





BMJ Open Perceived stress, trust, safety and severity of SARS-CoV-2 infection among patients discharged from hospital during the COVID-19 pandemic's first wave: a PREMs survey

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ABSTRACT

Aim To investigate experiences of stress, feelings of safety, trust in healthcare staff and perceptions of the severity of a SARS-CoV-2 infection among inpatients discharged from Valais Hospital, Switzerland, during the COVID-19 pandemic's first wave.

Methods Discharged patients aged 18 years or more (n=4665), hospitalised between 28 February and 11 May 2020, whether they had been infected by SARS-CoV-2 or not, were asked to complete a self-reporting questionnaire, as were their informal caregivers, if available (n=866). Participants answered questions from Cohen's Perceived Stress Scale (PSS) (0=no stress, 40=severe stress), Krajewska-Kulak *et al*'s Trust in Nurses Scale and Anderson and Dedrick's Trust in Physician Scale (10=no trust, 50=complete trust), the severity of a SARS-CoV-2 infection (1=not serious, 5=very serious), as well as questions on their perceived feelings of safety (0=not safe, 10=extremely safe).

Results Of our 1341 respondents, 141 had been infected with SARS-CoV-2. Median PSS score was 24 (IQR1–3=19–29), median trust in healthcare staff was 33 (IQR1–3=31–36), median perceived severity of a SARS-CoV-2 infection was 4 (IQR1–3=3–4) and the median feelings of safety score was 8 (IQR1–3=8–10). Significant differences were found between males and females for PSS scores ($p<0.001$) and trust scores ($p<0.001$). No significant differences were found between males and females for the perceived severity of SARS-CoV-2 infection scores ($p=0.552$) and the feelings of safety ($p=0.751$). Associations were found between age and trust scores ($R_s=0.201$), age and perceived SARS-CoV-2 severity scores ($R_s=0.134$), sex (female) and perceived stress ($R_s=0.114$), and sex (female) and trust scores ($R_s=0.137$). Associations were found between SARS-CoV-2 infected participants and the perceived SARS-CoV-2 severity score ($R_s=-0.087$), between trust scores and feelings of safety ($R_s=0.147$), and perceived severity of a SARS-CoV-2 infection ($R_s=0.123$).

Discussion The results indicated that inpatients experienced significant feelings of stress regarding perceived symptoms of the illness, yet this did not affect their feelings of safety, trust in healthcare staff

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study reports a large sample, cross-sectional patient-reported experience measures survey.
- ⇒ A self-reported questionnaire was designed to collect relevant data on stress, trust, safety and perceptions of SARS-CoV-2's severity.
- ⇒ The survey involved all adult inpatients hospitalised in the COVID-19 pandemic's first wave, whether infected by SARS-CoV-2 or not.
- ⇒ Almost all the participants answered using a paper questionnaire despite the option of completing an electronic version.
- ⇒ The psychometric properties of the existing scales used to measure stress, trust, safety and perceptions of SARS-CoV-2's severity are not yet available.

or perception of the severity of SARS-CoV-2 infection. Future patient-reported experience measures research is needed to give a voice to healthcare users and facilitate comparison measures internationally.

BACKGROUND

The first SARS-CoV-2 infection detected in the canton of Valais, Switzerland, was in February 2020, and it caused a sudden, substantial increase in multiorgan disease and dysfunction, resulting in high hospitalisation rates.¹ Inpatients were exposed to particular conditions of care, including social isolation and distancing, infection control measures, staff wearing personal protective equipment and potential harm to their health from a SARS-CoV-2 infection itself.² Hospital visits to patients were prohibited, probably leading to feelings of stress and unsafety.³ Healthcare professionals encouraged the use of technologies to compensate for the lack of real-life contact with relatives.^{4 5} Discharged inpatients' perceptions of stress, their trust in healthcare staff, their feelings of safety

and their perception of the severity of a SARS-CoV-2 infection during their COVID-19 hospitalisation were probably influenced by the safety and communication strategies experienced during interactions with professionals.^{6 7} Stress could also be provoked by the somatic symptoms of a SARS-CoV-2 infection.⁸ Patients admitted to intensive care units were undoubtedly at high risk of mental health consequences due to their life-threatening experiences.^{9–12} An individual's experience of the risk of contracting SARS-CoV-2 through contamination by other patients or healthcare professionals involves a mix of their different emotional, social and mental characteristics.¹³ Previous studies of patients who survived the SARS epidemics revealed their consequences on fatigue, cardiac and pulmonary function disorders, and mental disorder sequelae such as depression, anxiety and post-traumatic stress.^{13 14} Recent research has mentioned psychological difficulties among patients who had mild SARS-CoV-2 symptoms.^{14 15} Increasing reports of lingering malaise and exhaustion akin to chronic fatigue syndrome have recently been described among patients who may have been left with physical frailty and emotional disturbances. Fears and uncertainties could be reinforced by a worse than usual state of health. When patients have a pre-existing sensitivity to mental or neurological conditions, there is a risk of triggering new symptoms such as depression or a confusional state.^{16 17} Understanding patients' perceived experiences of the healthcare they received is integral to helping patients with a SARS-CoV-2 infection recover at home—their physical, psychological and functional problems must be considered together. There are also specific aspects of the hospitalisation experience associated with psychological difficulties among patients severely affected by SARS-CoV-2. Research on the consequences of SARS indicated that psychological distress was more severe among groups that contracted those infections than other severely ill patients hospitalised simultaneously.^{18 19} These studies also documented psychological difficulties after hospitalisation, which manifested themselves in the form of stress, anxiety, depression, persistent acute confusion and disorders based on continuous stress

such as hallucinations, nightmares or flashbacks, sleep and memory disorders, and attention difficulties.^{20–22} It is well known that psychosocial isolation can affect the morbidity and mortality associated with many health problems.^{23–25}

Study framework

Our study's overall framework involved the 'Quadruple Aim' of healthcare, which emphasises people's medical and social needs, the impact of unmet health needs and the importance of partnerships between the healthcare system and healthcare professionals.²⁶ In addition, patients' viewpoints on the delivery of their care have recently become thought of as an essential component of overall health system performance, based on the principles of patient-reported experience measures (PREMs).^{27 28}

The PREMs concept guided our investigation, gathering information on patients' views about their experiences while receiving hospital care during the COVID-19 pandemic's first wave. They are an indicator of the quality of patient care, although they do not measure it directly. PREMs can be classified as either relational or functional. Relational PREMs identify patients' experiences of their relationships during hospitalisation. Although functional PREMs aim to examine more practical issues, such as the facilities available and healthcare organisation, they were not applied in this study.²⁹ Figure 1 presents the concepts in our PREMs framework and those reported in our survey.

This large-sample survey aimed to collect information on patients' perceptions of stress, their trust in healthcare professionals (nurses and physicians), their feelings of safety and their perceptions of the severity of a SARS-CoV-2 infection during their hospitalisation, all within the context of their hospital's health crisis control measures during the COVID-19 pandemic's first wave.

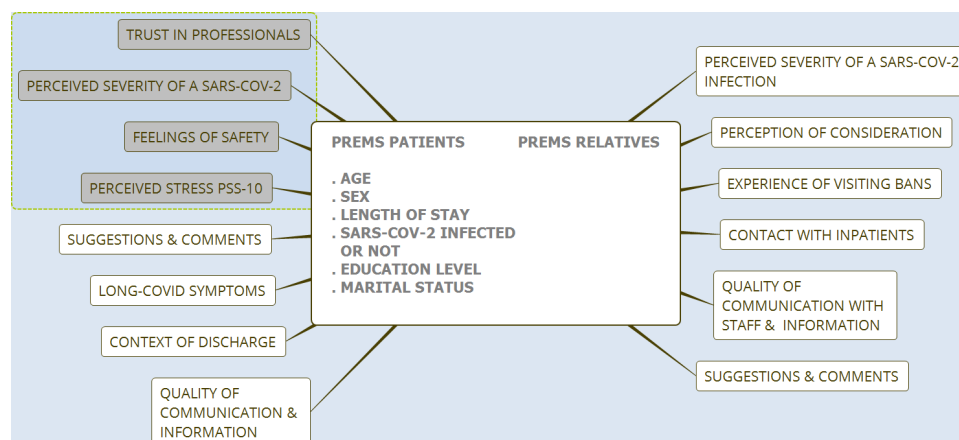


Figure 1 The study's patient-reported experience measures survey framework and the concepts investigated.

METHODS

Design

This large-sample PREMs survey used a self-reported questionnaire to collect data on hospitalised patients' and their relatives' perceptions of stress, trust in healthcare professionals, feelings of safety and perceptions of the severity of a SARS-CoV-2 infection during the COVID-19 pandemic's first wave. The study was performed with close regard to the Strengthening the Reporting of Observational Studies in Epidemiology statement.³⁰

Population and sample

The study sample consisted of all patients aged ≥ 18 years old (and their participating relatives $n=866$) hospitalised between 28 February and 11 May 2020, at the canton of Valais' 1007-bed, multisite public hospital in Switzerland. The hospital recorded more than 40 000 hospitalisations in 2019, mainly at its two primary hospital centres (one in each of the canton's two distinct linguistic regions), while serving a population of about 340 000.³¹ Study inclusion criteria included being hospitalised for >24 hours, as per the Swiss Federal Health Insurance Law definition, domicile in Switzerland, and oral and written comprehension of French or German (online supplemental file 1). Participants were excluded if they were <18 years old, lived abroad or died of a SARS-CoV-2 infection ($n=54$) or another illness.³²

Data collection instruments

The data collected were coded to ensure participant anonymity and good research practice, as per the Declaration of Helsinki.³³ Receipt of the questionnaire from the patient served as proxy written consent to participate. The questionnaire comprised two sections. The first asked for sociodemographic data: sex, age, marital status, educational level and a final question on the hospital trajectory followed by the patient. The second part assessed participants' scores on instruments assessing stress, trust, safety, SARS-CoV-2 infection and perceptions about the disease's severity during the hospitalisation period.

Instruments

Ten-item Perceived Stress Scale (PSS-10)

We measured perceived stress using the PSS-10 developed and validated by Cohen *et al.*³⁴ This 10-item self-reporting instrument assesses 'how unpredictable, uncontrollable, and overloaded respondents find their lives'. Each item was rated on a 5-point Likert scale ranging from 0 (never) to 4 (very often). To calculate a total PSS score, responses to the four positively stated items (items 4, 5, 7 and 8) first need to be reversed (ie, $0 \Rightarrow 4$; $1 \Rightarrow 3$; $2 \Rightarrow 2$; $3 \Rightarrow 1$; $4 \Rightarrow 0$) and then added to the other six items. Higher scores indicate higher levels of perceived stress. The PSS-10 is one of the most popular scales for assessing psychological stress; it is used in multiple contexts and has a Cronbach's alpha of >0.7 .³⁵ For example, scores of 0–13 are considered low, 14–26 moderate, and 27–40 are high perceived stress. She *et al.*³⁶ recently showed that the PSS-10 appears appropriate

for use in research on the general population during the COVID-19 pandemic, with solid psychometric properties shown in a Cronbach's alpha of 0.83.

Trust in healthcare professionals (nurses and physicians)

Trust was assessed using validated French language versions of the Trust in Nurses Scale developed by Krajewska-Kulak *et al.*³⁷ (Cronbach's alpha >0.7) and the Trust in Physician Scale developed by Anderson and Dedrick (Cronbach's alpha >0.89).^{37–39} Combined, these trust scales comprised 10 statements, measured on a five-point Likert-like scale and answered 1 (I definitely disagree), 2 (I disagree), 3 (I neither agree nor disagree), 4 (I agree) or 5 (I definitely agree), resulting in a possible total score ranging from 10 to 50. Four statements were negatively worded, so their results were reversed for calculating the score. For a valid score, all 10 items had to be ticked. Although their authors documented no cut-off points for little, moderate or great trust, high scores meant elevated trust in nurses or physicians. To maintain consistency with the institutional value of collaborative practice, the wording in our combined trust-scale questions included the terms medical and nursing so as not to create a barrier between the professional bodies of physicians and nurses, especially in the pandemic context.

Feelings of safety during hospitalisation

Participants' feelings of safety were explored using Dryhurst *et al.*'s¹³ Risk Perception During Pandemics question, 'Did you feel safe throughout your hospital stay?'. Participants rated their feelings of safety on a scale from 0 (not at all safe) to 10 (extremely safe).

Perceived severity of a SARS-CoV-2 infection

Perceptions of the severity of a SARS-CoV-2 infection were investigated using the question, 'How serious (on a scale from 1 to 5) do you think a SARS-CoV-2 infection would be for you if you contracted it?'. This was taken from the standard questionnaire on risk perception of an infectious disease outbreak by the Municipal Public Health Service of Rotterdam-Rijnmond.⁴⁰ Participants answered using a five-level Likert-like scale including 'not at all serious', 'not very serious', 'slightly serious', 'serious' and 'very serious'.

Data collection procedure

All eligible participants received a letter by post inviting them to participate in the survey, followed by a reminder 2 weeks later. Besides the enclosed paper questionnaire, an introductory page explained the study's background, the data sought and the participant protection strategy. Participants were invited to complete the electronic (URL link) or paper questionnaire and return it in the prepaid envelope provided. For reasons involving ethics approval and extreme workloads at the hospital's data warehouse, data collection only started in August and finished at the end of December 2020 (figure 2).

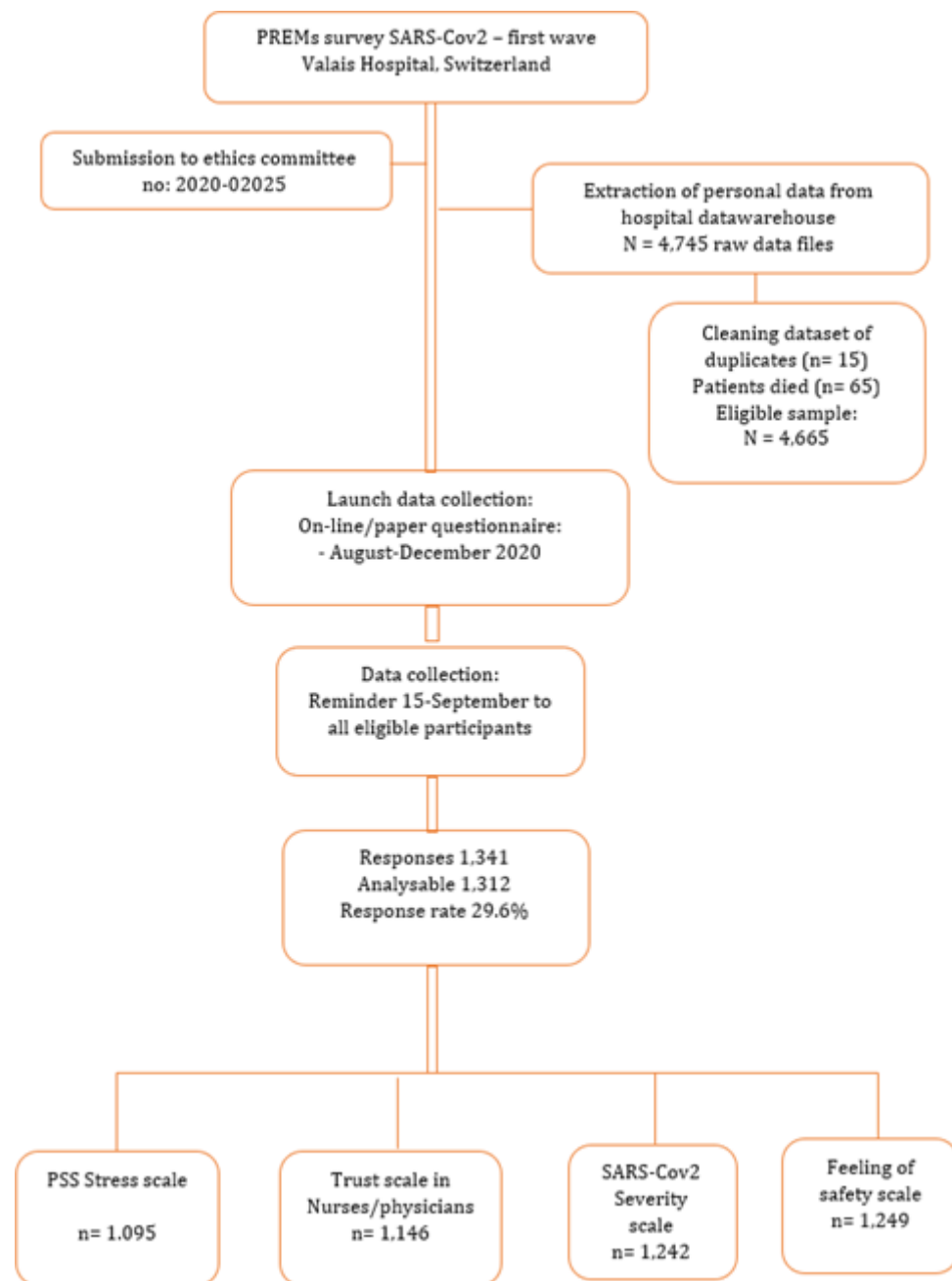


Figure 2 Flow chart of the data collection procedure. PREMs, patient-reported experience measures; PSS, Perceived Stress Scale.

Data analyses

Data from the self-reported questionnaires returned were extracted into an Excel spreadsheet (Microsoft, Redmond, Washington, USA), cleaned and imported into IBM SPSS software, V.27 (IBM Corp, Armonk, New York, USA), for analyses. The sample was described using descriptive statistics such as frequencies, distributions and leading trends. Data collected using Likert scales were analysed using descriptive and inferential statistics. Two important issues in large-sample surveys are the response rate and the management of missing values. We analysed the number of responses and missing values for each variable and reported them in our tables (n=answers).

Missing values were not replaced using any missing value strategy (eg, multiple imputations and mean score).⁴¹

Bivariate analyses were conducted using cross-tabulations between infected respondents and their scores for stress, trust in healthcare professionals, feelings of safety and the perceived severity of a SARS-CoV-2 infection during their hospitalisation sequence. Comparisons between males and females and scale scores were computed using the Wilcoxon non-parametric exact test. Comparisons between age groups, hospitalisation units and questionnaire scale scores were computed using the non-parametric Kruskal-Wallis test. Associations between stress, trust, feelings of safety and the perceived severity

of a SARS-CoV-2 infection, whether or not respondents contracted a SARS-CoV-2 infection, were calculated against respondents' sociodemographic characteristics and their hospital length of stay (LOS). Generalised estimating equations were computed to predict how inpatients, whether infected with SARS-CoV-2 or not, perceived stress, trust, feelings of safety and the severity of a SARS-CoV-2 infection. The model estimated each predictor's impact, other things being equal, by estimating its net impact controlling for the confounding factors of sex, age and LOS. The general estimating equations model gave predictions for the entire sample, not just for specific individuals. Since the data were based on a general population, not a sample, the ORs' CIs and other statistical tests were used to indicate the robustness of relationships, since ORs and CIs usually only make sense for statistical inference. Finally, multivariate linear regressions of the stress scores were calculated using the variables that might predict them—trust, feelings of safety and severity of a SARS-CoV-2 infection scores—adjusted for sex, age and LOS. Results were considered statistically significant when $p < 0.01$. All p values were based on two-tailed tests. All the analyses were supervised, reviewed or computed by a biostatistician.

Patient and public involvement

Before the survey, four patients were involved in constructing the research questions and determining priorities, experiences and preferences. Eligible participants ($n=4665$) and their participating proxy relations were subsequently invited to complete the questionnaire.

RESULTS

Response rate

Of 4665 eligible inpatients, 1341 respondents returned the self-reported questionnaire by post and none by the electronic link. Some reported additional information by phone or email. From this overall response rate of 29.6%, a total of 1312 questionnaires were more than 80% completed and analysable (figure 2).

Participants' characteristics and stress during hospitalisation

The mean participant age was 60.3 years old, with a min-max age range of 18–99 years. Detailed sociodemographic data are documented in table 1. The mean participant LOS was 15.1 days ($SD=26.7$). During the study period, 141 (10.9%) respondents were tested positive for a SARS-CoV-2 infection by the hospital laboratory, and 1148 (89.1%) were uninfected. Except for 228 (17.4%) respondents who did not know or mention the unit in which they were hospitalised, 300 patients (22.9%) reported hospitalisation in the surgery department, with 240 (18.03%) in general medicine, 169 (12.9%) in gynaecology/obstetrics, 44 (3.4%) in psychiatry, 24 (1.8%) in a rehabilitation unit with no declared pathway through another acute care unit and 77 (5.9%) stayed in more than one medical, surgical or rehabilitation unit. Thus, 229 participants (17.5%)

Table 1 Study participants' sociodemographic and hospitalisation characteristics

Characteristics	Participants
Age ($n=1195$)	
Mean (SD)	60.3 (19.4)
Median (IQR 1–3)	64 (45–76)
Min–max	18–99
Age groups ($n=1195$)	
18–34 (%)	185 (15.5)
35–55 (%)	238 (19.9)
56–64 (%)	183 (15.3)
65–74 (%)	253 (21.2)
75 and more (%)	336 (28.1)
Sex ($n=1291$)	
Male (%)	619 (47.9)
Female (%)	672 (52.1)
Marital status ($n=1161$)	
Single (%)	451 (34.3)
Married (%)	579 (44.1)
Divorced/separated (%)	131 (10.0)
Widowed (%)	84 (6.4)
Educational level ($n=1211$)	
Compulsory education (%)	375 (28.6)
Secondary education (%)	547 (41.7)
High school/university (%)	289 (22.0)
Length of stay (days) ($n=1080$)	
Mean (SD)	15.1 (26.7)
Min–max	1–280
SARS-CoV-2 infected ($n=1289$)	
Yes (%)	141 (10.9)
No (%)	1148 (89.1)
Hospital unit ($n=1312$)	
ICU (%)	230 (17.5)
Surgery (%)	300 (22.9)
Medicine (%)	240 (18.3)
Gynaecology (%)	169 (12.9)
Psychiatry (%)	44 (3.4)
Rehabilitation (%)	24 (1.8)
Other units (%)	228 (17.4)
Complex trajectory* (%)	77 (5.9)
*Two hospital units or more. ICU, intensive care unit.	

followed a complex pathway through continuing care, intensive care and another acute medical or surgical unit.

Stress during hospitalisation

A total of 1095 participants completed the PSS Cohen's stress scale, with an average score of 24.1 ($SD=7.7$);

**Table 2** Perceived Stress Scale scores by participant subgroup

	Min-max	Median (IQR1-3)	Lower n (%)	Moderate n(%)	Higher n (%)	P values
Sex (n=1060)*						
Male (n=517)	10-48	23 (18-28)	47 (9.1)	309 (59.8)	161 (31.1)	<0.001
Female (n=543)	10-50	25 (19-31)	43 (7.9)	288 (53.0)	212 (39.0)	
Age groups (n=991)†						
18-34 (n=164)	10-50	24 (19-31)	12 (7.3)	95 (57.9)	57 (34.8)	0.381
35-55 (n=216)	10-46	24 (19-29)	14 (6.5)	123 (56.9)	79 (36.6)	
56-64 (n=158)	10-45	24 (19-29)	12 (7.6)	95 (60.1)	51 (32.3)	
65-74 (n=220)	10-41	23 (18-28)	20 (9.1)	129 (58.6)	71 (32.3)	
75 or more (n=233)	10-48	25 (18-30)	25 (10.7)	116 (49.8)	92 (39.5)	
SARS-CoV-2 infected (n=1061)*						
Yes (n=117)	10-46	25 (19-30)	11 (9.4)	60 (51.3)	46 (39.3)	0.155
No (n=944)	10-50	24 (18-29)	79 (8.4)	538 (57.0)	327 (34.6)	
Hospital unit (n=1075)‡‡						
ICU (n=193)	10-50	23 (19-30)	12 (6.4)	105 (55.9)	71 (37.8)	<0.001
Surgery (n=249)	10-46	22 (17-27)	32 (12.9)	151 (60.6)	66 (26.5)	
Medicine (n=200)	10-46	24 (18-28)	12 (6)	114 (57)	74 (37)	
Gynaecology (n=155)	10-45	25 (20-30)	9 (5.8)	91 (58.7)	55 (35.5)	
Psychiatry (n=35)	10-46	28 (22-34)	4 (11.4)	14 (40)	17 (48.6)	
Rehabilitation (n=16)	17-40	31 (26-33)	0 (0)	5 (31.3)	11 (68.8)	
Other units (n=164)	10-46	25 (19-29)	18 (11)	84 (51.2)	62 (37.8)	
Complex trajectory (n=63)§	10-43	24 (17-31)	4 (6.4)	36 (57.1)	23 (36.5)	

Note: 0-13=low stress; 14-26=moderate stress; 27-40=high stress.

*Wilcoxon exact test.

†Kruskal-Wallis test.

‡Lowest mean severity significantly different from the other units.

§Two hospital units or more.

ICU, intensive care unit.

females (mean 25.1; SD=7.4) and participants hospitalised in the psychiatric department (mean 27.5; SD=9.4) or the rehabilitation/geriatric department (mean 29.9; SD=6.4) scored higher. Males and females showed a statistical difference ($p<0.001$). No statistically significant differences were found between those participants infected with SARS-CoV-2 and those not ($p=0.080$), and between age groups ($p=0.381$). The overall distribution of mild, moderate and high PSS scores was 91 (8.5%), 600 (56.1%) and 379 (35.4%), respectively. Significant differences were found between the lowest mean severe PSS stress scores between hospital units ($p<0.001$) (table 2).

Trust in medical nursing staff

A total of 1146 participants completed the physician/nurses trust scales, with an overall mean trust score of 33.8 (SD=4.0). The median trust score among males (34; IQR1-3=32-36) was significantly higher than among females (33, IQR1-3=31-35) and showed a significant difference ($p<0.001$). The 18-34 years age group had the lowest mean trust score (32, IQR1-3=30-35), whereas the >75 age group had the highest mean trust score (34, IQR1-3=32-37) no significant difference ($p=0.381$).

Unfortunately, we found no literature on the physician/nurses trust scales describing cut-off points for no trust, mild trust, moderate trust or high trust (table 3).

Perceived severity of a SARS-CoV-2 infection

A total of 1,242 participants completed the severity of a SARS-CoV-2 infection question with an overall mean score of 3.8 (SD=0.9) and a median score of 4 (IQR 1-3=1-2). Among inpatients in different units, those hospitalised in the psychiatry department perceived the lowest mean severity, with a median score of 3 (IQR 1-3=3-4). Significant differences were found between the age groups ($p<0.001$) and the hospitalisation units ($p<0.001$) (table 4).

Feelings of safety during the hospital stay

Overall, we found a mean and median score of 8.4 (SD=1.8) and 9 (IQR1-3=8-10), respectively, among the 1249 participants who felt safe during their hospital stay, with a small but statistically insignificant difference between participants infected with SARS-CoV-2 and those not ($p=0.107$). No differences were found between males and females, between age groups or between

Table 3 Participants' trust in healthcare professionals (nurses and physicians)

	Min–Max	Median (IQR 1–3)	P values
	19–50	33 (31–36)	
Sex (n=1133)*			
Male (n=550)	22–50	34 (32–36)	<0.001
Female (n=583)	19–50	33 (31–35)	
Age groups (years) (n=1049)†			
18–34 (n=173)	19–50	32 (30–35)	0.381
35–55 (n=225)	21–50	33 (31–34)	
56–64 (n=168)	26–50	33 (31–35)	
65–74 (n=219)	20–50	34 (32–36)	
75 and more (n=264)	20–50	34 (32–37)	
SARS-CoV-2 infected (n=1136)*			
Yes (n=134)	21–50	33 (31–35)	0.155
No (n=1002)	19–50	33 (31–36)	
Hospitalisation unit (n=1146)†‡			
ICU (n=206)	21–50	34 (32–36)	<0.001
Surgery (n=258)	19–50	33 (32–36)	
Medicine (n=214)	20–49	33 (31–35)	
Gynaecology (n=161)	24–50	32 (31–35)	
Psychiatry (n=40)	20–44	32 (30–35)	
Rehabilitation (n=19)	16–39	33 (31–35)	
Other units (n=179)	25–50	34 (32–37)	
Complex trajectory (≥2 units during hospitalisation) (n=69)§	23–46	34 (31–37)	

*Wilcoxon exact test.
 †Kruskal–Wallis test.
 ‡Lowest mean severity significantly different from the other units.
 §Two hospital units or more.
 ICU, intensive care unit.

hospitalisation units, including among patients with complex trajectories (table 5).

Associations between sociodemographic characteristics, hospital units and the severity of SARS-CoV-2 infection and scores for trust, stress and feelings of safety

Mildly significant positive associations⁴² were found between age and trust scores ($R_s=0.201$), between age and perceived severity of SARS-CoV-2 scores ($R_s=0.134$), between sex (female) and perceived stress scores ($R_s=0.114$), and between sex (female) and trust scores ($R_s=0.137$). Hospital LOS showed mild significant positive associations with the stress, trust and perceived severity of SARS-CoV-2 scores. A mildly significant negative association was found between inpatients infected with SARS-CoV-2 and the perceived severity of a SARS-CoV-2 infection score ($R_s=-0.087$). A mildly significant positive association was found between trust and feelings of

safety scores ($R_s=0.147$) and between trust and perceived severity of a SARS-CoV-2 infection scores ($R_s=0.123$) (online supplemental file 2).

Multivariate regressions

Multivariate logistic regression of infected and non-infected SARS-CoV-2

A simultaneous multiple logistic regression was computed to assess whether patients infected with SARS-CoV-2 showed significantly higher scores for stress, trust, feelings of safety and perceived severity of a SARS-CoV-2 infection when adjusted for sex, age and LOS. Our results showed a significantly higher ORs for the stress score (OR=1.034; 95% CI 1.004 to 1.065; $p=0.027$) but not for the trust, feelings of safety and perceived severity of a SARS-CoV-2 infection scores (table 6). Adjusting the model for sex, age and LOS did not improve the fits, with log-likelihood values from 684.905 to 660.670, and having a SARS-CoV-2 infection's predictivity of stress, calculated using Nagelkerke's R^2 , ranged from 0.018 to 0.066 (table 6).

Multivariate linear regressions of the stress scores

Simultaneous multiple linear regression was conducted to investigate the best predictors of stress scores. The combination of trust scores, feelings of safety, the perceived severity of a SARS-CoV-2 infection—adjusted for sex, age and LOS—significantly predicted stress scores ($F(7, 1105)=7.874$; $p<0.001$). Additionally, feelings of safety and the perceived severity of a SARS-CoV-2 infection significantly predicted discharged patients' stress scores (table 7). The adjusted R^2 value was 0.105, indicating that the adjusted model explained 10.5% of the variance in the stress scores. According to Cohen, this is a mild-to-moderate effect.⁴²

DISCUSSION

To the best of our knowledge, this is the first investigation based on the PREMs framework to be carried out among discharged patients and their relatives during the COVID-19 pandemic's first wave.⁴³ Although this survey employed an extended multidimensional questionnaire, the response rate from the eligible population was good (figure 2), suggesting that discharged patients and their relatives wanted to express their lived experiences during an exceptional health crisis, but the assurance of anonymity probably contributed too. Our survey gave discharged patients and their relatives the chance to explain their experiences and formulate suggestions for improving patient-centred care and care organisation.⁴² Half of the respondents wrote additional comments on their paper questionnaire or added pages to express emotionally charged comments; they also inserted punctuation marks into the closed questions or repeatedly underlined particular words and explained stressful experiences during hospitalisation and at discharge in their own words. The COVID-19 pandemic undoubtedly created never before encountered challenges and affected

Table 4 Participants' perceived severity of a SARS-CoV-2 infection

	Not at all serious n (%)	Not very serious n (%)	Slightly serious n (%)	Serious n (%)	Very serious n (%)	Median (IQR1–3)	P values
Sex (n=1229)*							
Female (n=639)	9 (1.8)	31 (4.9)	173 (27.1)	277 (43.3)	149 (23.3)	4 (3–4)	0.552
Male (n=590)	11 (1.9)	27 (4.6)	158 (6.8)	240 (40.7)	154 (26.1)	4 (3–5)	
Age groups (years) (n=1137)†							
18–34 (n=183)	3 (1.6)	21 (11.5)	67 (36.6)	59 (32.2)	33 (18.0)	4 (3–4)	<0.001
35–55 (n=235)	6 (2.6)	11 (4.7)	77 (32.8)	96 (40.9)	45 (18.9)	4 (3–4)	
56–64 (n=180)	3 (1.7)	6 (3.3)	42 (23.3)	86 (47.8)	43 (23.9)	4 (3–4)	
65–74 (n=242)	3 (1.2)	6 (2.5)	54 (22.3)	105 (43.4)	74 (30.6)	4 (4–5)	
75 and more (n=297)	5 (1.7)	13 (4.4)	71 (23.9)	133 (44.8)	75 (25.3)	4 (3–5)	
SARS-CoV-2 infected (n=1231)*							0.171
Yes (n=139)	2 (1.4)	6 (4.3)	36 (25.9)	51 (36.7)	44 (31.7)	4 (3–5)	
No (n=1092)	17 (1.6)	52 (4.8)	295 (27)	470 (43)	258 (23.6)	4 (3–4)	
Hospitalisation unit (n=1173)‡							
ICU (n=222)	2 (0.9)	8 (3.6)	44 (19.9)	91 (41.2)	76 (34.4)	4 (4–5)	<0.001
Surgery (n=288)	1 (0.3)	12 (4.2)	90 (31.4)	131 (45.6)	53 (18.5)	4 (3–4)	
Medicine (n=232)	3 (1.3)	9 (3.9)	59 (25.4)	94 (39.2)	67 (28.9)	4 (3–5)	
Gynaecology (n=167)	4 (2.4)	8 (4.8)	55 (32.9)	67 (40.1)	33 (19.5)	4 (3–4)	
Psychiatry (n=41)	2 (4.9)	5 (12.2)	16 (39)	11 (26.8)	7 (17.7)	3 (3–4)	
Rehabilitation (n=22)	2 (9.1)	2 (9.1)	2 (9.1)	7 (31.8)	9 (40.9)	4 (3–5)	
Other units (n=201)§	8 (4)	12 (6)	57 (28.4)	82 (40.8)	42 (18.4)	4 (3–4)	

*Wilcoxon exact test.
†Kruskal-Wallis test.
‡Lowest mean severity significantly different from the other units.
§Two hospital units or more.
ICU, intensive care unit.

patients' healthcare experiences, particularly if they did not have any direct support from their relatives. The Valais Hospital installed rigorous monitoring and hygiene measures at the pandemic's onset, prohibiting visits and provoking the additional stress—especially among older inpatients—mentioned in many respondents commentaries and in line with public health reporting.^{44 45} Respondents reported that regular revisions to hospital and federal government regulations influenced routine daily clinical care procedures,⁴⁶ amplifying stress and feelings of unsafety, in line with similar experiences cited by Adamson and Francis among 590 inpatients in London.⁴⁴ This increased stress and uncertainty, especially among older inpatients, as confirmed by our regression analysis and in line with patients' experiences in UK hospitals.^{44 45} Furthermore, the Valais Hospital placed patients with a confirmed SARS-CoV-2 infection in separate hospital units with dedicated staff. Although numerous studies have reported the effectiveness of these restrictive measures on hospital performance and disease management,^{47 48} our respondents did not always understand them. They probably provoked additional stress (OR=1.032), corroborating the lived experiences reported by Adamson and Francis.⁴⁴ Respondents aged 65 years or older had higher

scores for perceived stress and the perceived severity of a SARS-CoV-2 infection than younger respondents. We hypothesise that the information circulating about older adults being at a high risk of a SARS-CoV-2 infection, and the associated higher mortality rates, duly influenced older respondents' perceptions and feelings of safety. Not surprisingly, respondents who were infected with SARS-CoV-2 had a significant risk ratio for stress. Unexpectedly, and despite the quite extraordinary health situation, we found that only 10.5% (a small effect) of the variance in stress scores was explained by the simultaneous influences of trust, feelings of safety, perceived severity of a SARS-CoV-2 infection and actually being infected by SARS-CoV-2. The hospital's protective measures for patients exposed to the SARS-CoV-2 virus enabled the adoption of coping strategies to manage an individual's perceived risk and their feelings of safety from infection, confirmed by the Kalaitzaki *et al.*⁴⁷

Although public information was inconsistent and misinformation was circulating both inside and outside the Valais Hospital, respondents mostly maintained their trust in the hospital's healthcare staff, a testimony to the patient-centred care provided during the COVID-19 pandemic. It was not surprising that the longer

Table 5 Participants' feelings of safety

	Min–max	Median (IQR 1–3)	P values
Sex (n=1236)*			
Male (n=598)	1–10	9 (8–10)	
Female (n=638)	1–10	9 (8–10)	0.751
Age groups (years) (n=1145)†			
18–34 (n=180)	1–10	9(7–10)	
35–55 (n=237)	1–10	9 (8–10)	
56–64 (n=178)	1–10	9 (8–10)	
65–74 (n=243)	1–10	9 (8–10)	
75 and more (n=307)	1–10	9 (8–10)	0.332
SARS-CoV-2 infected (n=1238)*			
Yes (n=139)	1–10	8 (8–10)	
No (n=1099)	1–10	9 (8–10)	0.107
Hospitalisation unit (n=1249)†‡			
ICU (n=223)	3–10	9 (8–10)	0.217
Surgery (n=288)	3–10	9 (8–10)	
Medicine (n=232)	1–10	9 (8–10)	
Gynaecology (n=167)	1–10	9 (8–10)	
Psychiatry (n=43)	1–10	9 (7–10)	
Rehabilitation (n=22)	1–10	8 (7–10)	
Other units (n=201)	1–10	9 (8–10)	
≥2 units during hospitalisation (n=73)§	1–10	8 (7–10)	

*Wilcoxon exact test.
 †Kruskal-Wallis test.
 ‡Lowest mean severity significantly different from the other units.
 §Two hospital units or more.
 ICU, intensive care unit.

a respondent's LOS, the more they felt stressed and perceived SARS-CoV-2 infections to be severe. Contrarily, the longer their LOS, the higher respondents scored their trust and feelings of safety. Hospitalised respondents infected with SARS-CoV-2 (9.3% of respondents) showed significant associations with the perceived severity of a SARS-CoV-2 infection and perceived stress scores. Those results corroborated a recent study by Reile *et al*⁴⁸ among the general adult population in Estonia, which stated that 52.2% of 18–79 year-olds reported elevated stress levels related to the COVID-19 outbreak. According to Rossi Ferrario *et al*,⁴⁹ three-quarters of patients hospitalised in COVID-19 units required psychological treatment in the form of cognitive-behavioural therapy, a technique adaptable to each patient's specific needs.

Respondents had moderate scores for their perception of the severity of a SARS-CoV-2 infection. Our study highlighted that respondents had good scores for feelings of safety in the Valais Hospitals and expressed their trust in healthcare professionals. Furthermore, older respondents expressed more trust in healthcare professionals than

did younger ones, although without significant differences. Overall, participants felt safe, even those infected by the SARS-CoV-2. We hypothesise that those results are probably related to the appropriate management of the COVID-19 pandemic, including appropriate psychological support inside the hospital. This was not in line with Fancourt *et al*'s⁵⁰ results (2020); however, reporting that feelings of unsafety and worry about catching COVID-19 has been consistently prevalent among many people since the pandemic began and that people avoided healthcare settings, such as hospitals, due to the perceived increased risk there.⁵¹ After the outbreak, consultations at accident and emergency units dropped significantly.^{52 53} Not seeking help or delaying treatment can lead to less successful medical interventions or more intensive treatments later, premature death and longer waiting lists. Hospitals must thus work harder to provide safe environments and ensure that people feel safe and protected when attending them.^{54–56}

This PREMs survey will help strengthen collaborative practices and patients' power to influence improvements to care, allowing them to voice their interests. Their input will enable adjustments to institutional actions such as visiting restrictions, discharge planning or communications, thus responding to patients' expressed needs and not only to patient-reported outcomes measures or to other potential professional interests. Valais Hospital conducted governance reviews, clinical studies and surveys of its professional staff after the pandemic's first wave. It therefore appeared essential to consider the experiences of the people primarily affected by any hospital reorganisation: patients and their relatives. The Organisation for Economic Co-operation and Development (OECD) sees a shift towards patient-centred care as a priority, one requiring openness to other ways of collecting information from patients.⁴³ Hence the relevance of collecting patients' views on how healthcare services are delivered by nurses and physicians, staff responsiveness, the coordination of care and hospital discharge, and their experiences while receiving that care.⁴⁵ Increasing the use of PREMs surveys makes it possible to integrate these indicators at all levels, from design and planning to performance evaluation and healthcare system efficiency.

Strengths and limitations

This survey presents numerous strengths but also some limitations. To the best of our knowledge, this is the first large-sample PREMs survey carried out in Switzerland within the framework of the COVID-19 pandemic, including hospitalised patients and their significant informal caregivers. Furthermore, this survey employed psychometric validated questionnaires to investigate the appropriate PREMs concepts among discharged patients and their informal caregivers. Another strength of this large-sample survey is undoubtedly its significant return rate of almost 30% for a lengthy questionnaire. Furthermore, its almost equal distribution between sex and age

Table 6 Multivariate logistic regressions predicting stress, trust, safety and perceived severity of a SARS-CoV-2 infection among discharged patients who had been infected by SARS-CoV-2, adjusted for age, sex and LOS (n=1108)

Variables	B*	SE	Wald†	df‡	Sig.§	Exp(B)¶	95% CI for Exp(B)	
							Under limit	Upper limit
PSS scores	0.034	0.015	4.911	1	0.027	1.034	1.004	1.065
Trust scores	-0.031	0.030	1.081	1	0.298	0.970	0.915	1.028
Feeling of safety	-0.046	0.057	0.666	1	0.414	0.955	0.854	1.067
Severity of a SARS-CoV-2 infection	0.183	0.118	2.423	1	0.120	1.201	0.954	1.512
Sex	0.618	0.215	8.257	1	0.004	1.855	1.217	2.828
Age	0.020	0.006	10.171	1	<0.001	1.020	1.008	1.032
Hospital length of stay (LOS)	-0.006	0.005	1.535	1	0.215	0.994	0.985	1.003
Intercept	-4.198	1.186	12.530	1	<0.001	0.015	-	-

Bold values indicate significant odds ratios.

*Estimated multinomial logistic regression coefficients for the model.

†Wald χ^2 test tests the null hypothesis that the estimate equals 0.

‡Df for each of the variables included in the model.

§P values.

¶ORs for the predictors.

PSS, Perceived Stress Scale.

groups can be considered representative of the canton of Valais' hospitalised adult population during this specific period, reinforcing the external validity of our results.

One limitation of this study is its interpretation outside the context of the COVID-19 pandemic's first wave. Valais Hospital had never before conducted a PREMs survey and, to the best of our knowledge, no similar large-sample studies of >1000 participants were conducted during this period, making comparisons with our results difficult. The self-reported questionnaire was constructed especially for this survey, and its psychometric properties (including sensitivity analysis) could not be tested in the time available.

Another limitation was the delay between participants' hospitalisation and their self-reported survey responses due to the lengthy delays in ethics approval procedures at the time and the high workloads at the hospital's data warehouse. When developing the self-reported questionnaire, we could not find any literature on the physician/nurses trust scales about cut-off points between no trust, mild trust, moderate trust and high trust. Furthermore, for several years before the COVID-19 pandemic, the

Valais Hospital systematically invited patients to share their opinions and rate their satisfaction with the hospital's organisation and performance; the present survey did not investigate discharged patients' satisfaction so as to avoid redundancies, and this could be considered a limitation. Unfortunately, we do not have baseline assessments of patients' trust in health staff from before the pandemic's onset, so no comparisons with this study are possible. However, these results represent the situation during the COVID-19 pandemic's first wave and could prove useful for further studies exploring trust in health-care staff.

In order to maintain the specificity of the PREMs concepts considered, we did not report on the results of the significant informal caregivers who completed the self-reported questionnaire. Indeed, studies based on PREMs are usually regarded as a low level of evidence, as completion may lack rigour and the accuracy of information cannot be verified. In addition, the content of the concepts explored has still not been standardised, and we could have missed some relevant experiences among the respondents.

Table 7 Multivariate linear regression analysis of trust, feelings of safety and perceived severity of a SARS-CoV-2 infection predicting discharged patients' stress scores, adjusted for age, sex and LOS (n=1112)

Variables	B	SE	Exp(B)	t	Sig.
Trust scores	0.099	0.056	0.052	1.765	0.078
Infected with SARS-CoV-2	1.012	0.657	0.044	1.540	0.124
Feelings of safety	-1.188	0.116	-0.299	10.282	<0.001
Severity of a SARS-CoV-2 infection	0.488	0.231	0.061	2.114	0.035
Intercept	31.718	2.056	-		

Note: $R^2=0.105$; $F(7, 1105)=7.874$; $p<0.001$.
LOS, length of stay.

CONCLUSION

This survey describes discharged patients' self-reported scores of perceived stress, their trust in healthcare staff, their perceived safety and their perception of the severity of a SARS-CoV-2 infection during the COVID-19 pandemic's first wave. Our results revealed higher scores for stress and perceptions of the severity of a SARS-CoV-2 infection among older respondents than younger ones (<65 years). Patients' reported feelings of safety in the Valais Hospitals showed acceptable scores; however, their trust in healthcare professionals scores were moderate. Participants even felt safe when they were infected by the SARS-CoV-2. Longer hospital lengths of stay increased respondents' trust in healthcare staff scores and their safety scores. In other words, the results of our study indicate that patients hospitalised during the first wave of the COVID-19 pandemic experienced significant feelings of stress concerning perceived symptoms of the illness, yet this did not affect their feelings of safety, trust in healthcare personnel or their perception of the severity of a SARS-CoV-2 infection. These measures are beneficial for the promotion and evaluation of patient-centred care. The PREMs data reported COVID-19's impact on the social determinants of health among patients, helping to identify opportunities for improving care and hospital trajectories through the following waves of this ongoing crisis and perhaps after it. This will help us to develop new care pathways, codesigned and coproduced with patients and their relatives, and it will ensure that patients' care preferences are understood and respected if possible. Future research will need to focus on embedding PREMs more broadly throughout healthcare institutions, increasing the utility of measures for healthcare users, clinicians and policymakers, and facilitating comparisons of patient-reported experiences internationally.

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