaviour could be different in more rural regions which are not
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28 represented in this study.
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32 **Conclusions**

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34 To our knowledge, this is one of the first studies that analyse intended health care utilisation among the
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36 German general population using case vignettes of severe symptoms. It could be shown that different
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38 characteristics of vignettes and characteristics of the respondents lead to different health care utilisation,
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40 although urgency is equal in the presented vignettes. These variations in intended health care use suggest
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42 a potential need for interventions. Still, the communication of health care alternatives has to be improved
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44 among vulnerable subgroups, and clear pathways for adequate health care utilisation has to be further
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46 developed.
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50 **Acknowledgement**

51
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53
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Author contributions

OK, JK, AS and IS designed the study including questionnaire and vignettes. JK drafted the manuscript, and analysed and interpreted the data. AS essentially developed the vignettes. OK led the project and made an essential contribution to drafting the manuscript and interpreting the data. SK, AS and IS critically revised and approved the final manuscript.

Ethical approval

Local Psychological Ethics Committee at the Center for Psychosocial Medicine, University Medical Center Hamburg (No. LPEK-0200).

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Competing interests

There are no competing interests.

Table 1 Sample characteristics (N=1,207)*: n (%)

Sex (<i>1</i>)		
female	621	(51.5)
male	585	(48.5)
Age (years) (<i>1</i>)		
18 – 40	455	(37.8)
41 – 60	419	(34.7)
≥ 60	332	(27.5)
Education (years) (<i>43</i>)		
≤ 9	316	(27.1)
10	275	(23.6)
≥ 12	574	(49.3)
Migration background (<i>22</i>)		
no	915	(77.3)
2 nd generation	129	(10.9)
1 st generation	141	(11.7)
Children (<i>18</i>)		
yes	546	(45.9)
no	643	(54.1)
Personally affected by such complaints (<i>4</i>)		
yes	238	(19.7)
no	965	(80.0)
Intended utilisation (<i>1</i>)		
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

Table 2 Intended utilisation of different care facilities according to characteristics of the vignettes and the respondents (N=1,207): 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‡	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	0.058	0.317	0.002
Time	Tuesday morning	65.7	7.4	22.2
	Tuesday evening	41.8	22.5	30.0
	p	<0.001	<0.001	0.002
Symptoms	Gastrointestinal	44.9	9.5	39.4
	COVID-19	62.3	20.7	12.7
	p	<0.001	<0.001	<0.001
Respondents				
Sex	Male	49.9	16.6	29.1
	Female	56.8	13.7	23.5
	p	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	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	0.280	0.001	0.002
Migration background	No	52.0	16.8	28.5
	2 nd Generation	59.4	7.8	14.8
	1 st Generation	57.4	12.8	22.7
	p	0.172	0.020	0.003
Own children	No	53.5	14.3	26.6
	Yes	54.1	15.4	25.7
	p	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	0.025	0.106	0.028

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3 *the percentages do not sum to 100 due to missing data

4 †accident and emergency department/emergency practice/rescue service

5 ‡Pearson's Chi-square (statistically significant values ($p < 0.05$) in bold)

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Table 3 Intended utilisation of different care facilities (N= 1,170): Multivariate analysis (Odds Ratios and 95% confidence intervals)

	General practitioner/ paediatrician		Medical on-call service ("116117")		Emergency medicine*	
	OR (95% CI)**	p	OR (95% CI)	p	OR (95% CI)	p
Vignettes						
Sex (male)	1		1		1	
Sex (female)	1.34 (1.04-1.72)	0.024	0.48 (0.34-0.68)	<0.001	1.16 (0.86-1.56)	0.328
Age (child)	1		1		1	
Age (middle aged)	1.37 (1.01-1.86)	0.045	0.94 (0.62-1.44)	0.786	0.60 (0.42-0.85)	0.004
Age (older)	1.47 (1.08-2.02)	0.016	1.19 (0.78-1.83)	0.415	0.47 (0.33-0.69)	<0.001
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.35 (0.27-0.44)	<0.001	3.65 (2.53-5.34)	<0.001	1.61 (1.20-2.16)	0.002
Symptoms (gastrointestinal)	1		1		1	
Symptoms (COVID-19)	2.15 (1.67-2.77)	<0.001	2.88 (2.01-4.18)	<0.001	0.20 (0.15-0.28)	<0.001
Respondents						
Sex (male)	1		1		1	
Sex (female)	1.46 (1.13-1.88)	0.003	0.83 (0.59-1.17)	0.279	0.70 (0.52-0.95)	0.022
Age (18-40)	1		1		1	
Age (41 – 60)	0.71 (0.52-0.96)	0.026	0.81 (0.53-1.21)	0.297	1.85 (1.29-2.65)	<0.001
Age (> 60)	0.87 (0.61-1.24)	0.446	0.73 (0.44-1.20)	0.220	1.34 (0.87-2.05)	0.178
Education (≤9)	1		1		1	
Education (10 Years)	0.70 (0.49-0.99)	0.047	1.75 (1.02-3.01)	0.043	1.54 (1.02-2.32)	0.040
Education (≥ 12 Years)	0.80 (0.58-1.10)	0.180	2.15 (1.34-3.52)	0.002	0.84 (0.58-1.21)	0.384
No migration background	1		1		1	
Migration background (2 nd generation)	1.29 (0.87-1.95)	0.212	0.49 (0.23-0.93)	0.042	0.38 (0.21-0.65)	<0.001
Migration background (1 st generation)	1.31 (0.89-1.93)	0.167	0.64 (0.36-1.09)	0.114	0.70 (0.43-1.12)	0.128
Own children (no)	1		1		1	
Own children (yes)	0.84 (0.64-1.11)	0.227	1.15 (0.78-1.69)	0.480	1.09 (0.78-1.51)	0.626
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	1.15 (0.83-1.58)	0.401	0.63 (0.39-1.00)	0.051	0.89 (0.60-1.31)	0.581
R ² (Nagelkerke)	0.155		0.182		0.222	

*accident and emergency department/emergency practice/rescue service

**OR=odds ratio; CI=confidence interval (statistically significant values (p<0.05) in bold

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Supplement 1 Case vignettes

Symptoms: COVID-19**Age group: children**

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Paula S./Lukas P., 12 years old, schoolgirl/schoolboy,

...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.

Age group: adults, middle-aged

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Melanie P./Stefan D., 49 years, administration officer,

...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.

Age group: adults, older

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Hildegard S./Helmut K., 72 years, retired,

...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.

Symptoms: Inflammatory gastrointestinal diseases**Age group: children (appendicitis)**

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Paula S./Lukas P., 12 years old, schoolgirl/schoolboy,

...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.

Age group: adults, middle-aged (cholecystitis)

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Melanie P./Stefan D., 49 years, administration officer,

...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.

Age group: adults, elder (diverticulitis)

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Hildegard S./Helmut K., 72 years, retired,

...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.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	5-6
Methods			
Study design	4	Present key elements of study design early in the paper	6-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	6-7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-9
Bias	9	Describe any efforts to address potential sources of bias	8
Study size	10	Explain how the study size was arrived at	6-7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	8-9
		(b) Describe any methods used to examine subgroups and interactions	8-9
		(c) Explain how missing data were addressed	Table 1-3
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	NA
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6-7; Tables 1-3
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Table 1
		(b) Indicate number of participants with missing data for each variable of interest	Table 1
Outcome data	15*	Report numbers of outcome events or summary measures	Table 2-3
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Table 3; 5, 7-9
		(b) Report category boundaries when continuous variables were categorized	8
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	14

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Intended health care utilisation in cases of severe COVID-19 and inflammatory gastrointestinal disease – results of a population survey with vignettes

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Secondary Subject Heading:	Communication, Emergency medicine, General practice / Family practice, Sociology
Keywords:	HEALTH SERVICES ADMINISTRATION & MANAGEMENT, ACCIDENT & EMERGENCY MEDICINE, COVID-19, PRIMARY CARE, PUBLIC HEALTH, SOCIAL MEDICINE

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Title:

Intended health care 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 health care utilisation in severe cases of COVID-19 and inflammatory gastrointestinal disease (IGD).

Design: Representative cross-sectional telephone survey.

Setting and participants: 1,207 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 health care utilisation resulting in three different alternatives: general practitioner (GP)/paediatrician, medical on-call service ("116117"), and emergency care (accident & emergency department, emergency practice, rescue service). In multivariate analyses, associations of characteristics of the vignettes and participants (sex, age, education, migration background) with intended health care 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 health care utilisation depending on various characteristics of the vignettes and respondents. Depending on the type of disease inequalities vary. Overall, information about health care alternatives in severe cases has to be improved and clear pathways to facilitate health care utilisation has to be further developed.

Strengths and Limitations of this study

- This is one of the first studies that analyse intended health care utilisation among the German general population using case vignettes of severe symptoms (COVID-19 and inflammatory gastrointestinal diseases).
- The vignette design provides a standardised stimulus and comparability between symptoms and urgency.
- The survey was conducted during the second peak of the COVID-19 pandemic and provides information about health care utilisation under extraordinary conditions.
- No observed or reported behaviour was analysed, but intended utilisation.

Introduction

In the past decade, utilization 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 utilization 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 utilization when severe symptoms occur are very rare. Moreover, various studies have shown a tremendous impact of the COVID-19 pandemic on health care utilisation among all age groups [10,11]. A systematic review of 81 studies across 20 countries found out that health care utilisation decreased by about a third during the pandemic in the first six 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 health care utilization 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 health care system, three options are provided when severe symptoms occur [18]: (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 utilize emergency medicine (accident and emergency departments, 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

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3 arranged. The present study is focused on two types of diseases: inflammatory gastrointestinal diseases
4 (IGD) and COVID-19. While COVID-19 symptoms are currently a major reason for help-seeking in case of
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6 acute health problems, symptoms of gastrointestinal diseases are generally a prevalent driver of ED visits in
7
8 various countries including Germany [19,20].
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12 The well-established Behavioral Model of Health Services Use by Ronald Andersen distinguishes between
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14 predisposing, enabling and need factors of health care use on individual and contextual level [21,22]. It aims
15
16 to explain disparities in ambulatory and hospital services use by including various factors in the conceptual
17
18 model. Major individual predisposing factors are sex, age, education and ethnicity. Enabling is characterised
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20 by income, health insurance status and the organisation of health services for the individual. Need factors
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22 comprise the self-perception and the objective measurement of health and functional status. Over the
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24 years, the health care system was included into the model to give recognition to the importance of national
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26 health policy, the resources and their organisation [22]. Against the background of the current organisation
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28 of urgent and emergency care services in Germany, the present study introduces the individual predisposing
29
30 factors sex, age, education, migration background and having children into the analyses of utilisation.
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32 Predisposing factors as lower education and a migration background are often associated with more
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34 frequent or inadequate pre-hospital and hospital emergency care utilization in Germany and further
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36 European countries [7,23–26], although some current findings for Germany did not confirm these
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38 inequalities [27–29]. Moreover, higher age predicts increased ED use while sex does not seem to play a
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40 significant role [7,24,27,28]. Furthermore, the navigation within the health care system and the decision
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42 making concerning health care in everyday life is a major domain in the conceptual models of health literacy
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44 [30]. Thus, a major recommendation of The German National Action Plan Health Literacy is to facilitate
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46 navigation within the health care system including emergency medicine [31]. Studies have shown
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48 associations between low health literacy and more frequent as well as inadequate health care use, including
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50 emergency care [32–34].
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3 Against this background, three research questions are addressed: (1) How does the intended health care
4 utilisation in severe cases vary depending on predisposing factors (sex and age of the afflicted person), on
5 symptoms (COVID-19 vs. inflammatory gastrointestinal disease (IGD)) and daytime (Tuesday, 8 a.m.;
6 Tuesday, 8 p.m.) of the vignettes? (2) How does the intended health care utilisation in severe cases vary
7 depending on predisposing factors of the respondents (sex, age, education, migration background, having
8 children)? (3) What differences occur when analysing the intended utilisation separately for symptoms of
9 IGD and COVID-19?
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20 **Methods**

21 *Study design and sample*

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23 Cross-sectional data was assessed via computer assisted telephone interviews (CATI) between November
24 2020 and January 2021 in Hamburg, Germany. The sample was randomly drawn using all possible telephone
25 numbers in Hamburg, including non-registered numbers via random digital dialling [35]. Only landline
26 numbers could be included as mobile telephone numbers are not provided on regional level. Participants
27 were eligible when their age was ≥ 18 years, they were German-speaking and the place of residence was
28 Hamburg. On different weekdays, repeated calls were made by trained interviewers. The Kish selection grid
29 was used to randomly choose the target person in the respected household [36]. In this method, the
30 interviewer collected the age and gender of every household member that was eligible for the survey and
31 then randomly selected one person from that list. To analyse decisions for utilization, 24 different vignettes
32 (case stories) were used. Based on former research projects [37,38], a number of about $n=50$ participants
33 per vignette (i.e. total $N=1,200$) was considered sufficient to identify medium sized differences. The net
34 sample included 2,756 randomly selected persons. Of these, 961 (34.9 %) could not be reached and 588
35 (21.3 %) refused to participate leading to a total number of 1,207 participants (response rate: 43.8 %). The
36 study was approved by the Local Psychological Ethics Committee at the Center for Psychosocial Medicine,
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3 University Medical Center Hamburg (No. LPEK-0200). Respondents gave their informed consent for the
4 participation and the use of their data. Consents and refusals were documented by the interviewers.
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7 8 *Vignettes* 9

10 Vignettes were used as a stimulus at the beginning of the survey (please see Supplement 1). They were
11 designed in cooperation with primary care physicians, emergency physicians, geriatricians, paediatricians
12 and nursing staff. Two groups of prevalent diseases were selected for the vignettes: COVID-19 and
13 inflammatory gastrointestinal diseases (IGD). Additionally, vignettes were varied according to sex (female,
14 male), age (12 years (child), 49 years (middle-aged person), 72 years (older person)), and daytime (Tuesday,
15 8 a.m.; Tuesday, 8 p.m.) resulting in N=24 vignettes randomly assigned to the respondents. Presented
16 symptoms of both diseases were severe and comparable regarding urgency of treatment. However, it does
17 not imply that the recommended utilisation is the same for both types of diseases. In terms of inflammatory
18 gastrointestinal symptoms, typical and frequent diseases for the different age groups were selected:
19 appendicitis (child), cholecystitis (middle-aged person), and diverticulitis (older person). According to our
20 clinical cooperation partners, this was more realistic than to choose the same disease for all age groups.
21 Inspired by the Manchester-Triage-Score [39], urgency of treatment was indicated by fever or elevated
22 temperature and severe pain in all three gastrointestinal vignettes. A hospitalisation (own initiative or
23 referral by a physician) for further diagnostics or treatment is required in all three cases. Symptoms of the
24 COVID-19 vignette were based on guidelines and information provided by the Robert Koch Institute [40].
25 The recommended proceeding when COVID-19 symptoms occur is given by the Federal Ministry of Health
26 [41]: Affected people should stay at home, reduce contacts to a bare minimum and get in touch with a
27 doctor by phone. Outside of surgery opening hours, one can also call the medical on-call service by dialling
28 the nationwide number 116117 and wait for further instructions. In case of an emergency, it is
29 recommended to dial "112" for rescue service. All vignettes were audio-recorded by a clearly speaking
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3 trained person. The audio files were directly played to the respondents followed by a standardized
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5 questionnaire (total interview time: about 15 min.).
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8 *Measures*

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11 In the beginning of the interview, one of the vignettes was presented to the respondents. To assess intended
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13 utilization behaviour in the presented case, the respondents were requested to answer following open
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15 ended question: “Who would you turn to first for help in the place of Mrs. X. / Mr. X / in the place of the
16
17 parents of...?” The interviewers were provided with a list of possibilities to facilitate the documentation.
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19 Three major options of intended utilization could be categorised after data collection: general practitioner
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21 (GP/paediatrician), medical-on call service (“116117”), and emergency medicine facilities (accident and
22
23 emergency department, emergency practice, rescue service). These three categories were recoded as
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25 dummy variables (yes/no). A residual category (“Other”) sums up further responses (e.g. friends or family
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27 members, watchful waiting, alternative medicine, or pharmacy). Furthermore, the following characteristics
28
29 of the respondents were introduced: age (age groups: 18-40, 41-60, ≥ 60 years), sex, education (years of
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31 schooling: ≤ 9 , 10, ≥ 12), having children (yes/no), and migration background (no/2nd generation/1st
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33 generation). A person has a migration background, if he/she or one of his/her parents was born abroad.
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35 Respondents with a migration background who were born abroad and migrated to Germany were classified
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37 as 1st generation migrants, while German-born descendants of 1st generation migrants were considered as
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39 2nd generation migrants [42]. Finally, respondents were asked whether they ever had been affected by such
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41 complaints (yes/no). The sample was weighted for sex, age and educational level on the basis of official
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43 statistics of the population in Hamburg in 2020 [43,44]. Chi²-tests have shown an effective weighting
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45 indicating no significant differences between the study sample and the population in Hamburg in terms of
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47 sex, age and education.
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53 *Analyses*

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3 Bivariate analyses of intended utilisation of the different care facilities were calculated using crosstabs
4 including Pearson's Chi²-test. For multivariate analyses, binary logistic regressions were conducted.
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6 Dependent variables were the three options of utilization: (1) GP/paediatrician, (2) medical on-call service,
7
8 (3) emergency medicine (accident & emergency department, emergency practice, rescue service). As
9
10 predictor variables, characteristics of the vignettes (disease, sex, age, and daytime) and of the respondents
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12 (sex, age, education, migration status, children, and personal affliction) were entered simultaneously into
13
14 the models, so that all variables are adjusted for each other. In a further step, the multivariate analyses
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16 were conducted separately for the case scenarios of IGD and COVID-19. Analyses were carried out using the
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18 Statistical Package for the Social Sciences SPSS 26 [45] and the R statistical package [46].
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24 *Patient and Public Involvement*

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26 Patients and public were not involved.
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30 **Results**

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32 Sample characteristics are shown in Table 1. The sample consisted of 52% female respondents whilst nearly
33
34 half of the participants had a higher educational level (≥ 12 years of schooling) and 23% a migration
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36 background (1st and 2nd generation). In terms of the intended utilisation, more than half of the respondents
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38 (54%) would choose the general practitioner or paediatrician as first contact after vignette presentation.
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40 The medical on-call service ("116117") was preferred by 18% and emergency care (accident and emergency
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42 department/emergency practice/rescue service) mentioned 26% (other options like friends and family,
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44 pharmacy or alternative medicine: 5%).
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49 *(Table 1 here)*

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52 Bivariate analyses are shown in Table 2. In terms of characteristics of the vignettes, there were significant
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54 differences ($p < 0.05$) in intended utilization according to sex and symptoms. Respondents to whom a COVID-
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56 19 vignette was presented more frequently have chosen the GP/paediatrician or medical on-call service
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3 than emergency medicine as first option for medical support. Regarding characteristics of the respondents,
4
5 significant differences emerged for sex, age, education, migration background, and personal affection.
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8 *(Table 2 here)*
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11 Results of the multivariate regression analysis show that the GP/paediatrician was chosen significantly more
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13 often when the afflicted person in the vignette was female, middle aged or older, and had been affected by
14
15 COVID-19 symptoms (Table 3). There was a more than 2-fold likelihood of choosing the GP/paediatrician
16
17 when COVID-19 was presented in the vignette (OR: 2.15, CI: 1.67-2.77). Moreover, this option was less
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19 favoured when symptoms occurred in the evening. In contrast, the option of medical on-call service was
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21 more prevalent in male case vignettes and when the symptoms occurred in the evening. Similar to
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23 GP/paediatrician, the medical on-call service was chosen more often when the COVID-19 vignette was
24
25 presented (OR: 2.88, CI: 2.01-4.18). Emergency medicine (accident and emergency department/emergency
26
27 practice/rescue service) was mentioned more often when children were affected, when symptoms were
28
29 gastrointestinal, and occurred in the evening. Regarding respondents' characteristics, women favoured the
30
31 GP/paediatrician while men rather preferred emergency medicine. Furthermore, higher educated persons
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33 favoured the medical on-call service compared to the lowest status group (OR: 2.15, CI: 1.34-3.52). People
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35 with migration background (especially 2nd generation) less often chose medical on-call service and
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37 emergency medicine than non-migrants.
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43 *(Table 3 here)*
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46 When examining intended utilisation separately for IGD and COVID-19 cases, further important differences
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48 emerged (Table 4 and Table 5). In terms of vignettes' characteristics, even in the evening, emergency
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50 medicine was not chosen more often than in the morning when the COVID-19 vignette was presented (OR:
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52 1.00, CI: 0.59-1.68). Regarding the respondents' characteristics, predisposing factors showed considerable
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54 differences in some cases. Particularly, there was a significant social gradient in the association between the
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3 on-call service use and educational level in case of IGD. Elevated Odds Ratios were found for higher educated
4 groups (OR: 3.85, CI: 1.39-11.10 to OR: 4.65, CI: 1.68-12.85). This social gradient does not exist regarding
5 COVID-19. Moreover, higher age groups much more often preferred emergency medicine when COVID-19
6 symptoms occur, while age does not matter for IGD. Finally, only in case of IGD, the migration background
7 (2nd generation) indicated significant differences favouring the GP/paediatrician and less on-call service and
8 emergency care.
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17 *(Table 4 and Table 5 here)*
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19 20 **Discussion**

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22 In this study, the intended utilisation of different care facilities in a German metropolis was examined using
23 varied case vignettes of severe COVID-19 and inflammatory gastrointestinal diseases (IGD). Following
24 Andersen's Behavioral Model of Health Services Use, the study analysed different predisposing factors (sex,
25 age, education, migration background) for the utilisation of GP/paediatrician, medical on-call service
26 ("116117"), and emergency care (accident and emergency department, emergency practice, rescue service).
27 Moreover, daytime and symptoms were additionally included as predictors into the model. First of all, the
28 majority of the respondents chose the GP/paediatrician as first option to get help. Furthermore, multivariate
29 results show that both, the characteristics of the vignettes and the characteristics of the respondents are
30 associated with the intended utilisation. In terms of the vignettes' characteristics, the intended utilisation
31 of GP/paediatrician is associated with female sex, higher age, daytime (morning) and COVID-19 symptoms,
32 the medical on-call service with male sex, daytime (evening) and COVID-19 symptoms, and the emergency
33 medicine with young age, daytime (evening) and gastrointestinal symptoms. Regarding the respondents'
34 characteristics, women chose more often the GP/paediatrician, men preferred emergency medicine. Higher
35 educated persons more often chose the medical on-call service while people with a migration background
36 decided less often for medical on-call service and emergency medicine. Thus, although case stories were
37 similar regarding urgency of treatment, results suggest variations of intended health care utilisation
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3 according to various characteristics of the case vignettes and the respondents. Separate analyses for IGD
4 and COVID-19 cases show that the utilisation behaviour differs between the types of diseases. The
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6 associations between daytime and emergency medicine, and education and medical on-call service as well
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8 as associations between respondents' age and emergency medicine were solely significant in case of IGD.
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12 Only a few studies analysed intended utilization among the general population using case vignettes. A
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14 German study with a similar vignette design focused on intended behaviour and judgement of urgency, but
15
16 did not analyse any predisposing factors [47]. Another study with case scenarios conducted in the
17
18 Netherlands, Switzerland and Denmark examined the intended help-seeking behaviour exclusively in terms
19
20 of acute out-of-hours health care [48]. Parents or adults who were lower educated, older, or had a migration
21
22 background were more inclined to contact out-of-hours care, whereas women were less inclined [48]. A
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24 survey among the German general population about its utilisation of pre-hospital emergency care revealed
25
26 a higher use among lower educated persons and migrants [25]. Two more overviews – mostly including
27
28 patient samples – indicated similar findings [24,26]. However, a significantly higher use of emergency
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30 medicine among people with lower education and migrant background is not shown in the present study
31
32 which is supported by some current findings from Germany [27–29]. As in previous studies, a higher age of
33
34 the respondents (particularly in case of IGD) is associated with increased ED use [24]. The results also show
35
36 that female sex predicts lower ED use and a preference for GP/paediatrician. Although women still show a
37
38 different health care utilisation than men and utilise health care more frequently in general [49], there is no
39
40 clear evidence that female patients more often visit the GP in Germany [50–52]. The more frequent choice
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42 of the comparatively new nationwide medical on-call service (“116117”) among higher educated people (in
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44 case of IGD) reflects the evidence about social inequalities in health care use [53,54], and could be due to a
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46 generally better health literacy among higher socioeconomic status groups [55,56]. Overall, the knowledge
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48 about this service increased in the past years [57], and other data from the present study project confirm
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50 the increasing popularity of the medical on-call service [58]. Interestingly, further analyses solely among the
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3 respondents which were presented a COVID-19 case showed no more inequalities between utilisation and
4 educational level as well as migration history, while inequalities increased in case of IGD.
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8 Regarding the case vignettes' characteristics, sex plays another significant role. In this case, it is not about
9 different answers from females or males, but the reaction when a woman or a man is affected in the case
10 story. In the present study, a female vignette leads to significantly more GP/paediatrician consultations and
11 less on-call service. This suggests a less urgent perception when a female is affected, and is supported by
12 findings that symptoms of female patients were more often underestimated compared with males [59]. The
13 result that emergency care is more often preferred when a child was affected is supported by findings that
14 the perception of urgency is increased in case of ill children, and parents prefer to visit ED before contacting
15 the primary care provider [60,61]. The significant preference of medical on-call service and emergency care
16 in the evening is obvious due to restricted opening hours of practices. Concerning the disease-related
17 intended utilisation, significant difference are shown. While the GP/paediatrician and the medical on-call
18 service was significantly more chosen in case of a COVID-19 vignette, emergency facilities were more
19 preferred when an IGD vignette was presented. The respondents' preference of GP/paediatrician and
20 medical on-call service ("116117") in acute cases of COVID-19 indicates an adequate navigation within the
21 health care system as it is in line with the official national recommendations when symptoms of COVID-19
22 occur [41]. This suggests an improved information due to widespread campaigns about COVID-19 symptoms
23 and health care use. A German study about coronavirus-related health literacy showed that, despite some
24 confusion about coronavirus information, the vast majority felt well informed [62]. To differ between
25 adequate or inadequate utilisation in terms of the IGD vignettes is hardly possible as all three health care
26 options would be adequate. In this case, hospitalisation could be organised through self-referral, referral by
27 a physician, or after consultation with the medical on-call service. Additionally, the daytime plays an
28 important role for symptoms like that. Overall, measurement of adequate utilisation is very diverse and
29 remains difficult [7,23,47,63]. Thus, interpretations should be done carefully.
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3 Generally, it is still a challenge to work out the reasons behind differences in health care utilisation. Different
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5 utilisation behaviour could be due to differences in need, to differences in expectations and preferences
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7 (e.g. individual/cultural preferences or health beliefs), to differences in information (e.g. about service
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9 availability, navigation in the health care system, or wrong assumption of costs), or to formal access barriers
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11 (e.g. charges, waiting times, travel distances, or lost wages when using health care during work hours) [64].

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14 To figure out the reasons behind the patient's behaviour is highly relevant for implications in terms of
15
16 possible interventions. The results suggest differences in information (e.g. about the medical-on-call-service
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18 or further options), preferences (e.g. directly visiting ED on own initiative or expecting higher expertise in
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20 ED), and perceived need due to sociodemographic characteristics. It is likely that the campaigns regarding
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22 health care seeking during the COVID-19 pandemic had an impact on utilisation behaviour in our study. The
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24 use of the medical on-call service and primary care provider in case of symptoms of a COVID-19 infection
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26 conforms to the official recommendations. However, among people with lower education and with a
27
28 migration background, information about health care options needs to be more disseminated. In Germany,
29
30 the ongoing establishment of out-of-hours primary care centers ("Portalpraxen") located at hospitals aims
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32 at improving coordination between emergency and urgent care, and at improving availability of urgent
33
34 primary care [65]. In further European countries, similar approaches of out-of-hours services, walk-in and
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36 primary care centers are established [65]. Moreover, there is a challenge to tackle the unmet needs of
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38 patients with severe diseases which increased since the beginning of the pandemic. Suggestions include a
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40 division of the ED into respiratory and non-respiratory section and targeted messaging [17].
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46 **Limitations**

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

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

52
53 OK, JK, AS and IS designed the study including questionnaire and vignettes. JK drafted the manuscript, and
54
55 analysed and interpreted the data. AS essentially developed the vignettes. OK led the project and made an
56
57

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3 essential contribution to drafting the manuscript and interpreting the data. SK, AS and IS critically revised
4
5 and approved the final manuscript.
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7

8 **Ethical approval**

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10 Local Psychological Ethics Committee at the Center for Psychosocial Medicine, University Medical Center
11
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19 **Competing interests**

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21 There are no competing interests.
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Table 1 Sample characteristics (N=1,207)*: n (%)

Sex (<i>1</i>)		
female	621	(51.5)
male	585	(48.5)
Age (years) (<i>1</i>)		
18 – 40	455	(37.8)
41 – 60	419	(34.7)
≥ 60	332	(27.5)
Education (years) (<i>43</i>)		
≤ 9	316	(27.1)
10	275	(23.6)
≥ 12	574	(49.3)
Migration background (<i>22</i>)		
no	915	(77.3)
2 nd generation	129	(10.9)
1 st generation	141	(11.7)
Children (<i>18</i>)		
yes	546	(45.9)
no	643	(54.1)
Personally affected by such complaints (<i>4</i>)		
yes	238	(19.8)
no	965	(80.2)
Intended utilisation (<i>1</i>)		
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

Table 2 Intended utilisation of different care facilities according to characteristics of the vignettes and the respondents (N=1,207): 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‡	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	0.058	0.317	0.002
Time	Tuesday morning	65.7	7.4	22.2
	Tuesday evening	41.8	22.5	30.0
	p	<0.001	<0.001	0.002
Symptoms	Gastrointestinal	44.9	9.5	39.4
	COVID-19	62.3	20.7	12.7
	p	<0.001	<0.001	<0.001
Respondents				
Sex	Male	49.9	16.6	29.1
	Female	56.8	13.7	23.5
	p	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	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	0.280	0.001	0.002
Migration background	No	52.0	16.8	28.5
	2 nd Generation	59.4	7.8	14.8
	1 st Generation	57.4	12.8	22.7
	p	0.172	0.020	0.003
Own children	No	53.5	14.3	26.6
	Yes	54.1	15.4	25.7
	p	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	0.025	0.106	0.028

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3 *the percentages do not sum to 100 due to missing data

4 †accident and emergency department/emergency practice/rescue service

5 ‡Pearson's Chi-square (statistically significant values ($p < 0.05$) in bold)

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Table 3 Intended utilisation of different care facilities (N=1,170): Multivariate analysis (Odds Ratios and 95% confidence intervals)

	General practitioner/ paediatrician		Medical on-call service ("116117")		Emergency medicine*	
	OR (95% CI)**	p	OR (95% CI)	p	OR (95% CI)	p
Vignettes						
Sex (male)	1		1		1	
Sex (female)	1.34 (1.04-1.72)	0.024	0.48 (0.34-0.68)	<0.001	1.16 (0.86-1.56)	0.328
Age (child)	1		1		1	
Age (middle aged)	1.37 (1.01-1.86)	0.045	0.94 (0.62-1.44)	0.786	0.60 (0.42-0.85)	0.004
Age (older)	1.47 (1.08-2.02)	0.016	1.19 (0.78-1.83)	0.415	0.47 (0.33-0.69)	<0.001
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.35 (0.27-0.44)	<0.001	3.65 (2.53-5.34)	<0.001	1.61 (1.20-2.16)	0.002
Symptoms (gastrointestinal)	1		1		1	
Symptoms (COVID-19)	2.15 (1.67-2.77)	<0.001	2.88 (2.01-4.18)	<0.001	0.20 (0.15-0.28)	<0.001
Respondents						
Sex (male)	1		1		1	
Sex (female)	1.46 (1.13-1.88)	0.003	0.83 (0.59-1.17)	0.279	0.70 (0.52-0.95)	0.022
Age (18-40)	1		1		1	
Age (41 – 60)	0.71 (0.52-0.96)	0.026	0.81 (0.53-1.21)	0.297	1.85 (1.29-2.65)	<0.001
Age (> 60)	0.87 (0.61-1.24)	0.446	0.73 (0.44-1.20)	0.220	1.34 (0.87-2.05)	0.178
Education (≤9)	1		1		1	
Education (10 Years)	0.70 (0.49-0.99)	0.047	1.75 (1.02-3.01)	0.043	1.54 (1.02-2.32)	0.040
Education (≥ 12 Years)	0.80 (0.58-1.10)	0.180	2.15 (1.34-3.52)	0.002	0.84 (0.58-1.21)	0.384
No migration background	1		1		1	
Migration background (2 nd generation)	1.29 (0.87-1.95)	0.212	0.49 (0.23-0.93)	0.042	0.38 (0.21-0.65)	<0.001
Migration background (1 st generation)	1.31 (0.89-1.93)	0.167	0.64 (0.36-1.09)	0.114	0.70 (0.43-1.11)	0.128
Own children (no)	1		1		1	
Own children (yes)	0.84 (0.64-1.11)	0.227	1.15 (0.78-1.69)	0.480	1.09 (0.78-1.51)	0.626
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	1.15 (0.83-1.58)	0.401	0.63 (0.39-1.00)	0.051	0.89 (0.60-1.30)	0.581
R ² (Nagelkerke)	0.155		0.182		0.222	

*accident and emergency department/emergency practice/rescue service

**OR=odds ratio; CI=confidence interval (statistically significant values (p<0.05) in bold)

Table 4 Intended utilisation of different care facilities in case of inflammatory gastrointestinal diseases (N=603): Multivariate analysis (Odds Ratios and 95% confidence intervals)

	General practitioner/ paediatrician		Medical on-call service ("116117")		Emergency medicine*	
	OR (95% CI)**	p	OR (95% CI)	p	OR (95% CI)	p
Vignettes						
Sex (male)	1		1		1	
Sex (female)	1.24 (0.87-1.77)	0.243	0.45 (0.24-0.85)	0.013	1.35 (0.93-1.95)	0.110
Age (child)	1		1		1	
Age (middle aged)	1.29 (0.83-2.01)	0.255	1.31 (0.59-2.90)	0.511	0.63 (0.41-0.97)	0.036
Age (older)	1.81 (1.15-2.83)	0.010	1.85 (0.85-4.03)	0.121	0.36 (0.23-0.57)	<0.001
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.31 (0.22-0.44)	<0.001	3.20 (1.64-6.27)	0.001	2.02 (1.41-2.90)	<0.001
Respondents						
Sex (male)	1		1		1	
Sex (female)	1.32 (0.93-1.90)	0.127	1.10 (0.60-2.03)	0.751	0.75 (0.52-1.07)	0.123
Age (18-40)	1		1		1	
Age (41 – 60)	0.67 (0.43-1.04)	0.071	1.11 (0.54-2.33)	0.765	1.35 (0.87-2.10)	0.183
Age (61 and older)	0.89 (0.53-1.49)	0.658	1.46 (0.59-3.60)	0.409	0.95 (0.56-1.61)	0.840
Education (≤9)	1		1		1	
Education (10 Years)	0.56 (0.33-0.93)	0.024	3.85 (1.39-11.10)	0.012	1.84 (1.10-3.07)	0.020
Education (≥ 12 Years)	0.68 (0.43-1.07)	0.096	4.65 (1.68-12.85)	0.003	1.04 (0.65-1.66)	0.869
No migrant background	1		1		1	
Migrant background (2 nd generation)	2.01 (1.17-3.46)	0.012	0.16 (0.29-0.87)	0.034	0.35 (0.19-0.65)	0.001
Migrant background (1 st generation)	1.19 (0.69-2.07)	0.534	0.33 (0.87-1.29)	0.111	0.68 (0.39-1.20)	0.182
Own children (no)	1		1		1	
Own children (yes)	0.90 (0.60-1.34)	0.605	0.77 (0.38-1.55)	0.459	1.24 (0.82-1.88)	0.310
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	0.83 (0.49-1.39)	0.470	2.58 (1.17-5.67)	0.019	0.73 (0.42-1.28)	0.261

*accident and emergency department/emergency practice/rescue service

**OR=odds ratio; CI=confidence interval (statistically significant values (p<0.05) in bold)

Table 5 Intended utilisation of different care facilities in case of COVID-19 (N=604): Multivariate analysis (Odds Ratios and 95% confidence intervals)

	General practitioner/ paediatrician		Medical on-call service ("116117")		Emergency medicine*	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Vignettes						
Sex (male)	1		1		1	
Sex (female)	1.44 (0.99-2.07)	0.052	0.52 (0.33-0.82)	0.005	0.84 (0.50-1.43)	0.525
Age (child)	1		1		1	
Age (middle aged)	1.43 (0.92-2.23)	0.111	0.89 (0.52-1.52)	0.672	0.49 (0.25-0.95)	0.033
Age (older)	1.14 (0.73-1.78)	0.564	1.07 (0.62-1.84)	0.814	0.73 (0.39-1.35)	0.318
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.38 (0.27-0.55)	<0.001	3.92 (2.46-6.25)	<0.001	1.00 (0.59-1.68)	0.993
Respondents						
Sex (male)	1		1		1	
Sex (female)	1.68 (1.17-2.41)	0.005	0.70 (0.45-1.08)	0.106	0.56 (0.33-0.95)	0.033
Age (18-40)	1		1		1	
Age (41 – 60)	0.74 (0.48-1.14)	0.174	0.70 (0.42-1.17)	0.176	3.93 (1.93-8.00)	<0.001
Age (61 and older)	0.87 (0.52-1.46)	0.600	0.50 (0.26-0.96)	0.039	3.22 (1.46-7.0)	0.004
Education (≤9)	1		1		1	
Education (10 Years)	0.88 (0.53-1.49)	0.642	1.22 (0.62-2.41)	0.563	1.14 (0.59-2.23)	0.698
Education (≥ 12 Years)	0.89 (0.56-1.40)	0.607	1.65 (0.92-2.97)	0.093	0.58 (0.30-1.10)	0.099
No migrant background	1		1		1	
Migrant background (2 nd generation)	0.70 (0.38-1.29)	0.254	0.76 (0.34-1.73)	0.514	0.35 (0.19-0.60)	0.116
Migrant background (1 st generation)	1.44 (0.83-2.51)	0.198	0.76 (0.39-1.46)	0.405	0.73 (0.32-1.65)	0.444
Own children (no)	1		1		1	
Own children (yes)	0.79 (0.53-1.12)	0.242	1.42 (0.88-2.33)	0.160	0.91 (0.52-1.59)	0.728
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	1.42 (0.93-2.17)	0.110	0.36 (0.20-0.65)	0.001	1.08 (0.60-1.96)	0.801

*accident and emergency department/emergency practice/rescue service

**OR=odds ratio; CI=confidence interval (statistically significant values (p<0.05) in bold)

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Supplement 1 Case vignettes

Symptoms: COVID-19**Age group: children**

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Paula S./Lukas P., 12 years old, schoolgirl/schoolboy,

...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.

Age group: adults, middle-aged

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Melanie P./Stefan D., 49 years, administration officer,

...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.

Age group: adults, older

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Hildegard S./Helmut K., 72 years, retired,

...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.

Symptoms: Inflammatory gastrointestinal diseases**Age group: children (appendicitis)**

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Paula S./Lukas P., 12 years old, schoolgirl/schoolboy,

...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.

Age group: adults, middle-aged (cholecystitis)

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Melanie P./Stefan D., 49 years, administration officer,

...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.

Age group: adults, elder (diverticulitis)

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Hildegard S./Helmut K., 72 years, retired,

...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.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies* (refer to clean version of the manuscript)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5-6
Methods			
Study design	4	Present key elements of study design early in the paper	6-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-9
Bias	9	Describe any efforts to address potential sources of bias	8
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-9
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	9
		(b) Describe any methods used to examine subgroups and interactions	9
		(c) Explain how missing data were addressed	Tables 1-5
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	NA
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6; Tables 1-5
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Table 1
		(b) Indicate number of participants with missing data for each variable of interest	Table 1
Outcome data	15*	Report numbers of outcome events or summary measures	9-10; Tables 1-2
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Tables 3-5; 9-11
		(b) Report category boundaries when continuous variables were categorized	8
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10-11; Tables 4-5
Discussion			
Key results	18	Summarise key results with reference to study objectives	11-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14-15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	14-15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Intended health care utilisation in cases of severe COVID-19 and inflammatory gastrointestinal disease – results of a population survey with vignettes

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Title:

Intended health care 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 health care utilisation in severe cases of COVID-19 and inflammatory gastrointestinal disease (IGD).

Design: Representative cross-sectional telephone survey.

Setting and participants: 1,207 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 health care utilisation resulting in three different alternatives: general practitioner (GP)/paediatrician, medical on-call service ("116117"), and emergency care (accident & emergency department, emergency practice, rescue service). In multivariate analyses, associations of characteristics of the vignettes and participants (sex, age, education, migration background) with intended health care 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 health care utilisation depending on various characteristics of the vignettes and respondents. Depending on the type of disease inequalities vary. Overall, information about health care alternatives in severe cases has to be improved and clear pathways to facilitate health care 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 is 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.

For peer review only

Introduction

In the past decade, utilization 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 utilization 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 utilization when severe symptoms occur are very rare. Moreover, various studies have shown a tremendous impact of the COVID-19 pandemic on health care utilisation among all age groups [10,11]. A systematic review of 81 studies across 20 countries found out that health care utilisation decreased by about a third during the pandemic in the first six 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 health care utilization 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 health care system, three options are provided when severe symptoms occur [18]: (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 utilize emergency medicine (accident and emergency departments, 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

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3 arranged. The present study is focused on two types of diseases: inflammatory gastrointestinal diseases
4 (IGD) and COVID-19. While COVID-19 symptoms are currently a major reason for help-seeking in case of
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6 acute health problems, symptoms of gastrointestinal diseases are generally a prevalent driver of ED visits in
7
8 various countries including Germany [19,20].
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12 The well-established Behavioral Model of Health Services Use by Ronald Andersen distinguishes between
13
14 predisposing, enabling and need factors of health care use on individual and contextual level [21,22]. It aims
15
16 to explain disparities in ambulatory and hospital services use by including various factors in the conceptual
17
18 model. Major individual predisposing factors are sex, age, education and ethnicity. Enabling is characterised
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20 by income, health insurance status and the organisation of health services for the individual. Need factors
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22 comprise the self-perception and the objective measurement of health and functional status. Over the
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24 years, the health care system was included into the model to give recognition to the importance of national
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26 health policy, the resources and their organisation [22]. Against the background of the current organisation
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28 of urgent and emergency care services in Germany, the present study introduces the individual predisposing
29
30 factors sex, age, education, migration background and having children into the analyses of utilisation.
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32 Predisposing factors as lower education and a migration background are often associated with more
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34 frequent or inadequate pre-hospital and hospital emergency care utilization in Germany and further
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36 European countries [7,23–26], although some current findings for Germany did not confirm these
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38 inequalities [27–29]. Moreover, higher age predicts increased ED use while sex does not seem to play a
39
40 significant role [7,24,27,28]. Furthermore, the navigation within the health care system and the decision
41
42 making concerning health care in everyday life is a major domain in the conceptual models of health literacy
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44 [30]. Thus, a major recommendation of The German National Action Plan Health Literacy is to facilitate
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46 navigation within the health care system including emergency medicine [31]. Studies have shown
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48 associations between low health literacy and more frequent as well as inadequate health care use, including
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50 emergency care [32–34].
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3 Against this background, three research questions are addressed: (1) How does the intended health care
4 utilisation in severe cases vary depending on predisposing factors (sex and age of the afflicted person), on
5 symptoms (COVID-19 vs. inflammatory gastrointestinal disease (IGD)) and daytime (Tuesday, 8 a.m.;
6 Tuesday, 8 p.m.) of the vignettes? (2) How does the intended health care utilisation in severe cases vary
7 depending on predisposing factors of the respondents (sex, age, education, migration background, having
8 children)? (3) What differences occur when analysing the intended utilisation separately for symptoms of
9 IGD and COVID-19?
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20 **Methods**

21 *Study design and sample*

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24 Cross-sectional data was assessed via computer assisted telephone interviews (CATI) between November
25 2020 and January 2021 in Hamburg, Germany. The sample was randomly drawn using all possible telephone
26 numbers in Hamburg, including non-registered numbers via random digital dialling [35]. Only landline
27 numbers could be included as mobile telephone numbers are not provided on regional level. Participants
28 were eligible when their age was ≥ 18 years, they were German-speaking and the place of residence was
29 Hamburg. On different weekdays, repeated calls were made by trained interviewers. The Kish selection grid
30 was used to randomly choose the target person in the respected household [36]. In this method, the
31 interviewer collected the age and gender of every household member that was eligible for the survey and
32 then randomly selected one person from that list. To analyse decisions for utilization, 24 different vignettes
33 (case stories) were used. Based on former research projects [37,38], a number of about $n=50$ participants
34 per vignette (i.e. total $N=1,200$) was considered sufficient to identify medium sized differences. The net
35 sample included 2,756 randomly selected persons. Of these, 961 (34.9 %) could not be reached and 588
36 (21.3 %) refused to participate leading to a total number of 1,207 participants (response rate: 43.8 %). The
37 study was approved by the Local Psychological Ethics Committee at the Center for Psychosocial Medicine,
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3 University Medical Center Hamburg (No. LPEK-0200). Respondents gave their informed consent for the
4 participation and the use of their data. Consents and refusals were documented by the interviewers.
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7 8 *Vignettes* 9

10 Vignettes were used as a stimulus at the beginning of the survey (please see Supplement 1). They were
11 designed in cooperation with primary care physicians, emergency physicians, geriatricians, paediatricians
12 and nursing staff. Two groups of prevalent diseases were selected for the vignettes: COVID-19 and
13 inflammatory gastrointestinal diseases (IGD). Additionally, vignettes were varied according to sex (female,
14 male), age (12 years (child), 49 years (middle-aged person), 72 years (older person)), and daytime (Tuesday,
15 8 a.m.; Tuesday, 8 p.m.) resulting in N=24 vignettes randomly assigned to the respondents. Presented
16 symptoms of both diseases were severe and comparable regarding a higher urgency of treatment. However,
17 it does not imply that the recommended utilisation is the same for both types of diseases. In terms of
18 inflammatory gastrointestinal symptoms, typical and frequent diseases for the different age groups were
19 selected: appendicitis (child), cholecystitis (middle-aged person), and diverticulitis (older person). According
20 to our clinical cooperation partners, this was more realistic than to choose the same disease for all age
21 groups. Inspired by the Manchester-Triage-Score [39], a higher urgency of treatment was indicated by fever
22 or elevated temperature and severe pain in all three gastrointestinal vignettes. A hospitalisation (own
23 initiative or referral by a physician) for further diagnostics or treatment is required in all three cases.
24 Symptoms of the COVID-19 vignette were based on guidelines and information provided by the Robert Koch
25 Institute [40]. The recommended proceeding when COVID-19 symptoms occur is given by the Federal
26 Ministry of Health [41]: Affected people should stay at home, reduce contacts to a bare minimum and get
27 in touch with a doctor by phone. Outside of surgery opening hours, one can also call the medical on-call
28 service by dialling the nationwide number 116117 and wait for further instructions. In case of an emergency,
29 it is recommended to dial "112" for rescue service. In terms of the COVID-19 case scenarios of higher
30 urgency in the study, the correct procedure is to contact the GP/paediatrician (ideally via telephone) or to
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3 dial the permanently available medical on-call service (116117), and to wait for further instructions. All
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5 vignettes were audio-recorded by a clearly speaking trained person. The audio files were directly played to
6
7 the respondents followed by a standardized questionnaire (total interview time: about 15 min.).
8
9

10 *Measures*

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12 In the beginning of the interview, one of the vignettes was presented to the respondents. To assess intended
13
14 utilization behaviour in the presented case, the respondents were requested to answer following open
15
16 ended question: "Who would you turn to first for help in the place of Mrs. X. / Mr. X / in the place of the
17
18 parents of...?" The interviewers were provided with a list of possibilities to facilitate the documentation.
19
20 Three major options of intended utilization could be categorised after data collection: general practitioner
21
22 (GP/paediatrician), medical-on call service ("116117"), and emergency medicine facilities (accident and
23
24 emergency department, emergency practice, rescue service). These three categories were recoded as
25
26 dummy variables (yes/no). A residual category ("Other") sums up further responses (e.g. friends or family
27
28 members, watchful waiting, alternative medicine, or pharmacy). Furthermore, the following characteristics
29
30 of the respondents were introduced: age (age groups: 18-40, 41-60, ≥ 60 years), sex, education (years of
31
32 schooling: ≤ 9 , 10, ≥ 12), having children (yes/no), and migration background (no/2nd generation/1st
33
34 generation). A person has a migration background, if he/she or one of his/her parents was born abroad.
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36 Respondents with a migration background who were born abroad and migrated to Germany were classified
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38 as 1st generation migrants, while German-born descendants of 1st generation migrants were considered as
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40 2nd generation migrants [42]. Finally, respondents were asked whether they ever had been affected by such
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42 complaints (yes/no). The sample was weighted for sex, age and educational level on the basis of official
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44 statistics of the population in Hamburg in 2020 [43,44]. Chi²-tests have shown an effective weighting
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46 indicating no significant differences between the study sample and the population in Hamburg in terms of
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48 sex, age and education.
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55 *Analyses*

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3 Bivariate analyses of intended utilisation of the different care facilities were calculated using crosstabs
4 including Pearson's Chi²-test. For multivariate analyses, binary logistic regressions were conducted.
5
6 Dependent variables were the three options of utilization: (1) GP/paediatrician, (2) medical on-call service,
7
8 (3) emergency medicine (accident & emergency department, emergency practice, rescue service). As
9
10 predictor variables, characteristics of the vignettes (disease, sex, age, and daytime) and of the respondents
11
12 (sex, age, education, migration status, children, and personal affliction) were entered simultaneously into
13
14 the models, so that all variables are adjusted for each other. In a further step, the multivariate analyses
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16 were conducted separately for the case scenarios of IGD and COVID-19. Analyses were carried out using the
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18 Statistical Package for the Social Sciences SPSS 26 [45] and the R statistical package [46].
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24 *Patient and Public Involvement*

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26 Patients and public were not involved.
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30 **Results**

31
32 Sample characteristics are shown in Table 1. The sample consisted of 52% female respondents whilst nearly
33
34 half of the participants had a higher educational level (≥ 12 years of schooling) and 23% a migration
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36 background (1st and 2nd generation). In terms of the intended utilisation, more than half of the respondents
37
38 (54%) would choose the general practitioner or paediatrician as first contact after vignette presentation.
39
40 The medical on-call service ("116117") was preferred by 18% and emergency care (accident and emergency
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42 department/emergency practice/rescue service) mentioned 26% (other options like friends and family,
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44 pharmacy or alternative medicine: 5%).
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49 *(Table 1 here)*

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52 Bivariate analyses are shown in Table 2. In terms of characteristics of the vignettes, there were significant
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54 differences ($p < 0.05$) in intended utilization according to sex and symptoms. Respondents to whom a COVID-
55
56 19 vignette was presented more frequently have chosen the GP/paediatrician or medical on-call service
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3 than emergency medicine as first option for medical support. Regarding characteristics of the respondents,
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5 significant differences emerged for sex, age, education, migration background, and personal affection.
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8 *(Table 2 here)*
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11 Results of the multivariate regression analysis show that the GP/paediatrician was chosen significantly more
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13 often when the afflicted person in the vignette was female, middle aged or older, and had been affected by
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15 COVID-19 symptoms (Table 3). There was a more than 2-fold likelihood of choosing the GP/paediatrician
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17 when COVID-19 was presented in the vignette (OR: 2.15, CI: 1.67-2.77). Moreover, this option was less
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19 favoured when symptoms occurred in the evening. In contrast, the option of medical on-call service was
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21 more prevalent in male case vignettes and when the symptoms occurred in the evening. Similar to
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23 GP/paediatrician, the medical on-call service was chosen more often when the COVID-19 vignette was
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25 presented (OR: 2.88, CI: 2.01-4.18). Emergency medicine (accident and emergency department/emergency
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27 practice/rescue service) was mentioned more often when children were affected, when symptoms were
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29 gastrointestinal, and occurred in the evening. Regarding respondents' characteristics, women favoured the
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31 GP/paediatrician while men rather preferred emergency medicine. Furthermore, higher educated persons
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33 favoured the medical on-call service compared to the lowest status group (OR: 2.15, CI: 1.34-3.52). People
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35 with migration background (especially 2nd generation) less often chose medical on-call service and
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37 emergency medicine than non-migrants.
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46 When examining intended utilisation separately for IGD and COVID-19 cases, further important differences
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48 emerged (Table 4 and Table 5). In terms of vignettes' characteristics, even in the evening, emergency
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50 medicine was not chosen more often than in the morning when the COVID-19 vignette was presented (OR:
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52 1.00, CI: 0.59-1.68). Regarding the respondents' characteristics, predisposing factors showed considerable
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54 differences in some cases. Particularly, there was a significant social gradient in the association between the
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3 on-call service use and educational level in case of IGD. Elevated Odds Ratios were found for higher educated
4 groups (OR: 3.85, CI: 1.39-11.10 to OR: 4.65, CI: 1.68-12.85). This social gradient does not exist regarding
5 COVID-19. Moreover, higher age groups much more often preferred emergency medicine when COVID-19
6 symptoms occur, while age does not matter for IGD. Finally, only in case of IGD, the migration background
7 (2nd generation) indicated significant differences favouring the GP/paediatrician and less on-call service and
8 emergency care.
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17 *(Table 4 and Table 5 here)*
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19 20 **Discussion**

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22 In this study, the intended utilisation of different care facilities in a German metropolis was examined using
23 varied case vignettes of severe COVID-19 and inflammatory gastrointestinal diseases (IGD). Following
24 Andersen's Behavioral Model of Health Services Use, the study analysed different predisposing factors (sex,
25 age, education, migration background) for the utilisation of GP/paediatrician, medical on-call service
26 ("116117"), and emergency care (accident and emergency department, emergency practice, rescue service).
27 Moreover, daytime and symptoms were additionally included as predictors into the model. First of all, the
28 majority of the respondents chose the GP/paediatrician as first option to get help. Furthermore, multivariate
29 results show that both, the characteristics of the vignettes and the characteristics of the respondents are
30 associated with the intended utilisation. In terms of the vignettes' characteristics, the intended utilisation
31 of GP/paediatrician is associated with female sex, higher age, daytime (morning) and COVID-19 symptoms,
32 the medical on-call service with male sex, daytime (evening) and COVID-19 symptoms, and the emergency
33 medicine with young age, daytime (evening) and gastrointestinal symptoms. Regarding the respondents'
34 characteristics, women chose more often the GP/paediatrician, men preferred emergency medicine. Higher
35 educated persons more often chose the medical on-call service while people with a migration background
36 decided less often for medical on-call service and emergency medicine. Thus, although case stories were
37 similar regarding urgency of treatment, results suggest variations of intended health care utilisation
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3 according to various characteristics of the case vignettes and the respondents. Separate analyses for IGD
4 and COVID-19 cases show that the utilisation behaviour differs between the types of diseases. The
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6 associations between daytime and emergency medicine, and education and medical on-call service as well
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8 as associations between respondents' age and emergency medicine were solely significant in case of IGD.
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12 Only a few studies analysed intended utilization among the general population using case vignettes. A
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14 German study with a similar vignette design focused on intended behaviour and judgement of urgency, but
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16 did not analyse any predisposing factors [47]. Another study with case scenarios conducted in the
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18 Netherlands, Switzerland and Denmark examined the intended help-seeking behaviour exclusively in terms
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20 of acute out-of-hours health care [48]. Parents or adults who were lower educated, older, or had a migration
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22 background were more inclined to contact out-of-hours care, whereas women were less inclined [48]. A
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24 survey among the German general population about its utilisation of pre-hospital emergency care revealed
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26 a higher use among lower educated persons and migrants [25]. Two more overviews – mostly including
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28 patient samples – indicated similar findings [24,26]. However, a significantly higher use of emergency
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30 medicine among people with lower education and migrant background is not shown in the present study
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32 which is supported by some current findings from Germany [27–29]. As in previous studies, a higher age of
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34 the respondents (particularly in case of IGD) is associated with increased ED use [24]. The results also show
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36 that female sex predicts lower ED use and a preference for GP/paediatrician. Although women still show a
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38 different health care utilisation than men and utilise health care more frequently in general [49], there is no
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40 clear evidence that female patients more often visit the GP in Germany [50–52]. The more frequent choice
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42 of the comparatively new nationwide medical on-call service (“116117”) among higher educated people (in
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44 case of IGD) reflects the evidence about social inequalities in health care use [53,54], and could be due to a
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46 generally better health literacy among higher socioeconomic status groups [55,56]. Overall, the knowledge
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48 about this service increased in the past years [57], and other data from the present study project confirm
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50 the increasing popularity of the medical on-call service [58]. Interestingly, further analyses solely among the
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3 respondents which were presented a COVID-19 case showed no more inequalities between utilisation and
4 educational level as well as migration history, while inequalities increased in case of IGD.
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8 Regarding the case vignettes' characteristics, sex plays another significant role. In this case, it is not about
9 different answers from females or males, but the reaction when a woman or a man is affected in the case
10 story. In the present study, a female vignette leads to significantly more GP/paediatrician consultations and
11 less on-call service. This suggests a less urgent perception when a female is affected, and is supported by
12 findings that symptoms of female patients were more often underestimated compared with males [59]. The
13 result that emergency care is more often preferred when a child was affected is supported by findings that
14 the perception of urgency is increased in case of ill children, and parents prefer to visit ED before contacting
15 the primary care provider [60,61]. The significant preference of medical on-call service and emergency care
16 in the evening is obvious due to restricted opening hours of practices. Concerning the disease-related
17 intended utilisation, significant difference are shown. While the GP/paediatrician and the medical on-call
18 service was significantly more chosen in case of a COVID-19 vignette, emergency facilities were more
19 preferred when an IGD vignette was presented. The respondents' preference of GP/paediatrician and
20 medical on-call service ("116117") in acute cases of COVID-19 indicates an adequate navigation within the
21 health care system as it is in line with the official national recommendations when symptoms of COVID-19
22 occur [41]. This pathway of utilisation is correct in terms of the presented case scenarios of a COVID-19
23 infection and suggests an improved information due to widespread campaigns about COVID-19 symptoms
24 and health care use. A German study about coronavirus-related health literacy showed that, despite some
25 confusion about coronavirus information, the vast majority felt well informed [62]. To differ between
26 adequate or inadequate utilisation in terms of the IGD vignettes is hardly possible as all three health care
27 options would be adequate. In this case, hospitalisation could be organised through self-referral, referral by
28 a physician, or after consultation with the medical on-call service. Additionally, the daytime plays an
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3 important role for symptoms like that. Overall, measurement of adequate utilisation is very diverse and
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5 remains difficult [7,23,47,63]. Thus, interpretations should be done carefully.
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8 Generally, it is still a challenge to work out the reasons behind differences in health care utilisation. Different
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10 utilisation behaviour could be due to differences in need, to differences in expectations and preferences
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12 (e.g. individual/cultural preferences or health beliefs), to differences in information (e.g. about service
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14 availability, navigation in the health care system, or wrong assumption of costs), or to formal access barriers
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16 (e.g. charges, waiting times, travel distances, or lost wages when using health care during work hours) [64].
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18 To figure out the reasons behind the patient's behaviour is highly relevant for implications in terms of
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20 possible interventions. The results suggest differences in information (e.g. about the medical-on-call-service
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22 or further options), preferences (e.g. directly visiting ED on own initiative or expecting higher expertise in
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24 ED), and perceived need due to sociodemographic characteristics. It is likely that the campaigns regarding
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26 health care seeking during the COVID-19 pandemic had an impact on utilisation behaviour in our study. The
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28 use of the medical on-call service and primary care provider in case of symptoms of a COVID-19 infection
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30 conforms to the official recommendations. However, among people with lower education and with a
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32 migration background, information about health care options needs to be more disseminated. In Germany,
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34 the ongoing establishment of out-of-hours primary care centers ("Portalpraxen") located at hospitals aims
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36 at improving coordination between emergency and urgent care, and at improving availability of urgent
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38 primary care [65]. In further European countries, similar approaches of out-of-hours services, walk-in and
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40 primary care centers are established [65]. Moreover, there is a challenge to tackle the unmet needs of
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42 patients with severe diseases which increased since the beginning of the pandemic. Suggestions include a
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44 division of the ED into respiratory and non-respiratory section and targeted messaging [17].
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52 **Limitations**

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

30 **Conclusions**

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

48 **Acknowledgement**

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50 Runge and Michael Rieper for supporting the development of the case vignettes.
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Ethical approval

Local Psychological Ethics Committee at the Center for Psychosocial Medicine, University Medical Center Hamburg (No. LPEK-0200).

Contributorship statement

OK, JK, AS and IS designed the study including questionnaire and vignettes. JK drafted the manuscript, and analysed and interpreted the data. AS essentially developed the vignettes. OK led the project and made an essential contribution to drafting the manuscript and interpreting the data. SK, AS and IS critically revised and approved the final manuscript.

Competing interests

There are no competing interests.

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Data sharing statement

Data are available upon reasonable request.

Table 1 Sample characteristics (N=1,207)*: n (%)

Sex (<i>1</i>)		
female	621	(51.5)
male	585	(48.5)
Age (years) (<i>1</i>)		
18 – 40	455	(37.8)
41 – 60	419	(34.7)
≥ 60	332	(27.5)
Education (years) (<i>43</i>)		
≤ 9	316	(27.1)
10	275	(23.6)
≥ 12	574	(49.3)
Migration background (<i>22</i>)		
no	915	(77.3)
2 nd generation	129	(10.9)
1 st generation	141	(11.7)
Children (<i>18</i>)		
yes	546	(45.9)
no	643	(54.1)
Personally affected by such complaints (<i>4</i>)		
yes	238	(19.8)
no	965	(80.2)
Intended utilisation (<i>1</i>)		
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

Table 2 Intended utilisation of different care facilities according to characteristics of the vignettes and the respondents (N=1,207): 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‡	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	0.058	0.317	0.002
Time	Tuesday morning	65.7	7.4	22.2
	Tuesday evening	41.8	22.5	30.0
	p	<0.001	<0.001	0.002
Symptoms	Gastrointestinal	44.9	9.5	39.4
	COVID-19	62.3	20.7	12.7
	p	<0.001	<0.001	<0.001
Respondents				
Sex	Male	49.9	16.6	29.1
	Female	56.8	13.7	23.5
	p	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	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	0.280	0.001	0.002
Migration background	No	52.0	16.8	28.5
	2 nd Generation	59.4	7.8	14.8
	1 st Generation	57.4	12.8	22.7
	p	0.172	0.020	0.003
Own children	No	53.5	14.3	26.6
	Yes	54.1	15.4	25.7
	p	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	0.025	0.106	0.028

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3 *the percentages do not sum to 100 due to missing data

4 †accident and emergency department/emergency practice/rescue service

5 ‡Pearson's Chi-square (statistically significant values ($p < 0.05$) in bold)

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Table 3 Intended utilisation of different care facilities (N=1,170): Multivariate analysis (Odds Ratios and 95% confidence intervals)

	General practitioner/ paediatrician		Medical on-call service ("116117")		Emergency medicine*	
	OR (95% CI)**	p	OR (95% CI)	p	OR (95% CI)	p
Vignettes						
Sex (male)	1		1		1	
Sex (female)	1.34 (1.04-1.72)	0.024	0.48 (0.34-0.68)	<0.001	1.16 (0.86-1.56)	0.328
Age (child)	1		1		1	
Age (middle aged)	1.37 (1.01-1.86)	0.045	0.94 (0.62-1.44)	0.786	0.60 (0.42-0.85)	0.004
Age (older)	1.47 (1.08-2.02)	0.016	1.19 (0.78-1.83)	0.415	0.47 (0.33-0.69)	<0.001
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.35 (0.27-0.44)	<0.001	3.65 (2.53-5.34)	<0.001	1.61 (1.20-2.16)	0.002
Symptoms (gastrointestinal)	1		1		1	
Symptoms (COVID-19)	2.15 (1.67-2.77)	<0.001	2.88 (2.01-4.18)	<0.001	0.20 (0.15-0.28)	<0.001
Respondents						
Sex (male)	1		1		1	
Sex (female)	1.46 (1.13-1.88)	0.003	0.83 (0.59-1.17)	0.279	0.70 (0.52-0.95)	0.022
Age (18-40)	1		1		1	
Age (41 – 60)	0.71 (0.52-0.96)	0.026	0.81 (0.53-1.21)	0.297	1.85 (1.29-2.65)	<0.001
Age (> 60)	0.87 (0.61-1.24)	0.446	0.73 (0.44-1.20)	0.220	1.34 (0.87-2.05)	0.178
Education (≤9)	1		1		1	
Education (10 Years)	0.70 (0.49-0.99)	0.047	1.75 (1.02-3.01)	0.043	1.54 (1.02-2.32)	0.040
Education (≥ 12 Years)	0.80 (0.58-1.10)	0.180	2.15 (1.34-3.52)	0.002	0.84 (0.58-1.21)	0.384
No migration background	1		1		1	
Migration background (2 nd generation)	1.29 (0.87-1.95)	0.212	0.49 (0.23-0.93)	0.042	0.38 (0.21-0.65)	<0.001
Migration background (1 st generation)	1.31 (0.89-1.93)	0.167	0.64 (0.36-1.09)	0.114	0.70 (0.43-1.12)	0.128
Own children (no)	1		1		1	
Own children (yes)	0.84 (0.64-1.11)	0.227	1.15 (0.78-1.69)	0.480	1.09 (0.78-1.51)	0.626
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	1.15 (0.83-1.58)	0.401	0.63 (0.39-1.00)	0.051	0.89 (0.60-1.32)	0.581
R ² (Nagelkerke)	0.155		0.182		0.222	

*accident and emergency department/emergency practice/rescue service

**OR=odds ratio; CI=confidence interval (statistically significant values (p<0.05) in bold)

Table 4 Intended utilisation of different care facilities in case of inflammatory gastrointestinal diseases (N=603): Multivariate analysis (Odds Ratios and 95% confidence intervals)

	General practitioner/ paediatrician		Medical on-call service ("116117")		Emergency medicine*	
	OR (95% CI)**	p	OR (95% CI)	p	OR (95% CI)	p
Vignettes						
Sex (male)	1		1		1	
Sex (female)	1.24 (0.87-1.77)	0.243	0.45 (0.24-0.85)	0.013	1.35 (0.93-1.93)	0.110
Age (child)	1		1		1	
Age (middle aged)	1.29 (0.83-2.01)	0.255	1.31 (0.59-2.90)	0.511	0.63 (0.41-0.97)	0.036
Age (older)	1.81 (1.15-2.83)	0.010	1.85 (0.85-4.03)	0.121	0.36 (0.23-0.57)	<0.001
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.31 (0.22-0.44)	<0.001	3.20 (1.64-6.27)	0.001	2.02 (1.41-2.90)	<0.001
Respondents						
Sex (male)	1		1		1	
Sex (female)	1.32 (0.93-1.90)	0.127	1.10 (0.60-2.03)	0.751	0.75 (0.52-1.07)	0.123
Age (18-40)	1		1		1	
Age (41 – 60)	0.67 (0.43-1.04)	0.071	1.11 (0.54-2.33)	0.765	1.35 (0.87-2.10)	0.183
Age (61 and older)	0.89 (0.53-1.49)	0.658	1.46 (0.59-3.60)	0.409	0.95 (0.56-1.61)	0.840
Education (≤9)	1		1		1	
Education (10 Years)	0.56 (0.33-0.93)	0.024	3.85 (1.39-11.10)	0.012	1.84 (1.10-3.07)	0.020
Education (≥ 12 Years)	0.68 (0.43-1.07)	0.096	4.65 (1.68-12.85)	0.003	1.04 (0.65-1.66)	0.869
No migrant background	1		1		1	
Migrant background (2 nd generation)	2.01 (1.17-3.46)	0.012	0.16 (0.29-0.87)	0.034	0.35 (0.19-0.65)	0.001
Migrant background (1 st generation)	1.19 (0.69-2.07)	0.534	0.33 (0.87-1.29)	0.111	0.68 (0.39-1.20)	0.182
Own children (no)	1		1		1	
Own children (yes)	0.90 (0.60-1.34)	0.605	0.77 (0.38-1.55)	0.459	1.24 (0.82-1.88)	0.310
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	0.83 (0.49-1.39)	0.470	2.58 (1.17-5.67)	0.019	0.73 (0.42-1.28)	0.261

*accident and emergency department/emergency practice/rescue service

**OR=odds ratio; CI=confidence interval (statistically significant values (p<0.05) in bold)

Table 5 Intended utilisation of different care facilities in case of COVID-19 (N=604): Multivariate analysis (Odds Ratios and 95% confidence intervals)

	General practitioner/ paediatrician		Medical on-call service ("116117")		Emergency medicine*	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Vignettes						
Sex (male)	1		1		1	
Sex (female)	1.44 (0.99-2.07)	0.052	0.52 (0.33-0.82)	0.005	0.84 (0.50-1.43)	0.525
Age (child)	1		1		1	
Age (middle aged)	1.43 (0.92-2.23)	0.111	0.89 (0.52-1.52)	0.672	0.49 (0.25-0.95)	0.033
Age (older)	1.14 (0.73-1.78)	0.564	1.07 (0.62-1.84)	0.814	0.73 (0.39-1.35)	0.318
Time (Tuesday morning)	1		1		1	
Time (Tuesday evening)	0.38 (0.27-0.55)	<0.001	3.92 (2.46-6.25)	<0.001	1.00 (0.59-1.68)	0.993
Respondents						
Sex (male)	1		1		1	
Sex (female)	1.68 (1.17-2.41)	0.005	0.70 (0.45-1.08)	0.106	0.56 (0.33-0.95)	0.033
Age (18-40)	1		1		1	
Age (41 – 60)	0.74 (0.48-1.14)	0.174	0.70 (0.42-1.17)	0.176	3.93 (1.93-8.00)	<0.001
Age (61 and older)	0.87 (0.52-1.46)	0.600	0.50 (0.26-0.96)	0.039	3.22 (1.46-7.0)	0.004
Education (≤9)	1		1		1	
Education (10 Years)	0.88 (0.53-1.49)	0.642	1.22 (0.62-2.41)	0.563	1.14 (0.59-2.23)	0.698
Education (≥ 12 Years)	0.89 (0.56-1.40)	0.607	1.65 (0.92-2.97)	0.093	0.58 (0.30-1.10)	0.099
No migrant background	1		1		1	
Migrant background (2 nd generation)	0.70 (0.38-1.29)	0.254	0.76 (0.34-1.73)	0.514	0.35 (0.19-0.60)	0.116
Migrant background (1 st generation)	1.44 (0.83-2.51)	0.198	0.76 (0.39-1.46)	0.405	0.73 (0.32-1.65)	0.444
Own children (no)	1		1		1	
Own children (yes)	0.79 (0.53-1.12)	0.242	1.42 (0.88-2.33)	0.160	0.91 (0.52-1.59)	0.728
Personally affected by such complaints (no)	1		1		1	
Personally affected by such complaints (yes)	1.42 (0.93-2.17)	0.110	0.36 (0.20-0.65)	0.001	1.08 (0.60-1.96)	0.801

*accident and emergency department/emergency practice/rescue service

**OR=odds ratio; CI=confidence interval (statistically significant values (p<0.05) in bold)

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Supplement 1 Case vignettes

Symptoms: COVID-19**Age group: children**

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Paula S./Lukas P., 12 years old, schoolgirl/schoolboy,

...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.

Age group: adults, middle-aged

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Melanie P./Stefan D., 49 years, administration officer,

...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.

Age group: adults, older

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Hildegard S./ Helmut K., 72 years, retired,

...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.

Symptoms: Inflammatory gastrointestinal diseases**Age group: children (appendicitis)**

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Paula S./Lukas P., 12 years old, schoolgirl/schoolboy,

...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.

Age group: adults, middle-aged (cholecystitis)

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Melanie P./Stefan D., 49 years, administration officer,

...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.

Age group: adults, elder (diverticulitis)

It is Tuesday morning, 8 a.m./It is Tuesday evening, 8 p.m., Hildegard S./ Helmut K., 72 years, retired,

...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.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies* (refer to clean version of the manuscript)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5-6
Methods			
Study design	4	Present key elements of study design early in the paper	6-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7-9
Bias	9	Describe any efforts to address potential sources of bias	8
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-9
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	9
		(b) Describe any methods used to examine subgroups and interactions	9
		(c) Explain how missing data were addressed	Tables 1-5
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	NA
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6; Tables 1-5
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Table 1
		(b) Indicate number of participants with missing data for each variable of interest	Table 1
Outcome data	15*	Report numbers of outcome events or summary measures	9-10; Tables 1-2
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Tables 3-5; 9-11
		(b) Report category boundaries when continuous variables were categorized	8
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10-11; Tables 4-5
Discussion			
Key results	18	Summarise key results with reference to study objectives	11-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14-15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	14-15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.