

The impact of social and professional support on health-related quality of life after hospitalization due to neurological or cardiovascular diseases before and during Covid-19 in Germany: Results of a patient survey

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Abstract

Background: Patients with acute cardiac or neurological events, such as heart attack or stroke, are often in need of social support after the event. It is known that social support has an influence on both physical and mental health and contributes significantly to recovery success. This study aims to investigate the influence of social and professional support on Health-Related Quality of Life (HRQOL) in patients with cardiac or neurological events. In addition, we will analyse whether COVID-19 plays a role in the presence of social and professional support.

Methods: We used data of the evaluation of the project IKK IVP (Innovation - Medical Care – Patient), an intervention project of the statutory health insurance fund IKK gesund plus. In the study the variables HRQOL, social support within household, social support beyond own household, professional support, COVID-19 etc. were used. In order to investigate the influence of social and professional support on HRQOL multiple variance analyses were performed.

Results: The results of the analyses of variance show an influence of professional support on both physical and mental health of HRQOL. The results further show a moderate influence of social support on mental health. A significant influence of COVID-19 on physical and mental health cannot be determined for the first lockdown in Saxony-Anhalt, Saxony, and Thuringia.

Conclusions: Patients with acute cardiac or neurological events benefit from social and professional support, especially in terms of mental health and, consequently, recovery success. Professional support can additionally increase HRQOL physical limitations are present as a result of the acute condition.

Trial registration: The evaluation study was registered at the German Registry on Clinical Trials (DRKS, Register-No DRKS00020510).

Introduction

Patients with acute cardiac or neurological conditions such as myocardial infarction or stroke often have to cope with long-term consequences and disabilities and are thus dependent on social support [1]. For those affected, it is therefore even more important to obtain sufficient social support. Social support arises, among other things, from social ties and networks and is an important resource for health and wellbeing [2]. Social resources - as help and support that come from the individual's social network - act as a psychosocial immune system and can ensure health [3]. In this context, social support assumes various functions. It includes emotional support on the one hand, and instrumental support on the other. Emotional support is characterized by feelings of caring and perceived understanding. Instrumental support, in turn, is characterized, for example, by help in accomplishing concrete tasks of everyday life [2]. Conversely, there is evidence in literature that social stressors, low or absent social integration, and lack of social support are significant risk factors [2,4-7]. People who do not feel adequately supported socially recover much more poorly and have an increased risk of mortality [2].

With regard to cardiovascular diseases, it has been shown that there is an important relationship between social support and recovery success. For example, Lurie et al. [8] demonstrate a lower risk of frailty and concomitantly higher self-reported health status in patients with

cardiac disease who receive high levels of social support. Elloker et al. [9] and Sharrief et al. [10] show faster and successful recovery of functional capacity and return to work after stroke with greater social support. Conversely, lack of social support leads to lower rates of survival and poorer overall prognosis in people with coronary artery disease [5,7].

In addition to physical health, the disease and the available social support also have an impact on mental health. It is well known that patients with cardiovascular diseases are at increased risk of depression after the event because of the challenge of adapting to the new situation [11-14] in stroke patients, this affects approximately 30% of all affected individuals [4]. Professional and social support can reduce the rate of depression and increase rehabilitation success after cardiovascular diseases such as myocardial infarction or stroke [11,12,14-16]. Kruithof

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et al. [15] reported that more support in challenging situations leads to more depressive symptoms because it confirms stroke patients' dependence on supportive people, whereas more everyday support reduces depressive symptoms because it increases patients' autonomy. Stroke patients with unmet social needs also report a lower quality of life, which in turn negatively affects motivation for rehabilitation as well as rehabilitation success [4,6].

The importance of social support in the everyday life of affected persons is thus considerable. In particular, a rich social network plays an important role in rehabilitation after cardiac or neurological events [17]. Given the restrictions during COVID-19, social networks are limited in use or become non-functional, so negative effects in terms of reduced social support of patients with cardiac or neurological events and their relatives can be expected [18,19].

The purpose of this study was to investigate the impact of social and professional support on Health-Related Quality of Life (HRQOL) in patients with cardiovascular or neurological events. Because some of the questioning also took place during COVID-19 we were also able to analyse HRQOL differences in this regard before and during COVID-19.

Methods

We used data of the evaluation of the project IKK IVP (Innovation - Medical Care - Patient; sponsor: Innovation Fund, Federal Joint Committee (G-BA) funding code: 01NVF17039, duration: 01.04.2018-31.12.2021), an intervention project of the statutory health insurance fund IKK gesund plus, which aims at continuous, demand-oriented and cross-sectoral health care for patients with a serious acute neurological or cardiovascular disease. In this study, we present results of the evaluation of the IKK IVP project, which was a new interdisciplinary care model. Participants were clients of the IKK gesund plus living in Saxony-Anhalt and clients of the IKK classic with residence in the federal states of Saxony or Thuringia. All participants were of legal age and were treated as in-patients with one of the main (index) diagnoses such as heart attack (I21, I22), stroke (I61, I63, I64), cerebrovascular diseases (I60, I62, I65, I66, I67, I68, I69), paralysis (G81, G82, G83) and intracranial injuries.

Participation in the new care model is voluntary on the part of patients and care partners. In order to participate in the programme, patients signed a declaration of participation and consent ('informed consent') in accordance with EU-DSGVO Art. 7 [20] by which they agree to the processing of their personal data as well using their claims data for evaluation (this takes place in a separate module, not mentioned in detail here). Once the informed consent had been obtained, patients were added to the programme. The insured persons of the IKK classic declared their participation in the study by implied action and return of the questionnaire.

The Ethics Commission of the University of Magdeburg approved the design of the evaluation study (Register-No. 59/18). The data protection commissioner of the state of Saxony-Anhalt also had no objections to the planned procedure.

Ten weeks after discharge from hospital, study participants were contacted and asked to complete our survey. The survey aimed to measure HRQOL and functional ability. In addition, the questionnaire contained additional program-specific items about participation in IKK-IVP and personal details about age, gender, living situation, support within household, support outside household, professional support, and timing of treatment between hospital, rehabilitation, and outpatient care.

Health-related quality of life

HRQOL was measured by using the Short Form Health Survey of the socioeconomic panel (SF-12v2 of SOEP) on a five-point Likert scale, which has proven to be a valid and is an often-used instrument assessing HRQOL [21,22,23]. According to Nübling et al. [24] the aggregated scores, Physical Component Scale (PCS) and the Mental Component Scale (MCS) were calculated. For further analysis, the arithmetic mean of both summary scales was used. The overall mean is 50 points (exactly the average value of the SOEP 2004), the standard deviation is 10 points [24].

Social support within household

Social support within household was measured on a question about the current housing situation in accordance with the Bundesgesundheits survey 1998 (BGS 98) [25]. The following responses were possible: solitarily living with a spouse/partner, living in nursing home or living with other family members. In addition, other could be specified as free text. Here additional information such as, single parenting, have Nursing staff or assisted living were given. For further analysis the categories living with a spouse/partner and living with other family members were combined.

Social support beyond own household: For collecting social support beyond own household, we asked: How many people do you have beyond your own household.

- with whom you can speak about your worries and problems?
- who can do smaller tasks and jobs for you?
- who could help you deal with offices and authorities if necessary?
- who would lend you money?
- which you visit or invite to your home?

The categories no one 1-2 people, 3-4 people, more than 4 people and I don't want to use were given. The five questions were summarized to a higher-level question in accordance with the Bundesgesundheits survey 1998 (BGS 98) [25]. How many people do you know beyond your own household on whose help you can definitely rely on in an emergency?" The highest given category was taken as the answer.

Professional support

Information on professional support was collected on the question: Do you currently have

- Nursing service
- Household help
- Catering service
- No support

We created a dichotomous variable (support yes/no), if at least one of the first three responses was given.

In addition, a list of characteristics was obtained by the health insurance for all patients with sociodemographic data (gender, age, place of residence) and disease-related data on initial care (index diagnosis, first appearance of disease, long-term care grade). Both data sources were linked via a unique study-ID.

Diagnostic groups

The index diagnoses (ICD-10-GM (Federal Institute for Drugs and Medical Devices)) [26] were categorized into five diagnostic groups

such as heart attack (I21, I22), stroke (I61, I63, I64), cerebrovascular diseases (I60, I62, I65, I66, I67, I68, I69), paralysis (G81, G82, G83) and intracranial injuries (S06 without S06.0). The index diagnosis was part of the characteristics we received by the health insurance funds.

Long-term care grade

In Germany, there is a need of long-term care grade defined by the Social Code (Book XI: Social Care) implemented in the Long-term care insurance by the Federal Ministry of Health, which consists of five long-term care grades [27,28]. These care grades represent a system for representation of the applicant's need of care and claims for social security benefits provided by the Long-term care insurance. The assessment, carried out for each applicant by the Medical Advisory Service for the statutory health insurance (MDK), considers the patient's resources to manage everyday life as well as the extent/grade of independence. The assessment is based upon six areas of day-to-day life: self-care (e.g. personal hygiene, eating, getting dressed), coping and dealing independently with illness and treatment-related demands and stresses, planning day-to-day living, and maintaining social contact, cognitive and communication skills, mobility, behavior and psychological issues. The MDK assigns a certain number of points to each area, which results in a total number of points from which the applicant is being allotted to one of the five long-term care grades as follows: No need of care grade (0-12.5 points); Stage 1: low need of care grade (12.5-27 points); Stage 2: considerable need of care grade (27-47.5 points); Stage 3: severe reduction of independency (47.5-70 points); Stage 4: drastic reduction of independency (70-90 points); Stage 5: highest score, special demands for care (90-100 points) [27]. The long-term care grades 1-3 and 4-5 were combined, respectively.

First occurrence of disease

The first occurrence of disease means if the treated in-patient index diagnosis is a first event or a subsequent event, where an index diagnosis was already documented in the two-year pre period. The dichotomous variable yes/no is created.

COVID-19

Due to COVID-19 pandemic, several contact restrictions came into force, were changed, or cancelled again during the duration of the program (the study period). These measures affected social and professional support, so we decided to form two groups for analysis, "before" and "during" COVID-19: Questionnaires received between 1st of April 2019 and 31st of Mai 2019 were considered "before COVID-19", questionnaires received between 1st of April 2020 and 31st of Mai 2020 "during COVID-19".

Statistical analyses

For descriptive analyses, counts and percent were computed for all categorical variables, mean for continuous variables. Differences between before and during corona were statistically analyzed using Pearson's chi-square test for all categorical variables and Student's t-test for all metric variables.

In order to investigate the influence of social and professional support on HRQOL with consideration of other independent variables such as COVID-19, multiple variance analyses (stepwise UNIANOVA) were performed: the first model (model 1) with the PCS as dependent variable, the second model (model 2) with the MCS as dependent variable. In both models, the same independent variables were assessed in stepwise modelling: In the first step the sociodemographic variables gender, age groups and place of residence were considered initially.

In a second step, diagnostic groups, long-term care grade and first occurrence of disease as disease-related influencing determinants were added. Third, the support variables social support within household, social support beyond own household and professional support were added.

SPSS 26 (IBM Corp, Armonk, NY) was used for statistical analyses. No missing values were imputed. A p-value of <0.05 was considered statistically significant.

Results

Characteristics of the random sample before and during COVID-19-pandemic

Men were more likely to participate in the survey at 65.9% (before COVID-19) and 67.6% (during COVID-19). The age groups of 60-69 years (32.6% before COVID-19) and 70-79 years (32.7% during COVID-19) were most frequently represented. Respondents predominantly experienced a stroke (45.2% before COVID-19, 44.8% during COVID-19) or heart attack (37.0% before COVID-19, 37.7% during COVID-19). Most of the insured persons did not have a long-term care grade (84.4% before COVID-19, 85.8% during COVID-19). The event of interest (cardiovascular or neurological disease) occurred for the first time in 83.7% (before COVID-19) and 94.0% (during COVID-19) (significant differences between groups) (Table 1).

The highest proportion of insured respondents lived with their partner and/or other family members (79.3% before COVID-19, 80.1% during COVID-19). 40.7% (before COVID-19) and 37.0% (during COVID-19) of respondent's report having more than four people outside their household who would support them; very few respondents have no one outside their household for support. The majority of respondents (77.8% before COVID-19, 80.4% during COVID-19) report having no professional support in the form of a caregiver, home health aide, or meal provider. The physical as well as mental health of HRQOL of respondents before and during COVID-19 is approximately the same (PCS: 40.36 before COVID-19, 40.61 during COVID-19; MCS: 43.14 before COVID-19, 43.83 during COVID-19) and is about one standard deviation below SOEP 2004.

Impact of social and professional support on health

To investigate the long-term influence of social and professional support on the health of patients with cardiac and neurological events with concurrent effects of other sociodemographic and disease-related covariates, two analyses of variance were performed with physical (PCS) and mental (MCS) health of HRQOL as dependent variables (Table 2 and Table 3). The strength of the influence is indicated by the F and the adjusted R² by the variance resolution.

In stage three, adjustments were made for sociodemographic characteristics, disease-related variables, and social and professional support. In stage three, the model shows professional support as a significant influencing factor for PCS (p=0.031). Likewise, long-term care grade shows as a significant determinant, it has the strongest influence in the model of PCS (F=5.788). In the model of MCS, stage three shows social support outside the home (p=0.013) and Professional support as significant determinants (p=0.027). Diagnosis groups (p=0.003), long-term care grade (p=0.003), and age groups (p=0.002) also show up as significant determinants. In this model, long-term care grade also has the strongest influence (F=5.712), followed by age groups (F=4.332). Stage three explained the highest proportion of variance in each case (PCS 10.6%; MCS 18.0%). The final stage was adjusting for COVID-19. This does not improve variance resolution in either model

Table 1. Characteristics of the random Sample before and during COVID-19-Pandemic.

Characteristics of the random Sample before and during COVID-19-Pandemic					
		before COVID-19		during COVID-19	
		(n=270)	%	(n=281)	%
Gender	male	178	65.9	190	67.6
	female	92	34.1	91	32.4
Age groups	<50	21	7.8	14	5.0
	51-60	41	15.2	49	17.4
	61-70	88	32.6	83	29.5
	71-80	83	30.7	92	32.7
	>80	37	13.7	43	15.3
Place of residence	Saxony	114	42.2	135	48.0
	Saxony-Anhalt	101	37.4	85	30.2
	Thuringia	55	20.4	61	21.7
Diagnostic groups	Heart attack	100	37	106	37.7
	Stroke	122	45.2	126	44.8
	Cerebrovascular diseases	32	11.9	32	11.4
	Paralysis	2	0.7	6	2.1
	Intracranial injuries	14	5.2	11	3.9
Long-term care grade	No care grade	228	84.4	241	85.8
	Low care grade	38	14.1	38	13.5
	High care grade	4	1.5	2	0.7
First occurrence of disease*	yes	226	83.7	264	94.0
	no	44	16.3	17	6.0
Social support within household	living alone	41	15.2	43	15.3
	living with a spouse/partner and/or other family members	214	79.3	225	80.1
	Living in care institution	4	1.5	3	1.1
	other	11	4.1	10	3.6
Social support beyond own household	No one	4	1.5	4	1.4
	1-2 people	74	27.4	71	25.3
	3-4 people	72	26.7	92	32.7
	> 4 people	110	40.7	104	37.0
	I don't want to use/missing	10	3.7	10	3.6
Professional support	no	210	77.8	226	80.4
	yes	44	16.3	37	13.2
	missing	16	5.9	18	6.4
Health-Related Quality of Life		Mean		Mean	
	PCS			40.6	
	MCS			43.8	

*Significant impact (p < 0.05) between groups
 PCS = Physical Component Scale; MCS = Mental Component Scale

Table 2. Analyses of variance of PCS.

Modell 1	1		2		3	
	F	p-value	F	p-value	F	p-value
PCS						
gender	0.027	0.869	0.056	0.813	0.143	0.706
age groups	2.834	0.024	0.695	0.596	0.807	0.521
place of residence	0.738	0.479	0.544	0.581	0.515	0.598
diagnostic groups			0.477	0.753	0.520	0.721
long-term care grade			17.387	< 0.001	5.788	0.003
first occurrence of disease			3.952	0.047	2.767	0.097
social support within household					1.159	0.325
social support beyond own household					1.845	0.119
professional support					3.489	0.031
corrected R²	0.014		0.087		0.106	

p<0.05 refers to a significant impact on Physical Component Scale (PCS)

Table 3. Analyses of variance of MCS.

Modell 2	1		2		3	
	F	p-value	F	p-value	F	p-value
gender	0.611	0.435	0.189	0.664	0.067	0.731
age groups	3.279	0.011	4.094	0.003	4.332	0.002
place of residence	3.800	0.023	1.966	0.141	1.523	0.220
diagnostic groups			5.181	< 0.001	3.888	0.003
long-term care grade			19.311	< 0.001	5.712	0.003
first occurrence of disease			1.682	0.195	1.253	0.283
social support within household					1.139	0.368
social support beyond own household					3.166	0.013
professional support					3.613	0.027
corrected R ²	0.029		0.143		0.180	

p<0.05 refers to a significant impact on Mental Component Scale (MCS)

(PCS 10.4%; MCS 17.8%) (Therefore not shown in Tables 3 and 4). There is no significant effect of COVID-19 on the PCS and MCS.

Discussion

In this study, we investigated the influence of social and professional support on HRQOL in patients with cardiovascular or neurological events in light of COVID-19. For this purpose, in the first step, affected persons surveyed during the 1st prescription were descriptively compared with affected persons surveyed at the same time one year earlier with regard to sociodemographic and health-related variables and the presence of social and professional support. In the second step, two multiple analyses of variance were performed with physical (PCS) and mental (MCS) health for HRQOL as dependent variables, taking into account sociodemographic and health-related covariates as well as social and professional support.

Our data showed an influence of professional support on both physical and mental health of HRQOL. The degree of influence is moderate. It is hypothesized that a caregiver, home help, and/or meal delivery service may provide significant relief for patients with cardiovascular or neurological events in their daily lives and consequently have a positive effect on mental health. The health-protective effect of everyday support from the family environment and professional help is described in the following meta-analyses and systematic reviews. Rueda et al. [29] showed in a systematic review including 46 randomized controlled trials and controlled trials published in six databases between 1986 - 2011 that regular contact with a care service not only directly alleviates symptoms of illness, but also serves an important function for many patients as a mediator between them and the health care system [30], can lead to an improvement in quality of life [31], and serves as an important opportunity for social interaction [32]. In addition, a care service enables patients to live largely independently in their own homes despite limitations [33].

The results further show a moderate influence of social support on mental health of HRQOL. Knowing that there are people outside the household on whom one can rely when problems arise has a positive influence on mental health. Cai et al. [34] found a positive association between good social support and less pronounced symptoms of depression in study participants with cured Covid-19 infection. This corroborates previous studies showing that a social network plays an essential role in disease management of cancer [35] and rehabilitation after cardiac events [17]. Lack of social support, on the other hand, may be associated with increased susceptibility to disease [36] and reduced life expectancy [33]. For example, Valtora et al. [37] have shown that a lack of social relationships is associated with a 30% increased risk

of developing coronary heart disease and stroke. When considering HRQOL it should take into account whether affected individuals have a long-term care grade. Our data showed a moderate influence of the presence of a long-term care grade on both PCS and MCS. Several studies [31,38,39] confirm that a long-term care grade plays an important role in maintaining and enhancing quality of life and independence in chronic health needs, while not increasing the overall costs of health care.

Our data show differences in mental health of HRQOL with regard to age and the diagnosis group of the affected persons. Patients with neurological diseases such as a stroke or paralysis are often restricted in their mobility and consequently in their everyday life compared to patients with cardiovascular conditions, which has a negative impact on their mental health. Therefore, they are also more dependent on social support from their environment.

Analysis of variance additionally adjusted for COVID-19 (as a proxy for the time where contact restrictions were in place) showed no significant impact on HRQOL. Although the questionnaires completed during COVID-19 frequently indicated that social support outside the household was not currently available due to the contact ban, there were no significant differences between this and the presence of social support outside the household of those affected before the pandemic (Table 1). It is possible that the question about the existence of people outside the household who can be relied on in an emergency was also answered without considering the current contact ban. In addition, contacts may have been restricted, but not to those close family members or social support may have been necessary to an extent where it could not be dispensed with. Another possible reason is that in Saxony-Anhalt as well as in Saxony and Thuringia, the pandemic had only just begun at that time, so that the contact ban and the partial lockdown could not yet have had an impact on mental health. Furthermore, at the beginning of the pandemic in Germany, only a few COVID-19 cases had been recorded in Saxony-Anhalt, Saxony, and Thuringia (Robert-Koch-Institut [RKI] [40], where the virus could have had an impact on health. There is also evidence that in the first lockdown, it was not the elderly, who were part of the target group for the IKK IVP project survey, but rather middle-aged and young adults who suffered [41-43] as well as women and people with predisposing factors for a potentially severe course of COVID-19 such as age, obesity and diabetes [44].

When comparing those affected during and before COVID-19, only significant differences are evident as to whether the event occurred for the first time or was a repeat event. The fact that there were fewer re-events during the pandemic may be explained by the fact that there was also a delay in seeking medical help for acute cases, also related to myocardial infarction and stroke [45-47].

No conclusions can be made about long term consequences of COVID-19 on the development of physical and mental health, because HRQOL here was considered cross-sectionally once at the beginning of the pandemic.

Strengths and weaknesses of the study: The study combines claims data and primary data, including patient related outcomes. The survey also took place in part during the COVID-19 pandemic and the contact ban ordered as part of the pandemic response. Effects of COVID-19 on the survey were analyzed in this study and found to be statistically insignificant. However, data were also only used during the first lockdown in Saxony-Anhalt, Saxony, and Thuringia from April to May 2020. A selection bias has to be considered because very severely ill people did not participate in the survey.

Conclusions

Patients with an acute cardiovascular or neurological event benefit from social support, especially in terms of mental health of HRQOL. Just knowing that there are supportive people around, increases recovery success and reduces the rate of depression after the acute cardiovascular or neurological events. Professional support in the form of a carer, home help or meal provider not only has a positive impact on mental health of HRQOL but also on physical health of HRQOL. In many cases, support makes it possible to live as independently as possible in one's own home despite limiting consequences due to the cardiovascular or neurological acute events. This support leads to a significant relief for those affected in their daily lives and thus significantly increase their HRQOL. A significant influence of COVID-19 on physical and mental health cannot be determined for the first lockdown in Saxony-Anhalt, Saxony, and Thuringia. Differences in HRQOL before and during COVID-19 in patients with cardiovascular or neurological events could not be determined.

Declarations

Funding: The new form of care located at the IKK gesund plus is funded by Innovation Fund of the Federal Joint Committee, G-BA (funding code: 01NVF17039). The ISMG is a contractor of the IKK gesund plus and mandated with the evaluation of the new form.

Conflict of interest/Competing interests: The IKK gesund plus mandated the authors' institution (Institute of Social Medicine and Health Systems Research, University of Magdeburg, ISMG) to evaluate the IKK IVP intervention project. Both parties designed the study. The IKK gesund plus collected and provided the data. The ISMG as a contractor analyzed and interpreted the data. Neither the health insurance nor the sponsor was involved in writing of the article, nor the decision to submit the results for publication. Open Access funding enabled and by project DEAL.

Availability of data and materials: Statutory health insurance data are social data subject to special protection in Germany [48]. The datasets analysed during the current study are not publicly available as the transfer of the survey data to third parties has not been contractually agreed. Third parties had to contact the IKK gesund plus for permission for use of these data in scientific projects.

Code availability: Not applicable.

Authors' contributions: All authors have been involved in reviewing and editing the manuscript and have all read and approved the final draft.

Ethics approval

The evaluation study was approved by the Ethics Committee of the University of Magdeburg (Register-No. 59/18).

Consent to participate: Patients sign a declaration of participation and consent ('informed consent') in accordance with EU-DSGVO Art. 7 (Regulation (EU) 2016/679 of the European Parliament and of the Council on the protection of natural persons with regard to the processing of personal data and on the free movement of such data and repealing Directive 95/46/EC (General Data Protection Regulation), 2016) to participate in the programme. With the informed consent, they agree to the processing of their personal data. Once the informed consent has been obtained, patients are added to the programme.

The evaluation study is registered at the German Registry on Clinical Trials (DRKS, Register-No DRKS00020510).

Consent for publication: Not applicable.

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