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# Implementation of an electronic patient portal in routine mental health care of hospitals in Germany – evaluation of attitudes of healthcare providers

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## Abstract

**Background** The use of digital tools such as electronic patient portals in different health care disciplines and settings has been increasing, but the rate of implementation in clinical practice still lags behind expectations. While studies have linked the use of electronic patient portals to positive health outcomes for patients, studies addressing the viewpoints of healthcare providers are rare.

**Methods** We performed an online survey of attitudes of healthcare providers towards an electronic patient portal for mental health hospitals. The portal was developed by five communal providers of mental health care in different regions in Germany. The survey was carried out during the early phase of implementation of the portal.

**Results** Twenty project leaders and 37 clinicians from five different mental health hospitals answered the questionnaire (response rate: 45% and 28%). Overall, acceptance of online applications among respondents was high. The healthcare providers mentioned perceived benefits (e.g. accessibility of new patient groups, use of therapy-free periods) as well as a number of technical, structural, organizational and staffing barriers for successful implementation in hospital settings (e.g. workload of healthcare providers and lack of staff, limited digital competences, unstable WLAN).

**Conclusion** The perceived barriers and facilitators of the implementation of online applications and electronic patient portals in mental health hospitals identified by healthcare providers may be taken into account. Improving commitment of the healthcare providers to implementation and use of digital interventions may help foster digitalisation in mental health hospitals.

**Keywords** Digital platform, Electronic patient portal, Hospital mental health care, Therapist attitudes, Patient empowerment; implementation research

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## Background

Electronic patient portals are web-based systems through which patients can access personal health information or communicate and collaborate with their healthcare providers. The implementation of patient portals may be beneficial both for patients and providers and use of patient portals in different health care disciplines and settings has been linked to positive health outcomes, especially in somatic disorders, e.g. in cancer and diabetes [1–5]. Patient portals are used less frequently in the inpatient sector than in the outpatient sector [6], and benefits were shown: Reported benefits of patient portals in hospital services include improved communication between patients and caregivers [7], and enhanced self-management [8, 9] and self-efficacy for patients [10].

In mental healthcare, “stand-alone” digital applications are increasingly being used [11–13], but the implementation of patient portals is still limited and seems to lag behind expectations [14–16]. The use of patient portals may help in activation and patient empowerment, which have become important components of mental healthcare [8]. Specific functions, like secure messaging, may therefore be especially useful in mental health care and a high level of patient satisfaction with this function was shown in different studies [1]. In the Open Notes project and other projects with patient access to documentation or clinical notes, mental health care providers reported beneficial effects (e.g., increased transparency, increased patient involvement) as well as negative effects (e.g., impact on therapeutic relationship [16–20]).

The reasons for the lack of implementation of patient portals in hospital mental health care services may overlap with barriers for implementation of digital applications in general, such as lack of qualification, training and supervision of staff as well as technical, organizational and administrative factors [21, 22]. A critical attitude of clinical staff towards digital applications seems to play a role [23, 24]. Also, limited experience of clinical staff with online mental health care may be of relevance [25]. Moreover, specialty-specific barriers may play a role: psychiatrists reported more negative attitudes towards electronic patient portals compared to other medical disciplines, especially when patients could read doctors’ clinical notes, and psychiatrists who worked in acute care settings had even more negative perceptions of patient portals compared to those who worked in standard care units [26, 27]. While such barriers exist, clinician acceptance was described as a facilitator for the use of an electronic patient portal in people with mental disorders and comorbid substance use, and guidance from a clinical supervisor was shown to encourage the use of the portal [28].

Against this background, important aspects of the implementation of electronic patient portals in mental

healthcare remain unknown, especially from the perspective of healthcare providers. The implementation of patient portals so far focused on outpatient services, but the implementation processes in inpatient services are less well studied [29]. Our own previous review of studies in this area indicated that specific measures to implement electronic patient portals and other digital support systems are necessary in inpatient psychiatric services to foster implementation [30]. The main focus of our study was to evaluate viewpoints of healthcare providers towards an electronic patient portal in German mental health hospitals at an early stage of implementation and to identify barriers for implementation.

## Methods

We performed a questionnaire survey of attitudes of healthcare providers and experiences with a newly implemented electronic patient portal.

### Online platform and setting

The electronic patient portal ([www.curamenta.de](http://www.curamenta.de)) is a professional service offered by five public providers of mental health services in four different federal states of Germany. The providers operate 45 mental health hospitals with more than 500,000 inpatients per year (as of 2020). This is the study setting from which respondents were recruited. The platform *Curamenta* connects patients with practitioners using various digital services. Patients obtained access to the platform through their current inpatient treating physician and could use the platform during their inpatient stay. The platform had the following functions: (1) patient diary (patients can share the diary or excerpts from it with the treating physician); (2) messenger (only the treating physician can open and close the channel); (3) notes (for patients); (4) material pool (the treating physician and other members of the treatment team can provide work sheets, questionnaires etc.); (5) appointments/weekly schedule (appointments including changes/cancellations can be entered by the treating physician for patients in *Curamenta*); (6) digital health applications (“digitale Gesundheitsanwendung”; DIGA). The portal did not provide access to any aspects of medical records, laboratory results or clinical visit notes. All functions but 6) were already available at the time of the survey. The platform has been technically implemented in all clinics, but the number of users of the platform was heterogeneous at the different sites.

*The implementation process* of the platform is supported by an umbrella organisation (GDG; Gesellschaft für Digitale Gesundheit (Society for digital health), a non-profit organization for digital health), which connects partners at provider level. All five regional service providers are GDG associates. The implementation process was at an early starting phase at the time of the study

in 2023. Not all providers had already started training of staff and implementation into routine care. The study was performed by the research institute of one of the five providers (Section Research of the LVR (Rhineland Regional Council, Landschaftsverband Rheinland) Institute for Research and Education) in cooperation with GDG.

### Study population

Since the platform implementation was still in its starting phase when we conducted our study, there was no specific selection process for recruitment of participants. We basically invited all clinicians of all participating clinics who had already been trained in using the platform. Additionally, we also invited all local project leaders who were responsible at the clinic level to support the process of implementation locally. We therefore addressed two groups of participants: (a) 45 project leaders (PL) at provider and clinic levels; (b) 130 clinically active treating physicians and other members of the treatment team (“clinicians”; CL) who had been trained in the use of *Curamenta* and whose ward/department was in the pilot phase of implementing the online platform at the time of the surveys. Clinicians were psychiatrists, psychologists, nurses or social workers. Practical experience with the *Curamenta* platform was heterogeneous among clinicians: some clinicians had already used the platform in routine care with their patients, while others were practicing with test patients or had no practical experience at all.

### Procedures and data collection

The questionnaire consisted of 38 questions (Likert-type answer format) as well as four questions with open answer categories. The survey was anonymous and voluntary and took about 15 min per person. No expense allowance was paid. The surveys (including an information sheet about data protection) were conducted online in May and June 2023. The online links to the questionnaires were forwarded to the project leaders via the umbrella organisation. The project leaders forwarded the link to the respective clinicians at the level of their clinic. The questionnaires described below under the following headings 2, 3 and 5 below have been published elsewhere, questions under heading 1 and 4 were developed for this study. A translated version of the whole survey can be found in electronic appendix 1. The survey covered five areas:

- 1) *Socio-demographic and general information*: We assessed age (as by three age groups: younger than 30 years, 31–49 years, 50 years and older) and gender. Respondents rated their personal computer skills (“very poor” to “very good”, 5-point scale) and their previous professional experience with online

applications (“very little” to “very much”, 5-point scale). In addition, clinicians were asked whether they had already gained practical experience with the online portal (“yes, with real patients”, “yes, with test patients”, “no practical experience”).

- 2) *Attitude towards online applications*: We used the 8-item ATiPP questionnaire (Attitude toward Telemedicine in Psychiatry and Psychotherapy; [31]), which was translated in German by Sander and coworkers [25]. For the present study, the broader concept of “*telemedical interventions*” was narrowed down to “*online applications*” (“Online Anwendungen”) according to Sander [25]. Additionally, we evaluated the *willingness* to use online applications, separately for in- and outpatient setting according to Sander [25] in order to analyse setting-specific differences. We also assessed the level of staff knowledge about online applications (all questions used a 5-point scale: 1 = “not at all” to 5 = “very much”). Finally, we determined the expected attitude of others (family and friends; staff in clinic) by means of a 5-point scale (1 = “very negative” to 5 = “very positive”).
- 3) *Implementation*: We based our analysis on the Normalization Process Theory (NPT) [32] and used the German version of the *Normalization Measure Development* questionnaire (NoMAD) with small textual adaptations [33]. NoMAD is based on NPT and consists of 20 items to measure the attitudes and experiences of the respondents towards implementation (from “disagree” to “agree”, 5-point scale). These 20 items represent four scales for the domains coherence, cognitive participation, collective action and reflective observation. As planned by the authors of the NoMAD questionnaire, the placeholder “*intervention*” was replaced by the concrete name of the portal (“*Curamenta*”) and we specified the setting (“*clinic/clinic network*”) in order to enhance understanding of the questions by clinicians and project leaders.
- 4) *Evaluation of the functions of the online platform from a clinical perspective*: Clinicians rated six (planned) functions of the online platform on a 4-point scale (1 = “not at all useful” to 4 = “very useful”) or indicated “I cannot rate”.
- 5) *Perceived prerequisites, benefits, barriers and objections regarding the implementation of online applications in routine hospital care*: We employed the German version of an adapted self-rating questionnaire for providers of mental health services in Germany developed by Sander and coworkers [25] in an open response format. Four open questions were asked at the end of the questionnaire (see online appendix 1).

### Statistical procedures

We used descriptive statistics for the analysis of frequencies and calculated percentages or mean values, median and standard deviations for all frequency measures. The ATiPP sum score was calculated for each person (sum of the scores of all eight ATiPP items divided by eight, with higher scores indicating a more positive attitude towards online therapy). For the NOMAD questionnaire, we calculated scores of single items and the four scales. To assess the statistical significance of group differences (clinicians and project leaders) we used the  $X^2$  test (Pearson, two-sided) for categorical variables and the Mann Whitney U test for continuous variables (two-sided). We performed correlation analyses (two-sided) for explorative purposes. We considered  $p < .05$  as indicating a significant difference.

### Qualitative analysis

We analysed the responses to open questions at the end of the questionnaire which asked about perceived prerequisites, benefits and barriers of implementation employing an inductive approach according to Mayring [34]. The coding was performed by two persons consecutively. Superordinate thematic categories were developed by paraphrasing and summarizing the raw data by one person (RH) only, using 40% of the material. We assigned one sentence or paragraph (aspect) per category. Following this initial round of category building, we searched the remaining material (60%) for statements indicating new additional categories. During this second process of coding and categorization, RH added new categories and adapted the existing ones to the data. A second person (IR) reviewed the assignment of the aspects to the categories. Discrepancies were resolved by discussion between both researchers. The number of statements in each category was counted. We used Excel software for this qualitative analysis.

## Results

### Sociodemographic and general information

45% of the project leaders ( $N=20$ ) and 28% of the clinicians ( $N=37$ ) participated in the survey. Eleven project leaders were male and nine were female. Among the 37 clinicians, 21 clinicians were male, 15 female, and one person did not specify their gender. The gender distribution between the two groups was similar ( $X^2: 0.58; df=1; p < .809$ ). In both groups, most persons (project leaders=65%; clinicians=54%) stated that they were in the middle age group (31–49 years). Both, project leaders ( $N=20$ ; mean 4.15, SD 0.75) and clinicians ( $N=37$ ; mean 3.89, SD 0.66) indicated rather high levels (scale 1–5: (1) very poor, (2) poor, (3) average, (4) good, (5) very good) of self-perceived IT knowledge and IT skills and there was no significant difference between the groups ( $X^2=$

6,309;  $df=3; p < .097$ ). Regarding experience of health-care providers with online tools, the mean values of project leaders (mean 4.0 and CLs (mean 3.3) did not differ significantly ( $X^2= 5,138; df=4; p < .273$ ). 38% of the CL reported experience with the online platform with “real patients”, 38% reported experience with “test patients”, and 32% of the clinicians stated that they had not yet used the online platform themselves.

### Attitudes towards online applications (ATiPP)

1. *General* online applications was overall “rather” positive (scale 1–5: (5) „very much“, (4) „rather“, (3) „neither“, (2) „rather not“, (1) „not at all“, see online appendix 2) in both groups (ATiPP mean sum score project leaders ( $N=20$ ) 4.0, SD 0.5 and clinicianas ( $N=37$ ) 3.7, SD 0.6;  $U=275.000, Z=-1,593; p < .111$ ). Only one item (“Bridging waiting times for an appointment in psychiatry/psychotherapy using an online application is a sensible option.”) was rated significantly more positive by project leaders (mean 4.5, SD 0.7) compared to clinicians (mean 3.9, SD 0.9) (Online appendix 2).
2. The *willingness* to use online applications for mental illnesses was high, especially in day-clinical/ outpatient setting (project leaders mean 4.7; clinicians mean 4.2, significant group difference) but also in inpatient setting (project leaders mean 3.9; clinicians mean 3.7). The willingness to use online applications was significantly higher for day-clinical/ outpatient setting compared to inpatient setting as indicated by clinicians ( $Z=-3.08; p < .002$ ) and project leaders ( $Z=-3.03, p < .002$ ). Project leaders and clinicians rated the clinical staff willingness to use online applications more negatively than their own willingness to use online applications (clinicians: mean 2.6 vs. 3.7; project leaders: mean 2.75 vs. 3.9). Project leaders (mean 3.8) rated estimated attitude of family and friends about the use of online applications for mental illness significantly more positive than clinicians (mean 3.4) (see Table 1). There were significant positive correlations for both groups of the ATiPP sum score and item scores reflecting the willingness to use online applications (Online appendix 3).

### Evaluation of the functions of the online platform from a clinical perspective (only CL)

All six (planned) functions of the platform were rated as “rather useful” on average. Item 6 (“Use of digital offers (e.g. digital applications)”) received the highest ratings (mean 3.4), the messenger function got lowest mean

**Table 1** Willingness to use online applications [22]

Item	PL		CL		PL		CL								
	M (SD)	Md	M (SD)	Md	Z Sign (p)	(5) very much	(4) rather positive	(3) neither	(2) rather not	(1) not at all					
How much do you like the idea of using online applications in everyday inpatient care?	3.9 (1.04)	4	3.7 (1.06)	4	-0.664	35%	30%	30%	-	5%	24%	41%	19%	14%	3%
How much do you like the idea of using online applications in day-care/outpatient daily routine?	4.7 (0.45)	5	4.2 (1.00)	4	<b>-1.88</b>	43%	33%	-	-	-	49%	32%	11%	5%	3%
How widespread is knowledge about the possible uses of online applications in your clinic/clinic group?	2.7 (0.71)	3	2.9 (0.81)	3	-1.01	5%	-	42%	40%	-	3%	22%	41%	35%	-
How do you think the staff in your clinic/clinical group feel about the use of online applications in everyday inpatient care?	M (SD)	Md	M (SD)	Md	Sign (p)	very positive	rather positive	neither	rather negative	very negative	very positive	rather positive	neither	rather negative	very negative
What do you think your family and friends/acquaintances think about the use of online applications for mental illness?	2.75 (0.88)	3	2.6 (0.76)	3	-0.901	-	20%	45%	25%	10%	-	8%	47%	36%	8%
	3.8 (0.60)	4	3.4 (0.86)	3	<b>-2.02</b>	5%	75%	15%	5%	-	8%	36%	50%	-	6%
					<b>0.04</b>	(1)	(15)	(3)	(1)		(3)	(13)	(18)		(2)

M mean, SD standard deviation, Md median, PL project leaders, CL clinicians, Z Mann Whitney U test. Two-sided  $p < .05$  was considered statistically significant (shown in bold type)

**Table 2** Evaluation of (planned) functions of the online platform (only for CL (N=37))

Item	M	SD	I cannot rate
1. Diary for patients (patients can share the diary or excerpts from it with the practitioner)	3.00	0.45	N=18 (49%)
2. Messenger (only practitioner can open and close channel)	2.68	1.03	N=18 (49%)
3. Notes (for patients)	2.85	0.79	N=17 (46%)
4. Material pool (practitioner can provide materials)	3.13	0.33	N=13 (35%)
5. Appointments/weekly schedule (appointments can be displayed by the practitioner for patients in Curamenta, including changes/cancellations)	2.89	0.49	N=10 (27%)
6. Use of digital services (e.g. DIGAs)	3.44	0.67	N=12 (32%)

4-point scale: 1= „Not at all useful“, 2= „Rather not useful“, 3= „Rather useful“, 4= „Very useful“; M mean, SD standard deviation, PL project leaders, CL clinicians

value (mean 2.85). 27–49% of respondents were unable to provide an assessment for the individual items (Table 2).

**Implementation**

Ratings on the NoMAD questionnaire were rather positive in both groups (all scales with mean values above 3) (see Table 3). The CA-scale (“Collective Action”) obtained the highest values (project leaders mean 4.2 and clinicians mean 4.0; difference not significant;  $U=307.500$ ,  $Z = -1.05$ ,  $p=.295$ ). Three items differed significantly between both groups: Project leaders rated higher on item 3 (“I have an idea of how Curamenta influences the way staff work in my clinic/clinic group.”) and lower on item 9 (“It will be easy for the clinical staff to make Curamenta a normal part of their work”) and item 14 (“Sufficient resources are available to support/implement Curamenta”). There were significant positive correlations between the scales of NoMAD questionnaire and the ATiPP sum score (electronic appendix 3).

**Perceived prerequisites, benefits, barriers and objections regarding the implementation of online applications**

A complete list of categories is presented in electronic appendix 4.

The answers about prerequisites (PL 67 aspects, mean 3 aspects per PL; CL 72 aspects, mean 2 aspects per CL) were summarized into the categories structural/organisational, technical and personnel requirements, and staff training. Project leaders most frequently mentioned technical requirements of the application itself (30 out of 67 aspects; e.g. “functional, intuitive application”; “simple processes regarding usability”; “connection to hospital information system to avoid duplicate documentation”). Structural/organisational requirements

**Table 3** Results of the NOMAD questionnaire [29]

	PL		CL		Z value, P
	M (SD)	Md	M (SD)	Md	
<i>Domains</i>					
Coherence (CO) (item 1.1–1.4)	3.8 (0.7)	4	3.6 (0.6)	3,75	Z=-1.05, p<.29
Collective participation (CP) (item 1.5–1.8)	4.3 (0.5)	4,25	4.0 (0.8)	4	Z=-1.12, p<.27
Collective action (CA) (item 1.9–1.15)	3.0 (0.5)	3	3,2 (0,6)	3,29	Z=-1.05, p<.30
Reflexive monitoring (CM) (item 1.16–1.20)	3.3 (0.7)	3,6	3.4 (0.7)	3,60	Z=-0.28, p<.61
Overall scale	3.5 (0.5)	4	3.5 (0.6)	3,65	Z=-0.16, p<.87
<i>Adapted item (adaptation in italic)</i>					
1. The staff in the <i>clinics</i> (doctors, therapists, nurses) have a common understanding of the meaning and purpose of <i>Curamenta</i> .	2.9 (1.1)	3	3.0 (1.1)	3	Z=-0.66, p<.51
2 I can recognize that working with <i>Curamenta</i> will mean a different type of activity for the staff in the <i>clinics</i> .	4.3 (0.9)	4	4.0 (0.8)	4	Z=-1.81, p<.070
3. I have an idea of how <i>Curamenta</i> will affect the way staff work in my clinic/clinic group.	4.4 (0.9)	5	3.8 (0.9)	4	<b>Z=-2.29, p&lt;.02</b>
4. I have an idea of the potential added value of <i>Curamenta</i> for the work of the staff in the <i>clinics</i> .	3.5 (1.3)	4	3.7 (1.1)	4	Z=-0.49, p<.62
5. There are responsible persons in <i>my clinic/clinic network</i> who promote <i>Curamenta</i> and who involve others.	4.3 (0.9)	4	4.3 (0.9)	4	Z=-0.17, p<.87
6 I am convinced that my work for <i>Curamenta</i> is a meaningful part of my job.	3.8 (1.2)	4	3.3 (1.1)	3	Z=-1.72, p<.09
7) I am open to new ways of working with <i>Curamenta</i> .	4.6 (0.5)	5	4.2 (0.8)	4	Z=-1.71, p<.09
8 I will (continue to) support <i>Curamenta</i> .	4.4 (0.9)	5	4.0 (1.0)	4	Z=-1.21, p<.23
9. It will be easy for clinical staff to make <i>Curamenta</i> a normal part of their work.	1.9 (1.0)	2	2,81 (1,20)	3	<b>Z=-2.79, p&lt;.01</b>
10. <i>Curamenta</i> threatens the working relationship between the staff in <i>my clinic/clinic group</i> .	2.2 (0.9)	2	1.9 (0.9)	2	Z=-1.15, p<.25
11 I have confidence in the competence of the clinic staff to use <i>Curamenta</i> .	3.8 (1.1)	4	3.4 (0.8)	4	Z=1.54, p<.12
12. Activities for <i>Curamenta</i> are assigned to those who have the appropriate skills to use <i>Curamenta</i> .	3.7 (1.1)	4	3.5 (0.8)	4	Z=-0.90, p<.37
13. Sufficient training is provided to ensure the use of <i>Curamenta</i>	3.6 (1.4)	4	3.9 (1.1)	4	Z=-0.63, p<.53
14. Sufficient resources are available to support/implement <i>Curamenta</i> .	2.6 (1.3)	2	3.2 (1.1)	3	<b>Z=-1.98, p&lt;.05</b>
15. Managers provide sufficient support for <i>Curamenta</i> .	3.5 (1.1)	4	3.7 (0.9)	4	Z=-0.66, p<.51
16. I have access to reports on the impact of <i>Curamenta</i> .	3.1 (1.5)	3	2.9 (1.0)	3	Z=-0.83, p<.41
17. The staff agree that <i>Curamenta</i> is worthwhile.	2.4 (1.2)	3	2.8 (1.1)	3	Z=-1.01, p<.31
18. The staff in <i>my clinic/clinical group</i> will appreciate the impact of <i>Curamenta</i> on their work	2.7 (1.0)	3	3.2 (1.1)	3	Z=-1.92, p<.06
19. Feedback about <i>Curamenta</i> can be used to improve the platform in the future.	4.7 (0.1)	5	4.2 (1.0)	4	Z=-1.56, p<.12
20. The staff in <i>my clinic/clinic group</i> will have an impact on their work with <i>Curamenta</i> .	3.7 (1.1)	4	3.8 (0.9)	4	Z=-0.16, p<.87

5-point scale: 1 "disagree" to 5 "agree"; M mean, SD standard deviation, Md median, PL project leaders, CL clinicians, Z Mann Whitney U test. Two-sided p<.05 was considered significant (shown in bold type)

included the "integration into clinical routine", "clarification of responsibilities and substitutions" as well as "sufficient personnel resources". Clinicians most frequently named structural/organisational prerequisites (18 out of 72 responses; e.g. "sufficient personnel resources", "fixed contact person for technical questions"), technical prerequisites (18 out of 72 items; e.g., "stable WLAN connection", "hardware available"), individual requirements at staff level like "digital skills" and "commitment" as well as "sufficient and continuous training for staff".

Regarding perceived benefits of the use of online applications, project leaders (51 aspects, mean 2.5 aspects per project leader) most frequently mentioned aspects which can be summarized into the category treatment improvements (e.g., "better healthcare", "use of hitherto

therapy-free times"; 23 out of 51 aspects). Project leaders also mentioned that new responsibilities for occupational groups (e.g. nursing staff) could be an advantage and they mentioned "relief of the personnel". Clinicians (45 aspects; mean one response per clinician) most frequently mentioned aspects belonging to the category structural/organisational benefits (18 out of 45 aspects; e.g., "barrier-free access to therapeutic applications", "accessibility of new patient groups", "easiness of information transfer"). Clinicians also mentioned advantages for treatment like "bridging of therapy-free periods", "an additional therapeutic offer" and "the promotion of independent work".

Regarding perceived barriers for the implementation of online applications, both groups mentioned several

aspects (project leader 57 aspects, mean three items per project leader; clinician 52 aspects, mean one item per clinician). As category barriers on the practitioner side, the aspects “increased workload”, “lack of staff”, “staff resistance to change” and “limited digital competences” were mentioned. Barriers of the category technical barriers included “poor software quality”, “complicated registration process”, “poor WLAN”, “unclarified responsibilities” and “inflexible software structures”. Both groups also mentioned aspects belonging to the category “barriers on patient side”, which included “concentration problems”, “the severity of illness”, “increased demands on patients” and “limited technical understanding”.

When asking about what generally speaks against the use of online applications (objections) in the inpatient/hospital setting, project leaders provided in total 30 responses (on average one aspect per project leader) and clinicians mentioned in total 26 aspects (on average 0,5 aspect per clinician). Project leaders focused in their answers more on the category technical aspects, e.g. “lack of IT equipment” or application-related points of criticism (“adaptation to the patient’s ability level necessary”). Clinicians reported mostly aspects which can be summarized to the category of treatment-related points of criticism (e.g., “loss of direct person-to-person communication”) as well as aspects pertaining staff utilization (“additional workload”) and patient safety (“concern about suicide announcements in the app”, “danger with delusions/mania”, “misunderstandings”).

## Discussion

This study provides results from an online survey of attitudes of healthcare providers towards implementation of an electronic patient portal in mental health care of hospitals with a view to identify barriers of the implementation. The survey was conducted during the early phase of implementation of the *Curamenta* online platform in five groups of communal mental health hospitals in four different federal states in Germany.

Overall, both project leaders and clinicians were positive about online applications and indicated a rather high level of experience and computer skills. This observation is in contrast to other (German) studies, in which most clinicians reported rather low level of experience and computer skills [25, 35]. It is possible that practitioners who underwent training in the starting phase of the implementation process were rather technophile and highly motivated, which may lead to an overestimation of their own skills and experiences in our study. We found high values on the normalization scale for both groups, particularly with regard to “cognitive participation”. A literature review showed that the NPT, which can be operationalised by the normalization questionnaire, may contribute to the conceptual understanding

of implementation processes and outcomes in a variety of healthcare systems [32]. The eagerness to use online applications was rated higher for the day clinic/outpatient setting than for the inpatient setting, which is concordant with other findings from the literature: healthcare providers who worked in acute care settings had more negative perceptions of electronic patient portals than other health care providers and those who worked in less acute care settings [26]. Also, use of a patient portal by Veterans was much lower in the inpatient compared to outpatient setting, and limited staffing and infrastructure needs were identified as main barriers for inpatient use [21]. Of note, *Curamenta* does not support patients’ reading of clinical notes, which was a major area of concern of psychiatrists and psychotherapists in previous studies [17, 36]. Contextual factors of inpatient setting e.g. time constraints, less freedom in organizing their work, symptom severity may have led to this more negative rating for using patient portals in inpatient settings. Thus, providing additional support to psychiatrists and other health care providers, especially those who work in acute care settings, may be warranted. These context specific factors may need to be taken into account for successful implementation of a platform in the acute hospital settings, leading to specific structural/organisational preparations or adaptations to create suitable workflows. Moreover, one could consider starting the implementation process of the platform in outpatient/day care settings in order to familiarize healthcare providers with the platform first and move to inpatient settings afterwards.

A number of prerequisites, benefits and barriers for the implementation of the online applications in general were specified. As a prerequisite for implementation of online applications, demonstrating user-friendliness and the added value of the platform (for patients and healthcare providers) seem to be crucial aspects for implementation success. Development of a patient portal should involve users from the beginning to avoid barriers for later usage. Structural requirements (e.g. sufficient personnel resources, familiarization phase, clear processes and responsibilities) and technical requirements (e.g. stable wireless local area network (WLAN) connections) were mentioned very often (especially by clinicians). These basic factors are crucial for digital implementation in clinical settings but to our experience they are often not provided in hospital settings in Germany. Integration of new (digital) processes into everyday clinical practice should ideally be prepared and thought about before implementation starts and concepts adapted to specific hospital contexts are warranted to help providers using patient portals efficiently [30].

Clinicians and project leaders mentioned technical, structural/organizational and personnel barriers for successful implementation of the digital application in

hospital settings. Clinicians and project leaders did not differ largely from each other and the items mostly coincided with the aspects mentioned in the international literature [30]. This indicates that the results of our study may be generalized to similar settings in other countries. The wide array of potential barriers towards implementation of a digital intervention reported in our study supports similar findings from the literature, particularly for digital interventions the inpatient settings [21, 22]. Previous studies demonstrated that a severe course of disease [23, 24] and insufficient (technical) infrastructure [37] were perceived obstacles that prevented mental health providers from offering digital interventions to their patients.

Perceived prerequisites included technical preconditions (internet access, workspaces, devices), usability of internet-delivered interventions, sufficient functional level of patients, and intensive training of staff [38]. In particular, technical aspects (availability, reliability and interoperability) and appropriateness of the internet-delivered interventions for addressing a patient's mental health problem are also reflected [25, 39].

In our study, both clinicians and project leaders mentioned potential benefits of online applications in the hospital setting, such as simple information transfer and barrier-free access. These aspects may be emphasized in training courses to enhance clinicians' motivation to use the online platform and to encourage their patients to use the platform [40].

Both groups indicated general objections to online applications in the inpatient setting. These reservations have to be addressed right from the early phase of implementation if it is to be successful.

We did not ask specifically for barriers of implementation to patient portals in the open questions because we knew that experiences of healthcare providers were rather limited and that it would be more appropriate to broaden the question and ask about digital interventions in mental health care of hospitals in general. Patient portals are collaborative tools that should be evaluated separately from digital interventions if possible. This characteristic of patient portals must be taken into account. In our study, clinicians rated different functions available in the online portal (many respondents had not yet gained own user experiences with *Curamenta* at the time of the survey) but they did not necessarily mention these specific portal functions in their answers to the open questions. This was probably due to the fact that the survey occurred in the initial phase of implementation when their own experiences with the platform were still very limited. Whether there are differences in perceived key requirements or barriers for patient portals compared to digital therapeutic interventions has to be examined in further studies.

Our results provide important information for the implementation of this specific online platform and digital application in hospital setting in general, but, most importantly, they may also be transferred to implementation processes of other platforms in mental health care settings. A longitudinal evaluation of the implementation will be performed with the aim to provide additional information on the development of attitudes with increasing user experience. We were not able to assess potential aspects of unawareness about the available digital solutions, but these aspects may emerge in future studies [5].

In Germany, studies on the implementation of digital interventions in psychiatric hospital settings are limited [e.g. 23; 41]. To date, there is no comparable implementation of an online platform in such a high number of mental health hospitals in Germany. Our study shows that mental health care providers see potential benefits of online applications in inpatient routine care, for instance regarding efficient scheduling of therapy-free time and accessibility of other patient groups. These benefits seem to make it worthwhile to tackle the barriers to implementation. Besides technical preconditions on the organisational level, staff education and support as well as usability features of the digital intervention appear to be crucial facilitators.

Among the strengths of our study, our survey showed response rates indicating the acceptability of such survey in future studies. It is the first study to address the acceptability and experiences of healthcare providers of the implementation of an electronic patient portal in mental health hospitals in Germany. Our study provides proof of feasibility and usefulness of such studies, and may inform other groups about how early stages of complex multiannual and multicentric implementation processes of digital health interventions in mental health hospitals may be evaluated. The anonymized type of this survey may have encouraged participation, while open questions provided scope for personal comments not covered by preformed questions. The qualitative data provided a considerable enrichment of thematic categories. Using methodological approaches informed by models of implementation like normalization process theory was helpful in designing this study.

Among the limitations of our study, we studied a sample of healthcare providers who were involved in the implementation at the very beginning and who may have a more positive attitude and a higher level of computer skills than the average clinical staff member. Generally, representativeness of the sample may be limited. The sample may also be biased by a higher rate of participation among persons who are very motivated to use technical devices. Due to the anonymous nature of the survey, information on the occupational group or allocation to



individual clinics or wards/departments was not possible due to deanonymization risks. Also, the heterogeneity of the individual experience of clinicians with “real” patients may have had an influence on the results. In this study, the number of clinicians with “real” patients was too small for a separate analysis. Longitudinal studies will be important to gain insights into barriers and facilitators over the course of implementation.

In the light of the results of our survey and considering the strengths and limitations of our study, our study results are now under review by GDG with a view to develop recommendations for technical improvements of the electronic patient portal and for improved needs-adapted support for the portal users during the implementation process.

## Conclusions

Implementation research on patient portals for mental health hospitals is limited. Our study presents a set of factors to be considered in the implementation process based on the attitudes and experiences of mental healthcare providers involved in the early stage of such an implementation process in Germany. We have found in an own previous review that experiences and attitudes of healthcare providers seem to play a decisive role in programs implementing digital mental health in inpatient mental healthcare [30]. Continuous monitoring of the implementation process, including assessments of attitudes of healthcare providers and experiences, seems to be a promising way to identify their challenges, needs and preferences. Improving healthcare providers commitment towards implementation and use of digital interventions by addressing such aspects may help to foster the introduction of helpful digital applications in mental health hospitals.

## Abbreviations

ATIPP	Attitudes towards online applications questionnaire
GDG	Gemeinnützige Gesellschaft für digitale Gesundheit GDG mbH (Society for digital health)
N	number
NoMAD	Normalization MeASURE Development questionnaire
SD	standard deviation

## Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12913-024-11686-6>.

Supplementary Material 1  
Supplementary Material 2  
Supplementary Material 3  
Supplementary Material 4

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not applicable.

## Authors' contributions

IR, EGM and JZ designed the study, IR and RH analysed the data, All authors read and approved the final manuscript.

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## Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## Declarations

### Ethics approval and consent of participate

A data protection vote was obtained in advance from the responsible data protection officer. We did not submit the study protocol to an ethics committee, because the responsible committee of the German North Rhine Medical Association (Ärzttekammer Nordrhein) takes the position that a review of studies involving only voluntary and anonymized surveys of healthcare providers in the area of health care research is not necessary. Participants received information about the content and the conduct of the study (anonymous and voluntary survey study). By submitting the completed questionnaire, the participants agreed to take part in the questionnaire study.

### Consent for publication

Not applicable.

### Competing interests

The authors declare no competing interests.

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