

Development of a patient-centered app in Germany as a special health and organizational support by surveying patients with cardiovascular diseases

Supplementary appendix

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Supplementary appendix 1: MAEX questionnaire

This supplementary appendix contains the questionnaire on which this questionnaire study was based. It was originally in German and has been adapted in English for this publication for international comprehensibility.

MAEX: Medical Assistance Experience.

MEDICAL CENTER – UNIVERSITY OF FREIBURG University Heart Center, Department of Cardiology and Angiology	MAEX Questionnaire study	 UNIVERSITÄTS KLINIKUM FREIBURG UNIVERSITÄTS FREIBURG · BAD KROZINGEN HERZZENTRUM
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Name: _____ MAEX-ID: _____	Survey date: _____
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A	Baseline characteristics
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A 1 - A 5	A1: Gender: ☐ f ☐ m ☐ d	A3: Height: _____	A5: Stay: ☐ inpatient ☐ outpatient ☐ follow-up treatment
	A2: Age: _____	A4: Weight: _____	

A 6	Reason for current clinic visit/stay (or select from those below): _____
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A 7	Pre-existing conditions:		
	☐ heart failure	☐ coronary artery disease	☐ myocardial infarction/acute coronary syndrome
	☐ valvular heart disease	☐ coronary artery bypass graft	☐ other heart surgery: _____
	☐ aortic aneurysm, aortic dissection	☐ atrial fibrillation/flutter	☐ other cardiac arrhythmia: _____
	☐ endo-/myo-/pericarditis	☐ cardiomyopathy	☐ arterial hypertension
	☐ peripheral arterial disease	☐ carotid disease	☐ hypotension, orthostatic dysregulation
	☐ other angiopathy: _____		☐ other cardiovascular disease: _____
	☐ COPD	☐ kidney disease	☐ diabetes mellitus
	☐ other non-cardiovascular diseases (gastroenterological, oncological, nephrological, pulmonary, rheumatological, orthopedic, arthrosis, serious accident, surgeries...): _____ _____ _____ _____		

B Previous habits and dealing with the disease	
B 1	How much time did you do sports per week so far? ☐ <1h ☐ 1-3h ☐ 3-5h ☐ 5-7h ☐ >7h
B 2	What is your nutrition like? ☐ no restrictions ☐ vegetarian ☐ vegan ☐ other: _____
B 3	Do you smoke? ☐ no ☐ yes: ☐ currently ☐ formerly, <5a ago ☐ >5a ago pack years: _____
B 4	What does your everyday life look like? (working, shift work, housework...) _____
B 5	☐ fear for life ☐ fear of loss regarding job/status ☐ fear of loss in the social environment, interpersonal fears/worries ☐ financial fears/worries ☐ general concern
B 6	What feelings do you have in the context of your illness? (also multiple mention): ☐ overload regarding flood of information ☐ organizational overload
B 7	☐ confusion ☐ uncertainty ☐ repression ☐ anger ☐ sorrow ☐ hopelessness ☐ doubts ☐ feeling of being left alone ☐ other: _____
B 8	Have you had any support from people around you so far? ☐ no ☐ yes, through ☐ family ☐ friends ☐ general practitioner ☐ other: _____
B 9	How often do you see a doctor per year in the context of your diagnosis and how often are you hospitalized? doctor visits: _____ times/year hospitalized: _____ times/year, _____ days/year
B 10	☐ 1 very pleasant ☐ 2 rather pleasant ☐ 3 indifferent ☐ 4 rather unpleasant ☐ 5 very unpleasant
B 11	How did you perceive your previous outpatient/inpatient doctor contacts? ☐ 1 very well organized ☐ 2 rather well organized ☐ 3 indifferent ☐ 4 rather badly organized ☐ 5 very badly organized
B 12	☐ 1 very informative ☐ 2 rather informative ☐ 3 indifferent ☐ 4 rather uninformative ☐ 5 not informative at all

B 13	How do you manage your medical documents (findings, laboratory values, radiographs, etc.) and how do you transfer them to the doctor?	☐ in hard copy in a file folder ☐ scanned ☐ in an app
B 14		☐ other: _____
B 15	Is the administration or transfer of documents a problem or an effort? Do any mistakes occur thereby?	☐ bring a hard copy ☐ send by e-mail
B 16		☐ transfer via app
B 17		☐ other: _____
B 18	How do you get information about your illness?	☐ 1 highly unproblematic ☐ 2 rather unproblematic
B 19		☐ 3 indifferent ☐ 4 rather problematic
B 20	Do you already use digital health products? If so, which ones (write down each product) or what functions and what was your experience with them?	☐ 5 highly problematic
B 21		☐ 1 highly effortless ☐ 2 rather effortless
B 22	If not, could you imagine using a digital health product if it would benefit you? What would be important to you?	☐ 3 indifferent ☐ 4 rather complex
B 23		☐ 5 very complex
B 24	Have you ever paid for a digital health product or are you currently paying for it?	☐ 1 highly errorless ☐ 2 rather errorless
B 25		☐ 3 indifferent ☐ 4 rather error-prone
B 26	How do you get information about your illness?	☐ 5 very error-prone
B 27		☐ doctor ☐ patient-centered societies
B 28	Do you already use digital health products? If so, which ones (write down each product) or what functions and what was your experience with them?	☐ internet ☐ apps ☐ magazines
B 29		☐ other: _____
B 30	If not, could you imagine using a digital health product if it would benefit you? What would be important to you?	☐ wearable: e.g. smartwatch, pedometer, fitness bracelet
B 31		☐ pedometer of the smartphone
B 32	Have you ever paid for a digital health product or are you currently paying for it?	☐ fitness app
B 33		☐ other digital blood pressure/heart rate/heart rhythm recording, e.g. intelligent scale, insulin measuring devices
B 34	If not, could you imagine using a digital health product if it would benefit you? What would be important to you?	☐ (health) apps installed as standard on the smartphone
B 35		☐ service/app for medication management/order
B 36	Have you ever paid for a digital health product or are you currently paying for it?	☐ service/app for recording my health data
B 37		☐ service/app for managing documents (doctor's letters, laboratory results)
B 38	If not, could you imagine using a digital health product if it would benefit you? What would be important to you?	☐ service/app for video consultations
B 39		☐ other: _____
B 40	Have you ever paid for a digital health product or are you currently paying for it?	☐ Yes. For what? _____ How much €? _____
B 41		☐ No
B 42	If not, could you imagine using a digital health product if it would benefit you? What would be important to you?	☐ No, but I would be willing to pay for it if it offered the following or solved the following problem for me:
B 43		_____

C Inpatient stay and expectations for the future	
C 1	How do you feel about your inpatient stay regarding therapy? ☐ 1 very well organized ☐ 2 rather well organized ☐ 3 indifferent ☐ 4 rather badly organized ☐ 5 very badly organized
C 2	☐ 1 very informative ☐ 2 rather informative ☐ 3 indifferent ☐ 4 rather uninformative ☐ 5 not informative at all
C 3	How do you perceive the medical staff (medical/nursing staff)? ☐ 1 very pleasant ☐ 2 rather pleasant ☐ 3 indifferent ☐ 4 rather unpleasant ☐ 5 very unpleasant
C 4	How do you perceive your inpatient stay in general? ☐ 1 very pleasant ☐ 2 rather pleasant ☐ 3 indifferent ☐ 4 rather unpleasant ☐ 5 very unpleasant
C 5	☐ 1 very well organized ☐ 2 rather well organized ☐ 3 indifferent ☐ 4 rather badly organized ☐ 5 very badly organized
C 6	How well informed do you feel now about... ☐ 1 very good ☐ 2 rather good ☐ 3 indifferent ☐ 4 rather bad ☐ 5 very bad
C 7	1. your illness? ☐ 1 very good ☐ 2 rather good ☐ 3 indifferent ☐ 4 rather bad ☐ 5 very bad
C 8	2. follow-up treatment? ☐ 1 very good ☐ 2 rather good ☐ 3 indifferent ☐ 4 rather bad ☐ 5 very bad
C 9	3. possible contact persons? ☐ 1 very good ☐ 2 rather good ☐ 3 indifferent ☐ 4 rather bad ☐ 5 very bad
C 9	How do you feel at the end of your inpatient stay and with regard to dealing with the disease in the future? ☐ pleased ☐ dissatisfied ☐ hopeful ☐ hopeless ☐ motivated ☐ unmotivated ☐ assured ☐ uncertain ☐ reassured ☐ worried ☐ grateful ☐ confident ☐ concern about the future ☐ fear of change ☐ fear of the disease ☐ organizational overload ☐ other: _____
C 10	Is continuous aftercare important for you? ☐ 1 very important ☐ 2 rather important ☐ 3 indifferent ☐ 4 rather unimportant ☐ 5 very unimportant

C 11	What would you expect from aftercare?	☐ security ☐ confidence ☐ reliability ☐ spatial proximity ☐ monitoring ☐ information ☐ professional support ☐ organizational support ☐ simple communication of difficult medical content ☐ motivation/help in changing unfavourable habits ☐ addressing individual needs/wishes ☐ other: _____
C 12	Do you have a general practitioner/specialist and are you able to contact him/her at any time?	☐ No ☐ Yes, I can contact him/her at any time and receive timely feedback. ☐ Yes, but I can't always contact him/her or I don't get any feedback.
C 13	Would it be important to you that you could always contact him/her in a short time?	☐ Yes ☐ No
D	MAEX app	
D 1	Which basic data is important to you?	☐ patient data (such as name, date of birth, address, insurance) ☐ pre-existing conditions ☐ allergies ☐ contact persons/relatives ☐ other: _____
D 2	Which functions are fundamentally important to you?	☐ document management ☐ monitoring ☐ administration, telemedicine ☐ medication management ☐ knowledge transfer ☐ other: _____
MAEX app: Document management		
D 3	Which documents should be able to be deposited?	☐ doctor's letters ☐ laboratory findings ☐ further findings ☐ findings from medical imaging (radiographs, CT...) ☐ additional/personal photos/images ☐ pregnancy record ☐ vaccination record ☐ other: _____
D 4	Which functions/characteristics are important to you?	☐ scan function ☐ upload function
D 5	Regarding vaccination record?	☐ including digital corona vaccination record ☐ including current STIKO recommendations ☐ automatic updates for innovations

MAEX app: Monitoring	
D 6	Which parameters should the app measure/monitor? ☐ blood pressure ☐ heart rate ☐ heart rhythm ☐ weight ☐ blood sugar ☐ sleep monitoring ☐ pedometer ☐ distance measurement including ☐ energy consumption ☐ other: _____
D 7	What functions should be associated with it? ☐ automatic measurement/transfer of parameters (possibly linking to corresponding other apps/wearables) ☐ signal from the app when individually defined limit values are exceeded (e.g. blood pressure/heart rate too high) ☐ usability as a fitness tracker ☐ taking individual biorhythms into account
D 8	How important is a food diary to you? ☐ 1 very important ☐ 2 rather important ☐ 3 indifferent ☐ 4 rather unimportant ☐ 5 very unimportant
D 9	What should it contain? ☐ determine daily caloric intake ☐ calculation with weight/BMI ☐ signal from the app when the daily amount of calories has been reached/exceeded ☐ feedback via app if nutrition (in the long term) is too unhealthy/unsuitable for the patient ☐ consideration of individual nutritional habits/specialities, allergies/intolerances
MAEX app: Administration, telemedicine	
D 10	Which contact options and associated features/functions are important to you? ☐ inclusion of all medical disciplines (general practitioner, specialists, dentists, psychotherapists, physiotherapy...) ☐ ability to store pre-/post-care examinations with examination cycles ☐ signal from the app when the next appointment is due/needs to be booked ☐ preventive examinations are carried out individually in accordance with the costs covered by the respective health insurance ☐ "emergency doctor" function: direct contact person for (acute) complaints (or emergency number) ☐ overview of medical on-call service ☐ possibility of contact with doctors abroad (e.g. cardiac catheterization) ☐ contact with other sick people ☐ contact options for other contact points such as social services, food delivery services, care facilities... ☐ fitness facilities in the area

		☐ in addition to conventional medicine, there is also information about offers from naturopathy or alternative medicine ☐ activities/sports/doctor contacts specifically tailored to you and your illness
D 11	Which type of contact do you generally prefer?	☐ telephone ☐ e-mail ☐ SMS ☐ videotelephony ☐ other: _____
D 12	How would you like 24/7 availability?	☐ telephone ☐ e-mail ☐ SMS ☐ videotelephony ☐ other: _____
MAEX app: Medication management		
D 13	Which functions are important to you?	☐ medication plan ☐ declaration of usual dosage ranges/schemes ☐ note on interactions within the plan/with new medications ☐ signal from the app when medication is used up to order new ones ☐ possibility of digital transmission to treating physicians ☐ in addition to conventional medicine, there are also alternative medicine options
MAEX app: Knowledge transfer		
D 14	How important is it to you to have an overview of the relevant terms, abbreviations...?	☐ 1 very important ☐ 2 rather important ☐ 3 indifferent ☐ 4 rather unimportant ☐ 5 very unimportant
D 15	How detailed would you like explanations on this?	☐ 1 very detailed ☐ 2 rather detailed ☐ 3 indifferent ☐ 4 rather not detailed ☐ 5 not detailed at all
D 16	How important are education possibilities to you?	☐ 1 very important ☐ 2 rather important ☐ 3 indifferent ☐ 4 rather unimportant ☐ 5 very unimportant
D 17	What education possibilities should the app include? In the context of the app:	☐ media education for the general use of the app ☐ document management functions ☐ monitoring functions ☐ arrangement and administration of appointment/consultation ☐ 24-hour availability of a doctor ☐ prescription ordering/medication delivery ☐ other: _____

D 18	In the context of the disease and in general:	☐ knowledge about your own illness ☐ offers of supplementary naturopathic/alternative medicine ☐ knowledge about various other diseases in general ☐ medical knowledge about vacation ☐ nutrition ☐ movement ☐ gymnastics ☐ quit smoking ☐ intake of medication ☐ diabetes training ☐ stress management strategies ☐ relaxation exercises ☐ other: _____
D 19	Which format do you prefer?	☐ reading material ☐ training videos ☐ live tutorials with doctors/therapists ☐ other: _____
D 20	Which functions should be included?	☐ signal from the app when new important training is available ☐ linking to other training homepages, patient-centered societies... ☐ activities specifically tailored to you and your illness ☐ other: _____
MAEX app: General aspects		
D 21	Would the app make the organizational effort of your medical care easier for you?	☐ yes ☐ partially ☐ no
D 22	Would the app alleviate your aforementioned worries about the future?	☐ yes ☐ partially ☐ no
D 23	Do you see any barriers/obstacles or do you have concerns about using the app? (e.g. data protection)	_____
D 24	Would you be willing to use the app?	☐ yes ☐ possibly ☐ no
D 25	Would you perhaps prefer to use such an application in a web portal instead of an app?	☐ prefer the app ☐ indifferent ☐ prefer the web portal
D 26	Which of the mentioned functions would be most important to you if you could choose 3?	☐ document management ☐ monitoring ☐ administration, telemedicine ☐ medication management ☐ knowledge transfer ☐ other: _____

D 27	What are the determining factors for you to decide to use this application?	_____
D 28	Would you rather pay a small monthly fee or a larger, one-time charge?	☐ small but monthly fee ☐ indifferent ☐ higher but one-time charge
D 29	If the product was free in its basic function (save documents), but, for example, any additional functionality you wanted to activate (doctor's consultation, transmitting documents...) would cost extra, would that be more interesting to you?	☐ yes ☐ indifferent ☐ no
D 30	Which of the features (or the total package) would you be willing to pay for? And how much (e.g. €10/20/30... per month or one-time charge)? What would the entire package be worth to you?	☐ document management _____ ☐ monitoring _____ ☐ administration, telemedicine _____ ☐ medication management _____ ☐ knowledge transfer _____ ☐ total package _____
D 31	Would you be willing to book additional functions? Which?	☐ yes: _____ ☐ no
D 32	Would your doctor's recommendation be a reason to use the app?	☐ yes ☐ no
D 33	Do you think you would need support getting used to the app or web portal?	☐ yes ☐ no
D 34	If so, what should this support look like?	☐ explanatory videos ☐ detailed instruction with pictures ☐ instruction by doctor or clinic staff ☐ other: _____
D 35	Do you have any further ideas/suggestions?	_____ _____ _____ _____
	Interviewer:	
	Data entry:	on: _____ from: _____