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Stakeholders barriers and facilitators for the implementation of a personalised digital care pathway: a qualitative study

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Stakeholders barriers and facilitators for the implementation of a personalised digital care pathway: a qualitative study

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Keywords

patient-centred care, implementation, facilitators and barriers, digital communication, patient
information, stakeholder involvement

Strengths and limitations of this study

- Perspectives of all stakeholders, including patients and non-medical (supporting) staff, were incorporated in this qualitative study.

- The co-design approach in this project enhanced successful implementation as it ensured input and feedback by stakeholders and end-users and created commitment for further implementation.
- Investigator triangulation was assured since the interviews were conducted by multiple researchers.
- Due to the COVID-19 pandemic, the interviews were conducted both by video call and face-to-face, which may have led to differences in understanding and data interpretation between the interviews.
- Participants were recruited using snowball sampling techniques, which could have resulted in selection bias. However, this effect was minimised by including stakeholders both familiar and unfamiliar with the PDCP tool.

2 ABSTRACT

3 Objective

4 A prerequisite for patient-centeredness in healthcare organisations is offering patients access to
5 adequate health information which fits their needs. A personalised digital care pathway (PDCP) is a tool
6 that facilitates the provision of tailored and timely information. Despite its potential, barriers influence
7 the implementation of digital tools in healthcare organisations. Therefore, we investigated the perceived
8 barriers and facilitators for implementation of the PDCP among stakeholders.

9 Design

10 A qualitative study was conducted to acquire insight into perceptions of the stakeholders involved in the
11 implementation of a digital care pathway in three diverse patient groups.

12 Setting

13 This study is part of the “PersonalisedDigitalCarePathway” (PDCP) research project in a large academic
14 hospital in the Netherlands.

15 Participants

16 Purposive sampling was used to recruit internal stakeholders (e.g., healthcare professionals, employees
17 of the supporting departments) and external stakeholders (e.g., employees of the external PDCP
18 supplier). In addition, existing semi-structured interviews with patients involved in pilot implementation
19 (n=24) were used to verify the findings.

20 Results

21 We conducted 25 semi-structured interviews using the Consolidated Framework for Implementation
22 Research. Content analyses yielded four themes: 1) stakeholders' perceptions of the PDCP (e.g.,
23 perceived usefulness); 2) characteristics of the individuals involved and the implementation process
24 (e.g., individuals express resistance to change); 3) 'Organisational readiness' (e.g., lack of resources);
25 and 4) 'Collaboration within the organisation' (e.g., mutual communication, multidisciplinary co-design).
26 The main barriers mentioned by patients were duration of first activation and necessity for up-to-date
27 content. In addition, the most facilitating factor for patients was user-friendliness.

28 Conclusion

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3 29 Our findings emphasise the importance of gaining insights into the various perspectives of stakeholder
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5 30 groups, including patients, regarding the implementation of the PDCP. The perceived barriers and
6
7 31 facilitators can be used to improve the PDCP implementation plan and tailor the development and
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9 32 improvement of other digital patient communication tools.
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12 33 Trial registration number
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37 INTRODUCTION

38 In recent years, the emphasis on patient-centred care has increased in the Dutch healthcare
39 system (1). Patient-centeredness is a key element of high-quality care and entails collaboration
40 between the healthcare professional (HCP), the patient and their families, in which the needs,
41 values and preferences of patients are the focus of care (2, 3). Patients no longer want to be
42 passive recipients of care, but increasingly want and need to proactively manage their own
43 health. They also wish to be empowered and involved in decision-making that relates to their
44 care, which can contribute to patient-centred care (4-9). To achieve this, it is important that
45 HCPs and patients share the same information (10, 11).

46 To achieve patient-centred care including shared decision-making, health information should
47 be tailored. Personalised health information includes details about the diagnosis and treatment
48 options of the individual, and practical information about their care pathway (12, 13). This
49 concerns information about possible choices and the advantages and disadvantages of these
50 choices, along with outcomes and uncertainties (8, 13, 14). Information provision should match
51 the patient's wishes, needs and their ability to process information, which ensures a better
52 experience for the patient (15). In addition, optimally dosing and timing the information
53 provision is crucial, to prevent patients from an information overload (7, 15, 16). Also, health
54 literacy studies show that general health information is frequently not understood to a sufficient
55 extent (17).

56
57 Both patients and HCPs have expressed their willingness to contribute to patient-centred care,
58 but often have insufficient knowledge on how to put this into practice (4, 5, 7). Therefore, HCPs
59 should be instructed on how to provide their patients with suitable information (7, 18). Providing
60 the HCP and patient with tools to improve information provision facilitates effective

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4 61 communication (4, 11). A digital care pathway is an example of a tool that facilitates HCPs and
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6 62 their patients in accessing adequate information (4, 16, 19). This can be described as an
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8 63 overview of appointments and the coordination of care, specified for a certain patient group,
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10 64 which leads to greater information symmetry between the HCP and patient (20).
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15 66 Despite the potential of digital care pathways, there appear to be barriers to the implementation
16
17 67 of digital tools in healthcare organisations (11, 21-24). An innovation that has been poorly
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19 68 implemented by HCPs may end up not being used in daily routines or used in the wrong way,
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21 69 which results in a low uptake by end-users (24, 25). Gathering information about the
22
23 70 organisation, such as the context and responses to change before and during implementation,
24
25 71 can determine the factors that affect implementation (25-27). All stakeholders act within their
26
27 72 own contexts and expectations (28). Therefore, to implement a digital care pathway in practice,
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29 73 it is essential to explore the perceptions of all stakeholders involved including end-users (29).
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37 75 Information about implementation is often expressed in barriers and facilitators (27, 30). This
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39 76 information contributes to selecting tailored implementation strategies, which in turn can help
40
41 77 overcome the hurdles of implementing (27, 31). As example, previous studies have shown that
42
43 78 low health literacy and inadequate staffing were barriers to the implementation of digital tools.
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45 79 On the other hand, the perceived usefulness of an intervention and good multidisciplinary
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47 80 communication were identified as facilitating for implementation (3, 19, 32). However, some of
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49 81 these studies mainly focused on implementation in one specific patient group and the
50
51 82 perceived barriers and facilitators from an organisational perspective. As a result, there is a
52
53 83 lack of insight into the hospital-wide embedding in diverse patient groups and visions of all the
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55 84 different stakeholders involved, including end users.
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3 85 Therefore, the aim of this study was to identify the perceived facilitators and barriers among
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6 86 various internal and external stakeholders (i.e., patients, healthcare professionals, non-
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8 87 medical professionals, external supplier) regarding the implementation of personalised digital
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11 88 care pathways within a large academic hospital, Amsterdam UMC.
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90 METHODS

91 Study design

92 A qualitative study was conducted to acquire insight into perceptions of the stakeholders
93 involved in the implementation of a digital care pathway in three diverse patient groups.

95 Context and setting

96 This study is part of the “PersonalisedDigitalCarePathway” (PDCP) research project. As basis
97 for initiating this project, we used previous patient-reported experience measurements and
98 patient participation sessions during the start of the value-based healthcare program at
99 Amsterdam UMC, a large academic hospital in Amsterdam, the Netherlands. Patients
100 indicated that information was outdated and not easily accessible. Furthermore, they
101 experienced a low level of self-management. Development and subsequent implementation of
102 a PDCP was anticipated to remedy these shortcomings. The project included two phases:

- 103 1. Adaptive development including pilot implementation, based on experience-based co-
104 design. PDCPs were created in close collaboration with 1) patients with excessive
105 scars (Scar Clinic), 2) cleft lip and/or palate (Cleft Care) and 3) people who experience
106 gender dysphoria (Gender Care) and their healthcare professionals, communication
107 advisors and the eHealth team of our electronic health record service centre (EVA-SC).
- 108 2. Evaluation of implementation in practice of the PDCPs at Amsterdam UMC for the three
109 patient groups as described above.

110 We conducted this qualitative study at the end of phase 1.

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112 Personalised Digital Care Pathway (PDCP)

113 In this study we define a PDCP as a digital tool which provides patients and their healthcare

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3 114 professionals an overview of a the personal care pathway, with adequate and dosed
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6 115 information at appropriate time points. An example is shown in Figure 1 (web- and mobile
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8 116 version). In this customised tool, relevant content will become available gradually to end-users
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11 117 as the care pathway progresses over time - including appointments and practical information.
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13 118 Patients can access this tool after a two-factor authentication (33). Healthcare professionals
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15 119 have access to the patients' PDCP via the electronic health record (EHR). The IT system used
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17 120 for this project was developed by an external supplier (Solve Innovations) (34).
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25 123 *<PLEASE INSERT FIGURE 1 HERE>*
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32 126 **Study participants**

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34 127 Stakeholders were recruited by purposive sampling. To identify further relevant stakeholders,
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37 128 we used snowball sampling (35). Internal stakeholders were healthcare professionals and
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39 129 employees of the supporting departments, divided into managers and team members.
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41 130 Employees of the external supplier participated as external stakeholders. All stakeholders were
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44 131 contacted through email. Once the stakeholder had agreed to participate an interview was
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46 132 scheduled, digitally via Microsoft Teams or on location. Informed consent was signed after the
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49 133 participant was informed about the purpose of the study. Verbal consent for audio recording
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51 134 was obtained from every participant.
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56 136 **Theoretical framework**

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3 137 We used the Consolidated Framework of Implementation Research (CFIR), as this framework
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6 138 can help to explain why implementation of the PDCP may or may not be successful. It provides
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8 139 a practical guide for evaluating perceived facilitators and barriers. In this framework the
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11 140 context, complexity, multi-level aspects and interaction of the implementation are considered
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13 141 (31, 36). The five domains of the CFIR framework are: intervention (e.g., advantage,
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15 142 adaptability), outer setting (e.g., patient needs, external policies), inner setting (e.g., culture,
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17 143 readiness for implementation), the individuals involved (e.g., knowledge and beliefs, self-
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19 144 efficacy), and the implementation process (e.g., engaging, executing) (36, 37).
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25 146 **Data collection**

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27 147 We conducted individual, semi-structured, in-depth interviews guided by CFIR. The list of
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29 148 topics (Appendix 1) was amended minimally for stakeholders who work as healthcare
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31 149 professionals. All audio-recorded interviews were conducted by trained researchers (JS, JG,
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33 150 FH, FvN) and transcribed verbatim.
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39 152 *Patient and Public Involvement*

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41 153 Patients were actively involved during adaptive development of the PDCP. In this study
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43 154 pragmatic semi-structured interviews with patients (n=24) which had been conducted after
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45 155 taking part in the pilot implementation, were used for verification of our findings about the
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47 156 facilitators and barriers for implementation of the PDCP. The purpose of these interviews was
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49 157 to collect patients' experiences concerning the content and use of the application during the
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51 158 pilot implementation and verify the gathered findings. This data was also collected as part of
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54 159 the PDCP research project during phase 1 and will be used for further implementation.
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161 Data analysis

162 To ensure data saturation, data analysis was initiated during data collection, so that missing
163 information, themes or perspectives could be gathered (38). Data was analysed using content
164 analysis in Atlas.ti version 9 (Berlin, Germany). First, three researchers (FH, JS, FvN) coded
165 six transcripts openly and inductively. During several meetings (FH, JS, FvN) codes were
166 discussed, grouped in overarching codes, and revised to reach a consensus and ensure
167 quality of the analysis. The codes used in Atlas.ti 9 were described in a final codebook
168 (appendix 2), which was used to analyse the remaining transcripts by two independent
169 researchers (FH, JS). After coding the transcripts, categories were formed by deductive axial
170 coding. These categories were used to form themes and subthemes, described in the results
171 section. In the final step, quotes were selected for representation. All data were analysed and
172 presented pseudonymously.

173

175 RESULTS

176 In total, 25 interviews were conducted between November 2020 and June 2021. Most of the
 177 interviews were held digitally due to the COVID-19 pandemic (n=22) and three were held face-
 178 to-face. Interviews lasted on average an hour (37 minutes min; 67 minutes max). Table 1
 179 shows characteristics of the interviewees. The group of 'non-medical professionals' included
 180 supporting staff on department and division level (decentral), supporting staff of organisation
 181 (central) and external participants. Median employment duration of stakeholders in their
 182 current position was 2 years (min 1 – max 20 years).

184 *Table 1. Characteristics of study participants (N=25)*

185 ¹EVA-SC: electronic health record service centre, ²PDCP: Personalised Digital Care Pathway

Gender, N(%)		Professional roles in organisation, N(%)		Employment context of participants, N(%)		
Male	7 (28%)	<i>Healthcare professionals</i>	TOTAL	10 (40%)	Excessive scars (Scar Clinic)	4 (16%)
Female	18 (72%)		Doctor	5 (20%)	Cleft Lip or/and Palate (Cleft Care)	4 (16%)
			Nurse (specialist)	3 (12%)	Gender Incongruence (Gender Care)	6 (24%)
			Other roles	2 (8%)	Internal and External Communication	2 (8%)
		<i>Non-medical professionals</i>	TOTAL	15 (60%)	EvA Service Center ¹	4 (16%)
		<i>Decentral staff</i>	Consultant	2 (8%)	Strategy & Innovation	3 (12%)
			Other roles	2 (8%)	External PDCP ² supplier	2 (8%)
		<i>Central staff</i>	Manager	3 (12%)		
			Application specialist	2 (8%)		
			Consultant	4 (16%)		
		<i>External staff</i>	Other roles	2 (8%)		

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187 Content analyses yielded four main themes, subdivided in 24 subthemes (Table 2).

189 *Table 2. Themes and perceived barriers and facilitators regarding implementation of a digital*
 190 *care pathway*

191 ¹PDCP: Personalised Digital Care Pathway, ²HCP: Healthcare professional

Themes	Subthemes	
1. Stakeholders' perceptions of the PDCP¹	<i>Barriers</i>	Duration of first activation
		Not suitable for every patient group
		Necessity of up-to-date content
		Still unclear effectiveness
	<i>Facilitators</i>	User friendliness
		Perceived usefulness by patients
		Potential efficiency in practice
		Contribution to patient-centred care
2. Implementation by HCP² in daily practice	<i>Barriers</i>	Individuals express resistance to change
		Time-consuming implementation
		Non-optimal facilities
	<i>Facilitators</i>	Possibility of incorporation in daily practice
		Providing feedback on adoption
		Created support in the medical department by enlisting co-design
3. Organisational readiness	<i>Barriers</i>	Lack of long term capacity and resources
		Rigidity of organisation
		Ongoing merger
	<i>Facilitators</i>	Focus of national policy on digital healthcare
		Support from different levels in organisation
		Patients providing incentives for change
4. Collaboration within their organisation	<i>Barriers</i>	Mutual communication
		Lack of clear process agreements
	<i>Facilitators</i>	Multidisciplinary co-design

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		Appointing a clinical and operational lead
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1. Stakeholders' perceptions of the PDCP

Patients willing to use the PDCP for the first time needed different applications (apps) for first activation, including a two-factor authentication. This time consuming process, and that patients experienced practical difficulties was identified as a barrier by patients and HCPs. It was also mentioned that this may affect its suitability for patients in acute care settings or for end-users lacking digital skills. In addition, to access the PDCP through the EHR as a healthcare professional, the HCP must first manually install the tool.

- *"We want them [patients] to create and activate a MyChart account, but they also have to create another, separate account for MediMapp." [HCP]*

For the PDCP to permanently match the needs of the patients, one patient indicated that it is necessary for the application to remain up-to-date:

- *"It [the application] has to stay up-to-date. It should not be another tool that is produced but never updated. That is often what tends to happen with these kinds of innovations." [patient, gender care]*

The final barrier relates to the unknown effectiveness of the PDCP innovation in the context of an academic hospital. Respondents mentioned that the precise value of the PDCP tool for the organisation is still unclear. This meant that some HCPs and supporting staff were unconvinced by the innovation, which made it difficult to assess whether it is worth the investment in time and resources during implementation.

One of the main experienced facilitators was the user friendliness of the PDCP. All stakeholders, including patients, regarded the PDCP as visually attractive with a user-friendly interface and an easily understandable overview of the care pathway.

- *"It [MediMapp] looks clear and welcoming, you know exactly where to find what you need." [patient, cleft care]*

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4 219 Mainly HCPs and patients expressed that the perceived usefulness would facilitate PDCP
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6 220 implementation. The innovation met the information needs of patients and created better
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8 221 accessibility of high quality and dosed information. In addition, the PDCP is linked to the EHR,
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10 222 which ensures completeness and reliability for end-users.

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13 223 - *“The integration with electronic health records is one of the unique selling points of this*
14
15 224 *tool, because that allows patients access to their own [personal] app environment.”*

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18 225 *[HCP]*

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20 226 HCPs indicated that using a PDCP might improve efficiency in their daily practice. Firstly,
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22 227 patients know what to expect and what a consultation entails. Secondly, a PDCP could reduce
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24 228 patient questions, since patients can access information before and after a consultation.

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27 229 HCPs and supporting staff perceived that implementing a PDCP contributed to the provision
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29 230 of patient-centred care within the hospital. Important reasons were; 1) placing the patient at
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31 231 the centre of care and using digital tools to support this aligns with the strategy of Amsterdam
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33 232 UMC, 2) the PDCP may ensure a higher level of involvement by patients in their treatment and
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35 233 3) it may facilitate better interaction between the patient and the HCP.

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39 234 - *“In my opinion, the relationship between the patient and the specialist will actually*
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41 235 *improve ... They [patients] know that the specialist is offering the best possible option*
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43 236 *at that moment, because they [patients] can read up on the available information*
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45 237 *themselves.”[HCP]*

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51 239 **2. Implementation by HCP in daily practice**

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53 240 As indicated by a HCP, changing people’s behaviour is difficult and resistance may occur.
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56 241 Since HCP’s individual change is necessary for implementation of PDCP, this resistance was
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3 242 perceived as a barrier.. Breaking routines and demonstrating that the new way is better, was
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6 243 perceived as a difficult transition:

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8 244 - *“Doctors are often creatures of habit, and ... you [HCP] often have a routine that works*
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10 245 *effectively for yourself. Changes can then be more difficult to implement.” [HCP]*

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13 246 Since each department and organisation has its own routine in daily practice, it was mentioned
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15 247 that the innovation must also fit into the routine - including the departments' character and
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17 248 setting:

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20 249 - *“The risk is that there is no room for innovation, because of the kind of person or doctor,*
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22 250 *and the type of work you do. The setting does not immediately allow innovation.” [HCP]*

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27 252 In relation to this, it also often takes time to embed and apply an innovation into practice. Since
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29 253 using the tool required an initial (manually) action by the HCP, which costs time and motivation,
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31 254 this was perceived as a barrier. Moreover, some HCPs indicated that if the consultation room
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33 255 facilities were not optimal this hindered use in practice.

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37 256 - *“The screen cannot always be turned to face the patient because it is wired up with*
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39 257 *locked cables. ... This can make it quite a challenge to ensure a good view of the*
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41 258 *screen for both the HCP and patient. ... This raises the question: if I cannot show the*
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43 259 *screen to the patient, what added value does using it [PDCP] offer me? If I cannot show*
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45 260 *the patient my screen, it makes no sense to use it [PDCP].” [HCP]*

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49 261 However, most HCPs concluded that the consultation room facilities are currently adequate to
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51 262 apply the PDCP in practice.

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56 264 Due to mainly routine work, especially in the outpatient clinic, it should be possible to
57
58 265 implement the PDCP in their daily practice in the consultation room.

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4 266 To ensure long-term adoption, almost all stakeholders suggested that providing feedback on
5
6 267 adoption can facilitate the implementation for HCPs. It was also mentioned by HCPs that
7
8 268 sharing positive experiences, preferably those of their own colleagues, can also enthuse non-
9
10 269 users by showing added value for patients. Sharing experiences could also be a way of
11
12
13 270 explaining how the application works in practice. This can be promoted by internal
14
15 271 ambassadors. In addition, HCPs indicated that reminders may be needed to stimulate users
16
17
18 272 to continue using the app.

19
20 273 - *"If I could notice a couple of times that the tool really helped a patient, then it would be*
21
22 274 *sold to me. My own experiences would really contribute, but the experiences shared*
23
24
25 275 *by colleagues would make a big difference."* [HCP]

26
27 276 Lastly, mentioned by HCPs, the experience of being involved during the process of developing
28
29
30 277 the tool from an early stage would work as a facilitator. An internal staff member also indicated
31
32 278 that it would be conducive to ensure commitment from the department via a financial
33
34 279 contribution.

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36
37 280 - *"What I like about this [development of the PDGP], is how we have been closely*
38
39 281 *involved in the design phase and content development. ... I would have difficulty in*
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41
42 282 *adopting something new if I felt that my input was not taken seriously."* [HCP]

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285 **3. Organisational readiness**

286 Almost all stakeholders mentioned that in order to innovate, an organisation must provide
287 sufficient capacity and resources. One contradicting finding was that most HCPs suggested
288 that long-term implementation support from central departments can facilitate adoption and
289 maintenance, but these central departments indicated that due to a lack of capacity and
290 resources this was not sustainable. This dilemma was perceived as a barrier:

291 - *“The realisation that you need to make significant investments in digital support to*
292 *achieve the level of ambitions has not yet penetrated our governance structure and the*
293 *Board of Directors..... For example, the eHealth team has to devote quite some time*
294 *and effort to managing the PDCP.” [organisational staff]*

295 Furthermore, certain restrictive characteristics of this large organisation were mentioned as an
296 obstacle to implementation. Due to the rigidity and bureaucratic structure, the stakeholders,
297 including the external supplier, stated that decision-making in the organisation was difficult and
298 that all processes took a lot of time. These aspects negatively influenced the agility and ability
299 to change of the organisation:

300 - *“I know Amsterdam UMC as an extensive organisation, where many administrative*
301 *processes must be proceeded through to effect relatively minor changes ... In my*
302 *opinion, it [Amsterdam UMC] can be rigid and unwieldy. I hope this will not be the case*
303 *regarding the implementation of the PDCP.” [HCP]*

304 Another hindering characteristic was the current, ongoing merger of the two locations of
305 Amsterdam UMC. This was mainly perceived as a barrier for implementation. When mandatory
306 change is imposed by an organisation, employees perceived this as not having a choice. The
307 merger implied numerous changes (e.g., working at new locations, observing new medical
308 protocols, and working with new colleagues) to which employees were expected to adapt. In

1
2
3 309 view of the extent of the impending changes, one HCP expressed that it would be challenging
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5
6 310 to expect additional changes to be accepted too. However, it was also mentioned by a HCP
7
8 311 that as so much change was already taking place, it would be better to introduce all the
9
10 312 changes at once:

13 313 - *"We are already experiencing so much change, we can cope with this change as well."*

15 314 *[HCP]*

18 315 Frustration was observed among some HCPs. As the merger was creating insecurity
19
20 316 concerning their position as employees, this made additional changes even harder because
21
22 317 they need to focus on themselves first before focusing on changes in the organisation. In
23
24 318 contrast, internal staff stated that the merger was also having a positive impact on the
25
26 319 organisation. Since the formerly two hospitals had different cultures, merging them had a
27
28 320 positive influence on collaboration:

32 321 - *"Combining the teams at the VUmc and AMC is actually quite a relief. Bringing the two
33
34 322 cultures together creates positive energy ... I always characterised the culture of AMC
35
36 323 as more individualistic and the culture of the VUmc more as a group ... the merger has
37
38 324 been very healthy."* *[organisational staff]*

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43
44 326 With regard to facilitators, as mentioned by the external supplier, the national policy of the
45
46 327 Dutch Ministry of Health, Welfare and Sport (VWS) was focused on digital healthcare at the
47
48 328 time of this study. This created momentum and drove a sense of urgency to innovate for
49
50 329 healthcare organisations, as illustrated by the following quote:

53 330 - *"As soon as there is a sense of urgency, you see that change suddenly takes place.*

56 331 *That was also the case with COVID-19, digitalisation was rapidly embraced."*

58 332 *[organisational staff]*

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2
3 333 From the organisation itself, at department and division level, support was perceived as a
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6 334 facilitator for the stakeholders involved:

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8 335 - *“The ‘gender’ board and different department heads widely support the implementation*
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10 336 *of the PDCP. In addition, attention was given to the project on the policy day. This*
11
12 337 *support is very visible, which I think is very important.” [organisational staff]*

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16
17 339 To ensure sustainable implementation, it became clear that support is needed at various
18
19 340 levels, including from the Board of Directors. As a final facilitator, patients expressing a clear
20
21 341 desire and need for more digital information by requesting access to patient information in this
22
23 342 way could also act as a major incentive to implementation. Within these three patient groups,
24
25 343 the majority of the patients are relatively young and digital natives. This generates a stronger
26
27 344 demand for more digitalisation, which ultimately creates the motivation to innovate and change.

28
29 345 - *“In my opinion, the gender outpatient clinic is one of the outpatient clinics that already*
30
31 346 *has a high level of digitalisation, in terms of video consultation.” [HCP]*

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34 347

35 348 **4. Collaboration within the organisation (support)**

36
37 349 At the start of the PDCP project, the extent of collaboration between all stakeholders involved
38
39 350 was inadequate and there was a certain unwillingness to open up to cooperation with others.

40
41 351 - *“Due to the sheer size of Amsterdam UMC, I think that we still tend to work from*
42
43 352 *individual, isolated perspectives.” [organisational staff]*

44
45 353 In addition, this was also reinforced by disparities in the definitions of common terms used in
46
47 354 mutual communication. Stakeholders gave different definitions of important interpretive
48
49 355 concepts such as implementation and maintenance.

50
51 356 To ensure successful implementation and embedding in the organisation, clear process

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2
3 357 agreements were necessary between the external supplier, EvA Service Center, ICT and the
4
5
6 358 end-users. Most of the supporting staff regarded these agreements to be lacking during the
7
8 359 pilot implementation. It was experienced as important to also describe the division of roles and
9
10 360 ownership. Moreover, it was often unclear who held responsibility for what part of the process
11
12 361 and which tasks were assigned to which department. This emphasises the importance of
13
14
15 362 agreeing and coordinating these points beforehand:

16
17
18 363 - *"I think we should have paid more attention to project adoption and assurance from*
19
20 364 *the beginning. We should have appointed someone within the project team to be*
21
22 365 *responsible for this adoption and assurance."* [organisational staff]
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26
27 367 At a certain point in phase 1, the project team had been formed with the appropriate
28
29 368 representatives from medical and supporting staff to collaborate in the design of the PDCP.
30
31 369 This collaboration was perceived as very useful and resulted in regular multidisciplinary
32
33 370 meetings during the implementation phase, in which both positive findings and issues were
34
35 371 shared. This ensured a very approachable collaboration.
36
37

38
39 372 - *"The communication, care support, strategy and innovation departments, and the EvA*
40
41 373 *Service Center worked together ... This greatly contributed to making this project a*
42
43 374 *success, because all stakeholders were involved. ... This is a very positive*
44
45 375 *development and should be repeated in future projects."* [organisational staff]
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49 376 A complementary clinical and operational leader were both assigned from the start, based on
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51 377 personal motivation and availability. As indicated by multiple stakeholders, this facilitated good
52
53 378 cooperation, both substantively and operationally with prospective implementation in mind.
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56 379

58 380 **DISCUSSION**

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3 381 We investigated factors influencing the implementation of a digital care pathway that was
4
5
6 382 developed using experience-based co-design. We identified 4 themes: 1)'Stakeholders'
7
8 383 perceptions of the PDCP' (e.g., duration of first activation, perceived usefulness PDCP);
9
10 384 2)'Implementation by healthcare professionals in daily practice' (e.g., individuals express
11
12 385 resistance to change, providing feedback on adoption); 3) 'Organisational readiness' (e.g., lack
13
14 386 of resources, patients providing incentives for change); and 4) 'Collaboration within the
15
16 387 organisation' (e.g., mutual communication, multidisciplinary co-design). Main barriers
17
18 388 mentioned by patients were duration of first activation and necessity for up-to-date content. In
19
20 389 addition, the most facilitating factor for patients was user-friendliness.
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26
27 391 There were several common factors among stakeholders (e.g., user friendliness, lack of
28
29 392 resources and rigidity of the organisation). For example, all stakeholders agreed that more
30
31 393 resources are needed for sustainable implementation. However, what resources needed
32
33 394 depended on the stakeholder (e.g. funds, time, workforce). It was also expressed that this
34
35 395 funding should be made available by the central board.
36
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39 396 Nilsson et al. also stated that it is recommended to have sufficient support from the Board of
40
41 397 Directors and align the organisation from the initial stage of the development and
42
43 398 implementation of an innovation to embed the innovation well in the organisation. in line with
44
45 399 that, the Board of Directors should facilitate sufficient capacity and resources (39). These
46
47 400 findings imply that it is vital to invest in sufficient resources from the start of such a project (3).
48
49 401 Previous literature has also shown that *resistance to change* was not only found among HCPs,
50
51 402 but also among the broader stakeholders group (40). Since resistance to change could cause
52
53 403 an implementation to fail, the impact of this perceived barrier should be minimised (36).
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55 404 Explaining what the precise changes are for stakeholders, including end-users, emphasising
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4 405 the added value, and involving different stakeholder groups, including patients, during the
5
6 406 design from an early stage can help alleviate resistance (32, 36, 41-47).
7

8 407 The perception of *rigidity of the organisation*, mainly due to the size of the organisation, was
9
10 408 also mentioned by different stakeholders. This rigidity negatively influenced the decision-
11
12
13 409 making speed and action taking. This was also experienced in the collaboration by the external
14
15 410 supplier. Granja et al stated that this rigidity is typical for a healthcare organisation and
16
17 411 adapting and adjusting to eHealth interventions is not suited for these kind of organisations
18
19 412 (48). Our findings nuanced this, as there was a sense of urgency that created the first steps of
20
21
22 413 organisational readiness and willingness of HCPs to implement this innovation, since the
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24
25 414 added value was certainly recognised and acknowledged by almost all stakeholders. However,
26
27 415 as also mentioned by Threapleton et al., implementing a change in an organisation can take
28
29 416 several years (15). Therefore, transformation requires *organisational readiness* for change
30
31
32 417 among healthcare professionals, including cultural change (49-52).
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34 418 There were also remarkable differences between stakeholders, for example, regarding the
35
36
37 419 impact of the *ongoing merger*. Some stakeholders perceived this as an opportunity for change,
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39 420 while others, due to the merger, sometimes felt it was too much change at once. These
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42 421 differences were also reflected in terms of the facilities required.
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46 423 **Strengths and limitations**

47
48 424 A major strength of this study is that we incorporated the perspectives of all stakeholders,
49
50 425 including the non-medical (supporting) staff. We collected views and opinions of those directly
51
52 426 involved in implementation from an organisational perspective, and those of external
53
54
55 427 stakeholders (patients and supplier). The authors chose to include the patient's perspective
56
57
58 428 through the verification of findings with data from existing patient interviews, since these
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1
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3 429 interviews had already been conducted within the same scope. Other recent studies only
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5
6 430 focused on the organisational perspective or just on the experiences with eHealth
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8 431 implementation and adoption among healthcare professionals and patients. The inclusion of
9
10 432 all perspectives contributed to the representativeness of this study, which took place in the
11
12
13 433 complexity of a large organisation (3, 53-55).

14
15 434 Other strengths related to the fact that this study adds to the limited implementation studies by
16
17 435 providing insight into the development and the subsequent implementation process in daily
18
19
20 436 practice (56). The use of co-design in this project enhanced successful implementation as it
21
22 437 ensured input and feedback by stakeholders and end-users and created commitment for
23
24
25 438 further implementation. Furthermore, the data was structured according to the framework of
26
27 439 CFIR for examining the numerous influences during the implementation of complex
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29
30 440 innovations, making comparison with other studies possible (57). The final strength of this
31
32 441 study is that investigator triangulation was assured, since the interviews were conducted by
33
34 442 multiple researchers (58).

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37 443
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39 444 This study also has some limitations. Firstly, participants were recruited using snowball
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41 445 sampling techniques, which could have resulted in selection bias (59). However, this effect
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44 446 was minimised by including stakeholders both familiar and unfamiliar with the PDCP tool.
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46 447 Secondly, analyses of qualitative data relies on the subjective interpretation of researchers. To
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48
49 448 reduce this bias, two researchers independently analysed the data which positively affected
50
51 449 the validity (60). Thirdly, due to the COVID-19 pandemic, the interviews were conducted both
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53
54 450 by video call and face-to-face, which may have led to differences in understanding and data
55
56 451 interpretation between the interviews. Lastly, CFIR does not include the patients' perspectives
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58 452 as a separate domain, which is an identified gap in CFIR (57). To include this domain, Flottorp's
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3 453 model could be considered (61). In this study, the authors aspired to add this perspective by
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5
6 454 using data from patient interviews.
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10 456 **Practical implications**

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12 457 Based on the results of this study, we have formulated three practical implications to improve
13
14 458 and enhance implementation of a PDCP. Firstly, it is essential to translate the facilitating
15
16
17 459 aspects into evidence-based implementation strategies (62). For example, the added value
18
19 460 and effectiveness of the PDCP for HCPs and patients should be made clear to every
20
21 461 stakeholder involved, in a manner tailored to stakeholder. Secondly, it is vital to establish a
22
23 462 multidisciplinary team comprising a wide selection of stakeholders (e.g., patients, technicians,
24
25 463 HCPs and communication experts) right from the start of the project. This facilitates effective
26
27 464 collaboration in the subsequent adoption and implementation phase. In addition, it is
28
29 465 recommended to create change readiness and take advantage of momentum if change
30
31 466 readiness has already been created. This may take the form, for instance, of implementing
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33 467 innovations in parallel or as part of ongoing organisational changes, such as the hospital's
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35 468 merger.
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43 470 **Future research**

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45 471 At the time of data collection, the PDCP was implemented as a pilot phase in three
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47 472 departments. Subsequent process and effect evaluation research is planned to assess the full
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49 473 implementation of the PDCP. In addition, conducting research on comparable implementation
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51 474 processes in other departments or organisations to elaborate on the generalisability of our
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53 475 findings is also recommended.
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478 **CONCLUSION**

479 In conclusion, this qualitative study has identified factors facilitating or hindering the
480 implementation of a PDCP in a large Dutch academic hospital. There were several similarities
481 between the experienced facilitators or barriers among all stakeholders (e.g., user friendliness,
482 lack of resources and rigidity of the organisation). Influential factors were related to the
483 perceived usefulness of PDCP, yet need for keeping the content up to date. Resistance to
484 change and expected time investment hindered implementation, whilst possibility of
485 incorporation in daily practice worked as facilitator. Organisational readiness worked both as
486 facilitator and barrier, and clear process agreements and communication are needed in place
487 for strong collaboration. The co-creation process facilitated this collaboration. Findings were
488 echoed by patients, and their main barriers were duration of first activation and necessity for
489 up-to-date content. Our findings emphasise the importance of gaining insight into the various
490 perspectives of stakeholder groups, including patients. It is recommended to tailor
491 implementation strategies for each stakeholder group, adjusted to their perceived facilitators
492 and barriers. Our findings can be used to improve and enhance PDCP implementation and
493 tailor the development and improvement of other digital patient communication tools.

494

495 **APPENDIX**

496 1. Topic list and interview guide

497 2. Final codebook

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3 501 **ETHICAL APPROVAL**
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6 502 The need for approval for this study was waived by the Medical Ethical Committee at
7
8 503 Amsterdam UMC, Vrije Universiteit Amsterdam (2019.651). Participation was voluntarily and
9
10 504 all respondents gave verbal and written informed consent before taking part in our project.
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17 507 **ABBREVIATIONS**
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19 508 SDM: shared decision-making
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21 509 PCC: patient centred care
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24 510 PDCP: personalised digital care pathway
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26 511 CFIR: Consolidated Framework for Implementation Research
27

28
29 512 EHR: electronic health record
30

31 513 EvA-SC: EvA Service Center, electronic health record service centre
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33 514 eHealth: electronic health
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36 515 Amsterdam UMC: Amsterdam University Centres
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39
40 517 **ACKNOWLEDGEMENTS**
41

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43

44 519

45
46 520 **AUTHOR CONTRIBUTION**
47

48 521 Each author made substantial contributions to the work and writing of this manuscript: FH,
49

50 522 FvN, MM, MB and MdB participated in the design of the study; FH and JS were responsible
51

52 523 for data collection; FH, JS, and FvN participated in the analysis of the interviews; writing the
53

54 524 initial draft, FH and JS; review and editing, FH, FvN, MM, MB and MdB. All team members
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3 525 approved the version of the manuscript submitted for publishing and have agreed to be
4
5
6 526 accountable for all aspects of the work.
7

8 527

9
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11
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15
16
17 531 the decision to publish, or manuscript preparation.
18

19 532

20
21 533 **COMPETING INTERESTS**

22
23 534 None declared. All authors had full access to all the study data and take responsibility for the
24
25 535 integrity of the data and accuracy of the data analysis.
26

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31 538 **DATA SHARING STATEMENT**

32
33 539 The character and identifiability of the qualitative data does not allow for distribution. All data
34
35 540 relevant to the study are included in the article or uploaded as supplementary information.
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14 703 **FIGURE LEGEND**

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16 704 Figure 1. An example of Personalised Digital Care Pathway (web- and mobile version) in
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18 705 Amsterdam UMC.
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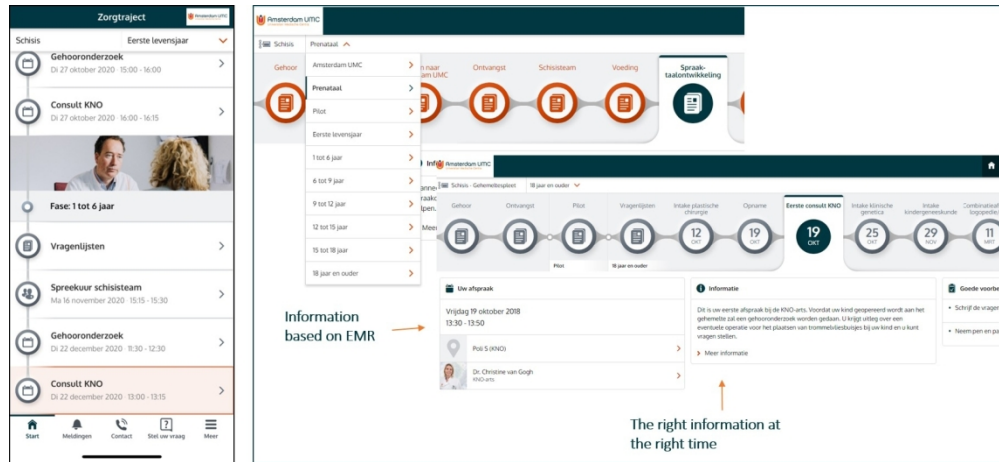


Figure 1. An example of Personalised Digital Care Pathway (web- and mobile version) in Amsterdam UMC.

154x70mm (300 x 300 DPI)

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APPENDIX 1. TOPIC LIST AND INTERVIEW GUIDE

Introductie:

Hartelijk dank voor uw deelname aan dit interview. <introdactie van mezelf en doel van onderzoek>
Het interview zal ongeveer drie kwartier tot een uur duren.

Heeft u nog vragen voor we beginnen?

Mag ik dit interview opnemen? Dan kunnen we nu starten met het interview en de opname.

<recorder aanzetten>

<nogmaals bevestiging vragen op recording voor opnemen>

Om u een idee te geven hoe het interview eruit gaat zien zijn dit de onderwerpen die we gaan behandelen: informatievoorziening huidige situatie, de gewenste situatie en MediMapp en wat uw verwachtingen zijn van MediMapp

Ik zou graag willen beginnen met de vraag of u kunt vertellen wie u bent en wat u doet?
(*geslacht, welke afdeling, functie: hoe lang en eindverantwoordelijke, patiëntgroep*)

Omdat dit interview over een digitale tool gaat, namelijk MediMapp, ben ik benieuwd of u affiniteit heeft met het gebruik van eHealth? Kunt u dit scoren van 1-5?

- En hoe kijkt u aan tegen het digitaliseren van informatievoorziening voor patiënten?
- Bent u al eens in aanraking geweest met MediMapp?
 - o In hoeverre bent u betrokken geweest bij de ontwikkeling van MediMapp?

Informatievoorziening huidige situatie

Kunt u kort beschrijven hoe de informatievoorziening er op dit moment uit ziet? Wij definiëren informatievoorziening als het faciliteren van informatie voor patiënten, met de beschikbare middelen, zowel mondeling als schriftelijk.

- Wat vindt u hier goed gaan? En wat kan nog verbeterd worden?
- Wat denkt u dat patiënten zouden willen veranderen?

Gewenste situatie

- Als u nu de informatievoorziening *opnieuw* zou mogen *inrichten*, hoe ziet dit er dan voor u uit? (*vorm, proces, hoeveelheid, kwaliteit, begrijpelijkheid, toegankelijkheid, personalisatie*)
- Wat hoopt/denkt u dat goede informatievoorziening kan *opleveren*? (*vertrouwen, gesprek, arts-patiëntrelatie, overzicht, verwachtingen, voorbereiding*)
- Wat ziet u als de belangrijkste risico's in deze gewenste situatie?

Kan MediMapp de oplossing zijn?

<korte uitleg MediMapp, digitaal patiëntpad waar nodig>

Verwachting MediMapp

- Wat verwacht u dat MediMapp kan bijdragen aan uw dagelijkse werkzaamheden?
 - o Voor u om informatie makkelijker te voorzien? (*kennis, vaardigheden, motivatie, tijd, ondersteuning, patiënt kenmerken*)
 - o Voor patiënt? (*vertrouwen, gesprek, arts-patiëntrelatie, overzicht, verwachtingen, voorbereiding*)
 - o Wat zou voor u de meerwaarde zijn? (*En voor verpleegkundige / baliemedewerker / overig*)
- Verwacht u MediMapp te gaan gebruiken?
 - o *Hoe? Geloof in MediMapp?*
- Als u MediMapp wilt gaan gebruiken, wat heeft u dan nodig in de praktijk?
Voordeel t.o.v. huidige situatie / aanpasbaarheid, veranderbaar, verfijndheid etc. / complexiteit
- Verwacht u dat er veel gaat veranderen aan uw dagelijkse werkzaamheden als u MediMapp gaat gebruiken?
 - o Hoe kijkt u aan tegen zo'n verandering?
- Hoe verwacht u dat uw collega's zullen reageren op het gebruik van MediMapp?

kennis en geloof in innovatie / *Mening over MediMapp / Kijk tegenover **verandering** / **verhouding** met organisatie / Andere persoonlijke kenmerken (motivatie, capaciteit, leiderschap stijl)*

- Denkt u dat MediMapp kan landen binnen uw afdeling?
 - o *Waarom? Hoe?*
- **Netwerk en communicatie / bereidwilligheid** van afdeling t.o.v. implementatie (cultuur, normen, waardes en aannames) / **implementatie klimaat** van afdeling
- Is MediMapp **passend** bij het Amsterdam UMC? (normen, waardes, werksystemen en stromen)
- **Bereidwilligheid** van Amsterdam UMC t.o.v. implementatie / verbintenis van medewerkers / informatie en kennis beschikbaar

Implementatie:

- Hoe denkt u dat MediMapp het best geïmplementeerd kan worden? En waarom?
 - o Wat heeft uw afdeling hiervoor nodig?
- **Netwerk en communicatie / cultuur, normen, waardes en aannames / implementatie klimaat / kijk tegen verandering / actieve implementatie**
 - o Waar gaan we tegenaan lopen tijdens de implementatie?
 - o Wat gaat ons helpen tijdens de implementatie?
 - o Waar ging het mis bij de implementatie van vorige projecten / oplossingen?
 - o *Klinische formulieren in Epic*
 - o Tijdens een implementatieproces is het belangrijk dat er actieve betrokkenheid is van de organisatie. Hoe ervaart u dat dit wordt gedaan bij het Amsterdam UMC?
- **Planning / (actief) meedoen / (actief) meegenomen worden (door manager, leider, collega) / uitvoering / terugkijken en evalueren**
- Zijn er nog factoren in het Amsterdam UMC die de implementatie van MediMapp makkelijker maken of moeilijker maken?
 - o *(beleid, draagvlak, expertise, samenwerking andere afdelingen, financiën, EPD, etc).*
- Zijn er nog andere factoren in de *brede context* die invloed hebben op de implementatie van MediMapp?
 - o *(everancier, zorgverzekeraar, betaalbaarheid voor organisatie etc.)*
- **DUS** Wat zijn bevorderende factoren voor de implementatie van MediMapp? En wat zijn belemmerende factoren?
 - o *Op de afdeling, gehele organisatie en bredere context*

Afsluiting

Dit was mijn laatste vraag. Zijn er nog dingen die we niet besproken hebben, maar waarvan u denkt dat deze wel relevant zijn voor dit project?

Vervolg uitleggen: verdere interviews doen en het verwerken van deze interviews, bevorderende en belemmerende factoren in kaart brengen. Hierop ga ik dan een advies uitbrengen voor implementatie strategieën die we kunnen toepassen.

Mochten we nog meer deelnemers nodig hebben, mag ik u dan benaderen voor contactlegging met andere collega's?

APPENDIX 2. FINAL CODEBOOK

Appendix 2: Final codebook with domains, sub-domains and definitions (in Dutch).

<i>Domain</i>	<i>Sub-domain</i>	<i>Code Atlas.ti</i>	<i>Definition</i>
1. Inner setting	<i>1.1 Afdeling</i>	1.1.1 + Draagvlak voor PDCP	Alles wat er gezegd wordt over de aanwezigheid van draagvlak op afdelingen (werknemers op afdeling zijn enthousiast over PDCP)
		1.1.2 - Draagvlak voor PDCP	Alles wat er gezegd wordt over afwezigheid van draagvlak op afdelingen (werknemers op afdeling zijn niet enthousiast over PDCP)
		1.1.3 + Teamsamenwerking afdeling	Alles wat gezegd wordt over factoren die een positieve invloed hebben op samenwerking binnen Amsterdam UMC
		1.1.4 - Inspanning door afdeling	Alles wat gezegd wordt over de inspanning die een afdeling levert met negatief effect
		1.1.5 + Inspanning door afdeling	Alles wat gezegd wordt over de inspanning die een afdeling levert
		1.1.7 + Kijk tegen verandering	Alles wat wordt gezegd over veranderingen binnen een afdeling met een bevorderende effect
		1.1.8 - Kijk tegen verandering	Alles wat wordt gezegd over veranderingen binnen een afdeling met een belemmerend effect
		1.1.9 - Medewerkers moeilijk te bereiken	Alles wat wordt gezegd over de bereikbaarheid van medewerkers
		1.1.10 - Resultaat van fuseren op samenwerking	Alles wat gezegd wordt over de nadelige invloed van de fusie op samenwerking binnen een team / afdeling
		1.1.11 - Verandering moe	Alles wat gezegd wordt over veranderingen wat aanduidt dat medewerkers klaar zijn met de veranderingen
		1.1.12 - Onbekendheid van medewerkers over zorgproces en informatie binnen aandoening	Alles wat gezegd wordt over de onbekendheid die medewerkers ervaren over wat er binnen een aandoening precies gebeurt in het zorgproces

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3	1.2	1.2.1 - Amsterdam UMC loopt	Alles wat gezegd wordt over het
4	Ziekenhuis-	achter qua innovatie	innovatieve karakter van Amsterdam
5	breed		UMC t.o.v. andere organisaties en de
6			samenleving
7			
8			
9		1.2.2 + Capaciteit om te	Alles wat gezegd wordt over het hebben
10		innoveren	van voldoende capaciteit van afdelingen
11			om te innoveren
12			
13		1.2.3 - Capaciteit om te	Alles wat gezegd wordt over de
14		innoveren	capaciteit van afdelingen om te
15			innoveren
16			
17		1.2.4 - Cultuur Amsterdam UMC	Alles wat gezegd wordt over de cultuur
18			van Amsterdam UMC
19			
20		1.2.5 - Dingen opleggen werkt	Alles wat gezegd wordt over dat
21		niet	medewerkers het idee krijgen dat ze iets
22			wordt opgelegd door besturende
23			organen (RvB, managers etc.), waar ze
24			zelf geen mening over hebben kunnen
25			geven
26			
27			
28		1.2.6 + Draagvlak nodig voor	Alles wat gezegd wordt over het
29		uitvoering	draagvlak wat nodig is voor het gebruik
30			van een innovatie
31			
32		1.2.7 - Draagvlak nodig voor	Alles wat gezegd wordt over het
33		uitvoering	draagvlak wat nodig is voor het gebruik
34			van een innovatie
35			
36			
37		1.2.8 + Eerdere ervaringen met	Alles wat gezegd wordt over eerdere
38		innovaties beïnvloeden adoptie	ervaringen met soortgelijke innovaties,
39			wat adoptie van innovatie positief kan
40			beïnvloeden
41			
42			
43		1.2.9 - Eerdere ervaringen met	Alles wat gezegd wordt over eerdere
44		innovaties beïnvloeden adoptie	ervaringen met soortgelijke innovaties,
45			wat adoptie van innovatie negatief kan
46			beïnvloeden
47			
48		1.2.10 + Financieren innovaties	Alles wat er gezegd wordt over het
49			financieren van innovaties en de invloed
50			hiervan op adoptie
51			
52			
53		1.2.11 - Financieren innovaties	Alles wat er gezegd wordt over het
54			financieren van innovaties en de invloed
55			hiervan op adoptie
56			
57		1.2.12 - Fusen twee huizen	Alles wat gezegd wordt over het fusen
58			van het VUmc en AMC (op
59			organisatieniveau)
60			

		1.2.13 + Helderheid in verdeling van rollen	Alles wat er gezegd wordt over dat het voor stakeholders duidelijk is wat de rolverdeling is
		1.2.14 - Helderheid in verdeling van rollen	Alles wat er gezegd wordt over dat het voor stakeholders duidelijk is wat de rolverdeling is
		1.2.15 + Informatie voorziening voor patiënten	Alles wat wordt gezegd over de informatie dat wordt aangeboden aan patiënten
		1.2.16 - Informatie voorziening voor patiënten	Alles wat wordt gezegd over de informatie dat wordt aangeboden aan patiënten
		1.2.17 + PDCP past binnen beleid Amsterdam UMC	Alles wat gezegd wordt over het passen van PDCP bij het beleid van Amsterdam UMC
		1.2.18 - PDCP past binnen beleid Amsterdam UMC	Alles wat gezegd wordt over het passen van PDCP bij het beleid van Amsterdam UMC
		1.2.19 - Onbekendheid ziekenhuis breed	Alles wat er gezegd wordt over de onbekendheid die medewerkers ervaren over processen en beleid keuzes
		1.2.20 - Teamsamenwerking ziekenhuis	Alles wat gezegd wordt over factoren die een negatieve invloed hebben op samenwerking (ook onderlinge communicatie bijv.) binnen Amsterdam UMC
2. Outer setting		2.1 Landelijk uitwisseling	Alles wat gezegd wordt over de uitwisseling tussen verschillende ziekenhuizen (van patiënt informatie, van informatie, filmpjes etc.)
		2.2 Landelijke druk eHealth	Alles wat gezegd wordt over de druk die de overheid uitoefent op het innoveren in eHealth
		2.3 Leverancier	Alles wat gezegd worden over samenwerking met een externe leverancier
3. Intervention	<i>3.1 Geen meerwaarde PDCP zorgverlener</i>	3.1 - Geen meerwaarde PDCP zorgverlener	Alles wat gezegd wordt over de meerwaarde van PDCP voor zorgverleners(groepen)

1			
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3	3.2	3.2.1 + Goede	Alles wat gezegd wordt over de
4	<i>Meerwaarde</i>	informatievoorziening voor	toegankelijke en betrouwbare
5	<i>PDCP</i>	patiënt	invoorziening (voor patiënt) met
6			kwaliteit en de juiste hoeveelheid, door
7			PDCP verzorgt
8			
9			
10		3.2.2 + Maatwerk voor patiënt	Alles wat gezegd wordt over de
11			mogelijkheid die PDCP biedt om
12			maatwerk te leveren aan de patiënt
13			
14		3.2.3 + Meerwaarde	Alles wat gezegd wordt over de
15		zorgverlener	meerwaarde van PDCP voor
16			zorgverleners(groepen)
17			
18			
19		3.2.4 + PDCP draagt bij aan	Alles wat gezegd wordt over andere
20		andere doelen	doelen die bereikt kunnen worden door
21			PDCP (SDM, koppeling PROMs, meer
22			grip zorgtraject voor patiënten)
23			
24		3.2.5 + Tijdsparing /	Alles wat gezegd wordt over dat PDCP
25		efficiënter werken	efficiëntie stimuleert
26			
27		3.2.6 + PDCP past in huidige	Alles wat gezegd wordt over de
28		werkwijze	passendheid van PDCP in de huidige
29			werkwijze
30			
31			
32		3.2.7 - PDCP past in huidige	Alles wat gezegd wordt over de
33		werkwijze	passendheid van PDCP in de huidige
34			werkwijze
35			
36		3.2.8 - Patiënt- arts relatie	Alles wat gezegd wordt over de invloed
37			van PDCP op de arts-patiënt relatie
38			
39	3.3 <i>Gebruiks-</i>	3.3.1 + Aansluiten behoeftes	Alles wat gezegd wordt over de
40	<i>vriendelijkheid</i>	patiënt	behoefte van de patiënt aan PDCP
41			
42		3.3.2 - Aansluiten behoeftes	Alles wat gezegd wordt over de
43		patiënt	behoefte van de patiënt aan PDCP
44			
45		3.3.3 + Aansluiten	Alles wat gezegd wordt over de
46		informatiebehoefte patiënt	informatiebehoefte van de patiënt
47			
48			
49		3.3.4 - Geschiktheid voor	Alles wat gezegd wordt over de
50		iedereen	geschiktheid van PDCP bij ieder type
51			patiënt (zoals laaggeletterden, andere
52			talen)
53			
54	3.4 <i>Beheer</i>	3.4.1 - Beheer PDCP	Alles wat gezegd wordt over het beheer
55			van PDCP
56			
57			
58		3.4.2 + Koppeling met Epic	Alles wat gezegd wordt over de
59			koppeling tussen EPIC en PDCP
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	3.4.3 - Koppeling met Epic	Alles wat gezegd wordt over de koppeling tussen EPIC en PDCP
	3.4.4 + Kosten	Alles wat gezegd wordt over de kosten van PDCP
	3.4.5 - Kosten	Alles wat gezegd wordt over de kosten van PDCP
	3.4.6 - Meerdere apps nodig	Alles wat gezegd wordt over dat er meerdere apps nodig zijn voor patiënten om meer te weten over hun zorg en zorgtraject
	3.4.7 + Gebruik van PDCP	Alles wat er gezegd wordt over hoe PDCP te gebruiken is
	3.4.8 - Gebruik van PDCP	Alles wat er gezegd wordt over hoe PDCP te gebruiken is
	3.4.9 + Uiterlijk PDCP	Alles wat gezegd wordt over de ervaring van hoe PDCP eruit ziet
	<i>3.5 Risico's</i> 3.5.1 + Effect en risico	Alles wat gezegd wordt over risico's van informatie digitaliseren (wat invloed kan hebben op de implementatie van PDCP)
	3.5.2 – Effect en risico	Alles wat gezegd wordt over risico's van informatie digitaliseren (wat invloed kan hebben op de implementatie van PDCP)
	4.1 + Attitude eindgebruikers t.o.v. PDCP	Alles wat gezegd wordt over hoe eindgebruikers tegenover PDCP staan
	4.2 - Attitude eindgebruikers t.o.v. PDCP	Alles wat gezegd wordt over hoe eindgebruikers tegenover PDCP staan
	4.3 + Betrokkenheid van eindgebruikers	Alles wat gezegd wordt over de invloed van de betrokkenheid van eindgebruikers op de implementatie
	4.4 - Betrokkenheid van eindgebruikers	Alles wat gezegd wordt over de invloed van de betrokkenheid van eindgebruikers op de implementatie
	4.5 + Karakteristieken eindgebruikers	Alles wat gezegd wordt over de eigenschappen van eindgebruikers, zoals leeftijd, skills met omgaan eHealth
	4.6 - Karakteristieken eindgebruikers	Alles wat gezegd wordt over de eigenschappen van eindgebruikers, zoals leeftijd, skills met omgaan eHealth

		4.7 + Ervaringen delen motiveert	Alles wat gezegd wordt over ervaringen delen (van eindgebruikers) met de ondersteunende diensten, wat als motiverend wordt ervaren
		4.8 + Motivatie om te veranderen	Alles wat gezegd wordt over de motivatie van medewerkers om hun dagelijkse werkzaamheden te veranderen
		4.9 - Motivatie om te veranderen	Alles wat gezegd wordt over de motivatie van medewerkers om hun dagelijkse werkzaamheden te veranderen
		4.10 + Herinnering voor PDCP nodig	Alles wat gezegd wordt over het herinneren van eindgebruikers aan PDCP
		4.11 - Herinnering voor PDCP nodig	Alles wat gezegd wordt over het herinneren van eindgebruikers aan PDCP
5. Process	<i>5.1 Bevorderend</i>	5.1.1 + Randvoorwaarden gebruik	Alles wat gezegd wordt over wat nodig is voor eindgebruikers om PDCP (praktisch) te gebruiken in dagelijkse werkzaamheden
		5.1.2 + Suggesties voor implementatie en gebruik	Suggesties hoe de implementatie en gebruik het best vormgegeven kan worden
		5.1.3 + Suggesties voor verbetering inhoud / ontwikkeling	Suggesties hoe verbeteringen het best aangepakt kunnen worden (feedbackloops)
		5.1.4 + Sense of urgency nodig voor succes	Alles wat gezegd wordt over het gevoel van urgentie, wat een organisatie nodig heeft om een innovatie te laten slagen
	5.2 Belemmerend	5.2.1 - Onduidelijkheid rondom proces PDCP	Alles wat gezegd wordt over onduidelijkheid rondom gebruikers proces van PDCP
		5.2.2 - Randvoorwaarden gebruik	Alles wat gezegd wordt over wat nodig is voor eindgebruikers om PDCP te gebruiken in dagelijkse werkzaamheden
		5.2.3 - Selectie maken is moeilijk	Alles wat wordt gezegd over de selectie welke afdelingen mee mogen doen met gebruik PDCP
		5.2.4 - Uitvoering moeizaam	Alles wat gezegd wordt over hoe de uitvoering van PDCP gaat

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5.2.5 - Verschil in definities

Alles wat gezegd wordt over definities en termen rondom het proces van implementeren van PDCP

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COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the interview or focus group?	
Duration	21	What was the duration of the interviews or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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Stakeholders barriers and facilitators for the implementation of a personalised digital care pathway: a qualitative study

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Stakeholders barriers and facilitators for the implementation of a personalised digital care pathway: a qualitative study

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Keywords

patient-centred care, implementation, facilitators and barriers, digital communication, patient
information, stakeholder involvement

ABSTRACT

Objective

A prerequisite for patient-centeredness in healthcare organisations is offering patients access to adequate health information which fits their needs. A personalised digital care pathway (PDCP) is a tool that facilitates the provision of tailored and timely information. Despite its potential, barriers influence the implementation of digital tools in healthcare organisations. Therefore, we investigated the perceived barriers and facilitators for implementation of the PDCP among stakeholders.

Design

A qualitative study was conducted to acquire insight into perceptions of the stakeholders involved in the implementation of a digital care pathway in three diverse patient groups.

Setting

This study is part of the “PersonalisedDigitalCarePathway” (PDCP) research project in a large academic hospital in the Netherlands.

Participants

Purposive sampling was used to recruit internal stakeholders (e.g., healthcare professionals, employees of the supporting departments) and external stakeholders (e.g., employees of the external PDCP supplier). In addition, existing semi-structured interviews with patients involved in pilot implementation (n=24) were used to verify the findings.

Results

We conducted 25 semi-structured interviews using the Consolidated Framework for Implementation Research. Content analyses yielded four themes: 1) stakeholders' perceptions of the PDCP (e.g., perceived usefulness); 2) characteristics of the individuals involved and the implementation process (e.g., individuals express resistance to change); 3) 'Organisational readiness' (e.g., lack of resources); and 4) 'Collaboration within the organisation' (e.g., mutual communication, multidisciplinary co-design).

The main barriers mentioned by patients were duration of first activation and necessity for up-to-date content. In addition, the most facilitating factor for patients was user-friendliness.

Conclusion

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3 Our findings emphasise the importance of gaining insights into the various perspectives of stakeholder
4 groups, including patients, regarding the implementation of the PDCP. The perceived barriers and
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8 facilitators can be used to improve the PDCP implementation plan and tailor the development and
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10 improvement of other digital patient communication tools.

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12 Trial registration number

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Strengths and limitations of this study

- This qualitative study took into account the diverse perspectives of all types of stakeholders.
- A co-design approach was used to enhance successful implementation.
- Due to the COVID-19 pandemic, interviews were conducted both digitally and physically.
- Participants were recruited using snowball sampling techniques, which could have resulted in selection bias.
- Since the interviews were conducted and analysed by multiple researchers, investigator triangulation was applied.

2 INTRODUCTION

3 In recent years, the emphasis on patient-centred care has increased in the Dutch healthcare
4 system (1). Patient-centeredness is a key element of high-quality care and entails collaboration
5 between the healthcare professional (HCP), the patient and their families, in which the needs,
6 values and preferences of patients are the focus of care (2, 3). Patients no longer want to be
7 passive recipients of care, but increasingly want and need to proactively manage their own
8 health. They also wish to be empowered and involved in decision-making that relates to their
9 care, which can contribute to patient-centred care (4-9). To achieve this, it is important that
10 HCPs and patients share the same information (10, 11).

11 To achieve patient-centred care including shared decision-making, health information should
12 be tailored. Personalised health information includes details about the diagnosis and treatment
13 options of the individual, and practical information about their care pathway (12, 13). This
14 concerns information about possible choices and the advantages and disadvantages of these
15 choices, along with outcomes and uncertainties (8, 13, 14). Information provision should match
16 the patient's wishes, needs and their ability to process information, which ensures a better
17 experience for the patient (15). In addition, optimally dosing and timing the information
18 provision is crucial, to prevent patients from an information overload (7, 15, 16). Also, health
19 literacy studies show that general health information is frequently not understood to a sufficient
20 extent (17).

21
22 Both patients and HCPs have expressed their willingness to contribute to patient-centred care,
23 but often have insufficient knowledge on how to put this into practice (4, 5, 7). Therefore, HCPs
24 should be instructed on how to provide their patients with suitable information (7, 18). Providing
25 the HCP and patient with tools to improve information provision facilitates effective

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4 26 communication (4, 11). A personalised digital care pathway is an example of a tool that
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6 27 facilitates HCPs and their patients in accessing adequate information (4, 16, 19). This can be
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8 28 described as a digital tool providing personalised dosed information and an overview of
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10 29 appointments for the coordination of care, tailored to a certain patient group, which leads to
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13 30 greater information symmetry between the HCP and patient (20).
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18 32 Despite the potential of digital care pathways, there appear to be barriers to the implementation
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20 33 of digital tools in healthcare organisations (11, 21-24). An innovation that has been poorly
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22 34 implemented by HCPs may end up not being used in daily routines or used in the wrong way,
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24 35 which results in a low uptake by end-users (24, 25). Gathering information about the
25
26 36 organisation, such as the context and responses to change before and during implementation,
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28 37 can determine the factors that affect implementation (25-27). All stakeholders act within their
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30 38 own contexts and expectations (28). Therefore, to implement a digital care pathway in practice,
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32 39 it is essential to explore the perceptions of all stakeholders involved including end-users (29).
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39 41 Information about implementation is often expressed in barriers and facilitators (27, 30). This
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41 42 information contributes to selecting tailored implementation strategies, which in turn can help
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43 43 overcome the hurdles of implementing (27, 31). As example, previous studies have shown that
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45 44 low health literacy and inadequate staffing were barriers to the implementation of digital tools.
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47 45 On the other hand, the perceived usefulness of an intervention and good multidisciplinary
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49 46 communication were identified as facilitating for implementation (3, 19, 32). However, some of
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51 47 these studies mainly focused on implementation in one specific patient group and the
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53 48 perceived barriers and facilitators from an organisational perspective. As a result, there is a
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55 49 lack of insight into the hospital-wide embedding in diverse patient groups and visions of all the
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3 50 different stakeholders involved, including end users.
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6 51 Therefore, the aim of this study was to identify the perceived facilitators and barriers among
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8 52 various internal and external stakeholders (i.e., patients, healthcare professionals, non-
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10 53 medical professionals, external supplier) regarding the implementation of personalised digital
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13 54 care pathways within a large academic hospital.
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56 METHODS

57 Study design

58 A qualitative study was conducted to acquire insight into perceptions of the stakeholders
59 involved in the implementation of a digital care pathway in three diverse patient groups.

61 Context and setting

62 This study is part of the “PersonalisedDigitalCarePathway” (PDCP) research project. As basis
63 for initiating this patient-centred project, we used previous patient-reported experience
64 measurements and patient participation sessions during the start of the value-based
65 healthcare (VBHC) program at Amsterdam UMC, a large academic hospital in Amsterdam, the
66 Netherlands (33). Patients indicated that information was outdated and not easily accessible.
67 This was mentioned among all three selected patient groups, all of them were part of the VBHC
68 program. Furthermore, they experienced a low level of self-management with regard to their
69 care healthcare. Development and subsequent implementation of a PDCP was anticipated to
70 remedy these shortcomings. The project included two phases:

- 71 1. Adaptive development including pilot implementation, based on experience-based co-
72 design (out of scope in this study). PDCPs were created in close collaboration with 1)
73 patients with excessive scars (Scar Clinic), 2) cleft lip and/or palate (Cleft Care) and 3)
74 people who experience gender dysphoria (Gender Care) and their healthcare
75 professionals, communication advisors and the eHealth team of our electronic health
76 record service centre (EvA-SC).
- 77 2. Evaluation of implementation in practice of the PDCPs at Amsterdam UMC for the three
78 patient groups as described above.

79 We conducted this qualitative study at the end of phase 1.

80

81 **Personalised Digital Care Pathway (PDCP)**

82 In this study we define a PDCP as a digital tool which provides patients and their healthcare
83 professionals an overview of a the personal care pathway, with adequate and dosed
84 information at appropriate time points. An example is shown in Figure 1 (web- and mobile
85 version). In this customised tool, relevant content will become available gradually to end-users
86 as the care pathway progresses over time - including appointments and practical information.
87 Patients can access the PDCP tool after a two-factor authentication via an app or as a web-
88 based tool (34). Access is given after their first intake to the hospital, and after the initial
89 authentication, patients and/or parents can enter the tool at any time. Healthcare professionals
90 have access to the patients' PDCP via the electronic health record (EHR). The IT system used
91 for this project was developed by an external supplier (Solve Innovations) (35).

92
93 *<PLEASE INSERT FIGURE 1 HERE>*

94 **Study participants**

95 Stakeholders were recruited by purposive sampling. To identify further relevant stakeholders,
96 we used snowball sampling (36). Internal stakeholders were healthcare professionals of the
97 medical specialties involved (plastic surgery, otorhinolaryngology, psychology and
98 gynaecology) and employees of the supporting departments, divided into managers and team
99 members. Employees of the external supplier participated as external stakeholders. All
100 stakeholders were contacted through email. Once the stakeholder had agreed to participate
101 an interview was scheduled, digitally via Microsoft Teams or on location. Informed consent
102 was signed after the participant was informed about the purpose of the study. Verbal consent
103 for audio recording was obtained from every participant.

104

105 **Theoretical framework**

106 We used the Consolidated Framework for Implementation Research (CFIR), as this framework
107 can help to explain why implementation of the PDCP may or may not be successful (37). It
108 provides a practical guide for evaluating perceived facilitators and barriers. In this framework
109 the context, complexity, multi-level aspects and interaction of the implementation are
110 considered (31, 37). The five domains of the CFIR framework are: intervention (e.g.,
111 advantage, adaptability), outer setting (e.g., patient needs, external policies), inner setting
112 (e.g., culture, readiness for implementation), the individuals involved (e.g., knowledge and
113 beliefs, self-efficacy), and the implementation process (e.g., engaging, executing) (37, 38).

114

115 **Data collection**

116 We conducted individual, semi-structured, in-depth interviews guided by CFIR. We ordered
117 the themes in a way that was consistent with the care and implementation process,
118 incorporating all components of CFIR. The list of topics (Appendix 1) was amended minimally
119 for stakeholders who work as healthcare professionals. All audio-recorded interviews were
120 conducted by trained researchers (JS, JG, FH, FvN) and transcribed verbatim.

121

122 *Patient and Public Involvement*

123 Patients were actively involved during adaptive development of the PDCP (phase 1). Patients
124 were selected via their healthcare professional, consultation appointment or inpatient
125 admission. In this study pragmatic semi-structured interviews with patients (n=24) which had
126 been conducted after taking part in the pilot implementation, were used for verification of our
127 findings about the facilitators and barriers for implementation of the PDCP. The purpose of

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3 128 these interviews was to collect patients' experiences concerning the content and use of the
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6 129 application during the pilot implementation and verify the gathered findings. This data was also
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8 130 collected as part of the PDCP research project during phase 1 and will be used for further
9
10 131 implementation.

132

133 **Data analysis**

134 To ensure data saturation, data analysis was initiated during data collection, so that missing
135 information, themes or perspectives could be gathered during upcoming interviews (39). This
136 process was repeated until no new themes emerged from the data and we mainly heard
137 information we gathered before. Data was analysed using content analysis in Atlas.ti version
138 9 (Berlin, Germany). First, three researchers (FH, JS, FvN) coded six transcripts openly and
139 inductively. During several meetings (FH, JS, FvN) codes were discussed, grouped in
140 overarching codes, and revised to reach a consensus and ensure quality of the analysis. The
141 codes used in Atlas.ti 9 were described in a final codebook (appendix 2), which was used to
142 analyse the remaining transcripts by two independent researchers (FH, JS). After coding the
143 transcripts, categories were formed by deductive axial coding. These categories were used to
144 form themes and subthemes, described in the results section. In the final step, quotes were
145 selected for representation. All data were analysed and presented pseudonymously.

147 **RESULTS**

148 In total, 25 interviews were conducted between November 2020 and June 2021. Most of the
 149 interviews were held digitally due to the COVID-19 pandemic (n=22) and three were held face-
 150 to-face. Interviews lasted on average an hour (37 minutes min; 67 minutes max). Table 1
 151 shows characteristics of the interviewees. The group of ‘non-medical professionals’ included
 152 supporting staff of the implicated medical departments level (decentral), supporting staff of the
 153 main organisation e.g. strategy, communication and EHR department (central) and employees
 154 of the external supplier as external participants. Median employment duration of stakeholders
 155 in their current position was 2 years (min 1 – max 20 years).

157 *Table 1. Characteristics of study participants (N=25)*

158 ¹EvA-SC: electronic health record service centre, ²PDCP: Personalised Digital Care Pathway

Gender, N(%)		Professional roles in organisation, N(%)		Employment context of participants, N(%)		
Male	7 (28%)	<i>Healthcare professionals</i>	TOTAL	10 (40%)	Excessive scars (Scar Clinic)	4 (16%)
Female	18 (72%)		Doctor	5 (20%)	Cleft Lip or/and Palate (Cleft Care)	4 (16%)
			Nurse (specialist)	3 (12%)	Gender Incongruence (Gender Care)	6 (24%)
			Other roles	2 (8%)	Internal and External Communication	2 (8%)
		<i>Non-medical professionals</i>	TOTAL	15 (60%)	EvA Service Center ¹	4 (16%)
		<i>Decentral staff</i>	Consultant	2 (8%)	Strategy & Innovation	3 (12%)
			Other roles	2 (8%)	External PDCP ² supplier	2 (8%)
		<i>Central staff</i>	Manager	3 (12%)		
			Application specialist	2 (8%)		
			Consultant	4 (16%)		
		<i>External staff</i>	Other roles	2 (8%)		

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In addition, the 24 interviews with patients were conducted after taking part in the pilot implementation (phase 1) and were included in the results. An interview validity check was used for verification of the themes and findings. Quotes were used for representation.

Content analyses yielded four main themes, subdivided in 24 subthemes (Table 2).

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166 *Table 2. Themes and perceived barriers and facilitators regarding implementation of a digital*
 167 *care pathway*

168 ¹PDCP: Personalised Digital Care Pathway, ²HCP: Healthcare professional

Themes	Subthemes	
1. Stakeholders' perceptions of the PDCP¹	<i>Barriers</i>	Duration of first activation
		Not suitable for every patient group
		Necessity of up-to-date content
		Still unclear effectiveness
	<i>Facilitators</i>	User friendliness
		Perceived usefulness by patients
		Potential efficiency in practice
		Contribution to patient-centred care
2. Implementation by HCP² in daily practice	<i>Barriers</i>	Individuals express resistance to change
		Time-consuming implementation
		Non-optimal facilities
	<i>Facilitators</i>	Possibility of incorporation in daily practice
		Providing feedback on adoption
		Created support in the medical department by enlisting co-design
3. Organisational readiness	<i>Barriers</i>	Lack of long term capacity and resources
		Rigidity of organisation
		Ongoing merger
	<i>Facilitators</i>	Focus of national policy on digital healthcare
		Support from different levels in organisation
		Patients providing incentives for change
4. Collaboration within their organisation	<i>Barriers</i>	Mutual communication
		Lack of clear process agreements
	<i>Facilitators</i>	Multidisciplinary co-design

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		Appointing a clinical and operational lead
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1. Stakeholders' perceptions of the PDCP

Patients willing to use the PDCP for the first time needed different applications (apps) for first activation, including a two-factor authentication. This time consuming process, and that patients experienced practical difficulties was identified as a barrier by patients and HCPs. It was also mentioned that this may affect its suitability for patients in acute care settings or for end-users lacking digital skills. In addition, to access the PDCP through the EHR as a healthcare professional, the HCP must first manually install the tool.

- *"We want them [patients] to create and activate a MyChart [patient portal] account, but they also have to create another, separate account for MediMapp [PDCP tool]." [HCP]*

For the PDCP to permanently match the needs of the patients, one patient indicated that it is necessary for the application to remain up-to-date:

- *"It [the application] has to stay up-to-date. It should not be another tool that is produced but never updated. That is often what tends to happen with these kinds of innovations." [patient, gender care]*

The final barrier relates to the unknown effectiveness of the PDCP innovation in the context of an academic hospital. Respondents mentioned that the precise value of the PDCP tool for the organisation is still unclear. This meant that some HCPs and supporting staff were unconvinced by the innovation, which made it difficult to assess whether it is worth the investment in time and resources during implementation.

One of the main experienced facilitators was the user friendliness of the PDCP. All stakeholders, including patients, regarded the PDCP as visually attractive with a user-friendly interface and an easily understandable overview of the care pathway.

- *"It [MediMapp] looks clear and welcoming, you know exactly where to find what you need." [patient, cleft care]*

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4 196 Mainly HCPs and patients expressed that the perceived usefulness would facilitate PDCP
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6 197 implementation. The innovation met the information needs of patients and created better
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8 198 accessibility of high quality and dosed information. In addition, the PDCP is linked to the EHR,
9
10 199 which ensures completeness and reliability for end-users.

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13 200 - *"The integration with electronic health records is one of the unique selling points of this*
14
15 201 *tool, because that allows patients access to their own [personal] app environment."*

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18 202 *[HCP]*

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20 203 HCPs indicated that using a PDCP might improve efficiency in their daily practice. Firstly,
21
22 204 patients know what to expect and what a consultation entails. Secondly, a PDCP could reduce
23
24 205 patient questions, since patients can access information before and after a consultation.

25
26
27 206 HCPs and supporting staff perceived that implementing a PDCP contributed to the provision
28
29 207 of patient-centred care within the hospital. Important reasons were; 1) placing the patient at
30
31 208 the centre of care and using digital tools to support this aligns with the strategy of Amsterdam
32
33 209 UMC, 2) the PDCP may ensure a higher level of involvement by patients in their treatment and
34
35 210 3) it may facilitate better interaction between the patient and the HCP.

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39 211 - *"In my opinion, the relationship between the patient and the specialist will actually*
40
41 212 *improve ... They [patients] know that the specialist is offering the best possible option*
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43 213 *at that moment, because they [patients] can read up on the available information*
44
45 214 *themselves."*[HCP]

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51 216 **2. Implementation by HCP in daily practice**

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53 217 As indicated by a HCP, changing people's behaviour is difficult and resistance may occur.
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55 218 Since HCP's individual change is necessary for implementation of PDCP, this resistance was
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4 219 perceived as a barrier.. Breaking routines and demonstrating that the new way is better, was
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6 220 perceived as a difficult transition:

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8 221 - *“Doctors are often creatures of habit, and ... you [HCP] often have a routine that works*
9
10 222 *effectively for yourself. Changes can then be more difficult to implement.” [HCP]*

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13 223 Since each department and organisation has its own routine in daily practice, it was mentioned
14
15 224 that the innovation must also fit into the routine - including the departments' character and
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17 225 setting:

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20 226 - *“The risk is that there is no room for innovation, because of the kind of person or doctor,*
21
22 227 *and the type of work you do. The setting does not immediately allow innovation.” [HCP]*

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26
27 229 In relation to this, it also often takes time to embed and apply an innovation into practice. Since
28
29 230 using the tool required an initial (manually) action by the HCP, which costs time and motivation,
30
31 231 this was perceived as a barrier. Moreover, some HCPs indicated that if the consultation room
32
33 232 facilities were not optimal this hindered use in practice.

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37 233 - *“The screen cannot always be turned to face the patient because it is wired up with*
38
39 234 *locked cables. ... This can make it quite a challenge to ensure a good view of the*
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41 235 *screen for both the HCP and patient. ... This raises the question: if I cannot show the*
42
43 236 *screen to the patient, what added value does using it [PDCP] offer me? If I cannot show*
44
45 237 *the patient my screen, it makes no sense to use it [PDCP].” [HCP]*

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49 238 However, most HCPs concluded that the consultation room facilities are currently adequate to
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51 239 apply the PDCP in practice.

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56 241 Due to mainly routine work, especially in the outpatient clinic, it should be possible to
57
58 242 implement the PDCP in their daily practice in the consultation room.

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3 243 To ensure long-term adoption, almost all stakeholders suggested that providing feedback on
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6 244 adoption can facilitate the implementation for HCPs. It was also mentioned by HCPs that
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8 245 sharing positive experiences, preferably those of their own colleagues, can also enthuse non-
9
10 246 users by showing added value for patients. Sharing experiences could also be a way of
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13 247 explaining how the application works in practice. This can be promoted by internal
14
15 248 ambassadors. In addition, HCPs indicated that reminders may be needed to stimulate users
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17
18 249 to continue using the app.

19
20 250 - *"If I could notice a couple of times that the tool really helped a patient, then it would be*
21
22 251 *sold to me. My own experiences would really contribute, but the experiences shared*
23
24 252 *by colleagues would make a big difference."* [HCP]

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26
27 253 Lastly, mentioned by HCPs, the experience of being involved during the process of developing
28
29 254 the tool from an early stage would work as a facilitator. An internal staff member also indicated
30
31 255 that it would be conducive to ensure commitment from the department via a financial
32
33 256 contribution.

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37 257 - *"What I like about this [development of the PDGP], is how we have been closely*
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39 258 *involved in the design phase and content development. ... I would have difficulty in*
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41 259 *adopting something new if I felt that my input was not taken seriously."* [HCP]

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262 **3. Organisational readiness**

263 Almost all stakeholders mentioned that in order to innovate, an organisation must provide
264 sufficient capacity and resources. One contradicting finding was that most HCPs suggested
265 that long-term implementation support from central departments can facilitate adoption and
266 maintenance, but these central departments indicated that due to a lack of capacity and
267 resources this was not sustainable. This dilemma was perceived as a barrier:

268 - *“The realisation that you need to make significant investments in digital support to*
269 *achieve the level of ambitions has not yet penetrated our governance structure and the*
270 *Board of Directors..... For example, the eHealth team has to devote quite some time*
271 *and effort to managing the PDCP.” [organisational staff]*

272 Furthermore, certain restrictive characteristics of this large organisation were mentioned as an
273 obstacle to implementation. Due to the rigidity and bureaucratic structure, the stakeholders,
274 including the external supplier, stated that decision-making in the organisation was difficult and
275 that all processes took a lot of time. These aspects negatively influenced the agility and ability
276 to change of the organisation:

277 - *“I know Amsterdam UMC as an extensive organisation, where many administrative*
278 *processes must be proceeded through to effect relatively minor changes ... In my*
279 *opinion, it [Amsterdam UMC] can be rigid and unwieldy. I hope this will not be the case*
280 *regarding the implementation of the PDCP.” [HCP]*

281 Another hindering characteristic was the current, ongoing merger of the two locations of
282 Amsterdam UMC. This was mainly perceived as a barrier for implementation. When mandatory
283 change is imposed by an organisation, employees perceived this as not having a choice. The
284 merger implied numerous changes (e.g., working at new locations, observing new medical
285 protocols, and working with new colleagues) to which employees were expected to adapt. In

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3 286 view of the extent of the impending changes, one HCP expressed that it would be challenging
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6 287 to expect additional changes to be accepted too. However, it was also mentioned by a HCP
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8 288 that as so much change was already taking place, it would be better to introduce all the
9
10 289 changes at once:

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13 290 - *"We are already experiencing so much change, we can cope with this change as well."*

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15 291 *[HCP]*

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18 292 Frustration was observed among some HCPs. As the merger was creating insecurity
19
20 293 concerning their position as employees, this made additional changes even harder because
21
22 294 they need to focus on themselves first before focusing on changes in the organisation. In
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25 295 contrast, internal staff stated that the merger was also having a positive impact on the
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27 296 organisation. Since the formerly two hospitals had different cultures, merging them had a
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30 297 positive influence on collaboration:

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32 298 - *"Combining the teams at the VUmc and AMC is actually quite a relief. Bringing the two*
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34 299 *cultures together creates positive energy ... I always characterised the culture of AMC*
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36 300 *as more individualistic and the culture of the VUmc more as a group ... the merger has*
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38 301 *been very healthy."* *[organisational staff]*

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44 303 With regard to facilitators, as mentioned by the external supplier, the national policy of the
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46 304 Dutch Ministry of Health, Welfare and Sport (VWS) was focused on digital healthcare at the
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48
49 305 time of this study. This created momentum and drove a sense of urgency to innovate for
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51 306 healthcare organisations, as illustrated by the following quote:

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53 307 - *"As soon as there is a sense of urgency, you see that change suddenly takes place.*
54
55 308 *That was also the case with COVID-19, digitalisation was rapidly embraced."*

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58 309 *[organisational staff]*

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3 310 From the organisation itself, at department and division level, support was perceived as a
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6 311 facilitator for the stakeholders involved:

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8 312 - *“The ‘gender’ board and different department heads widely support the implementation*
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10 313 *of the PDCP. In addition, attention was given to the project on the policy day. This*
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12 314 *support is very visible, which I think is very important.” [organisational staff]*

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17 316 To ensure sustainable implementation, it became clear that support is needed at various
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19 317 levels, including from the Board of Directors. As a final facilitator, patients expressing a clear
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21 318 desire and need for more digital information by requesting access to patient information in this
22
23 319 way could also act as a major incentive to implementation. Within these three patient groups,
24
25 320 the majority of the patients are relatively young and digital natives. This generates a stronger
26
27 321 demand for more digitalisation, which ultimately creates the motivation to innovate and change.

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30 322 - *“In my opinion, the gender outpatient clinic is one of the outpatient clinics that already*
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32 323 *has a high level of digitalisation, in terms of video consultation.” [HCP]*

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39 325 **4. Collaboration within the organisation (support)**

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41 326 At the start of the PDCP project, the extent of collaboration between all stakeholders involved
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43 327 was inadequate and there was a certain unwillingness to open up to cooperation with others.

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45 328 - *“Due to the sheer size of Amsterdam UMC, I think that we still tend to work from*
46
47 329 *individual, isolated perspectives.” [organisational staff]*

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49 330 In addition, this was also reinforced by disparities in the definitions of common terms used in
50
51 331 mutual communication. Stakeholders gave different definitions of important interpretive
52
53 332 concepts such as implementation and maintenance.

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56 333 To ensure successful implementation and embedding in the organisation, clear process

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3 334 agreements were necessary between the external supplier, EvA Service Center, ICT and the
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6 335 end-users. Most of the supporting staff regarded these agreements to be lacking during the
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8 336 pilot implementation. It was experienced as important to also describe the division of roles and
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10 337 ownership. Moreover, it was often unclear who held responsibility for what part of the process
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12 338 and which tasks were assigned to which department. This emphasises the importance of
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15 339 agreeing and coordinating these points beforehand:

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18 340 - *"I think we should have paid more attention to project adoption and assurance from*
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20 341 *the beginning. We should have appointed someone within the project team to be*
21
22 342 *responsible for this adoption and assurance."* [organisational staff]
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27 344 At a certain point in phase 1, the project team had been formed with the appropriate
28
29 345 representatives from medical and supporting staff to collaborate in the design of the PDCP.
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31 346 This collaboration was perceived as very useful and resulted in regular multidisciplinary
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33 347 meetings during the implementation phase, in which both positive findings and issues were
34
35 348 shared. This ensured a very approachable collaboration.
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39 349 - *"The communication, care support, strategy and innovation departments, and the EvA*
40
41 350 *Service Center worked together ... This greatly contributed to making this project a*
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43 351 *success, because all stakeholders were involved. ... This is a very positive*
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45 352 *development and should be repeated in future projects."* [organisational staff]
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49 353 A complementary clinical and operational leader were both assigned from the start, based on
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51 354 personal motivation and availability. As indicated by multiple stakeholders, this facilitated good
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53 355 cooperation, both substantively and operationally with prospective implementation in mind.
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57 58 357 **DISCUSSION**

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4 358 We investigated factors influencing the implementation of a digital care pathway that was
5
6 359 developed using experience-based co-design. We identified 4 themes: 1) 'Stakeholders'
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8 360 perceptions of the PDCP' (e.g., duration of first activation, perceived usefulness PDCP);
9
10 361 2) 'Implementation by healthcare professionals in daily practice' (e.g., individuals express
11
12 362 resistance to change, providing feedback on adoption); 3) 'Organisational readiness' (e.g., lack
13
14 363 of resources, patients providing incentives for change); and 4) 'Collaboration within the
15
16 364 organisation' (e.g., mutual communication, multidisciplinary co-design). Main barriers
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18 365 mentioned by patients were duration of first activation and necessity for up-to-date content. In
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20 366 addition, the most facilitating factor for patients was user-friendliness.
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27 368 There were several common factors among stakeholders (e.g., user friendliness, lack of
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29 369 resources and rigidity of the organisation). For example, all stakeholders agreed that more
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31 370 resources are needed for sustainable implementation. However, what resources needed
32
33 371 depended on the stakeholder (e.g. funds, time, workforce). It was also expressed that this
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35 372 funding should be made available by the central board.
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39 373 Nilsson et al. also stated that it is recommended to have sufficient support from the Board of
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41 374 Directors and align the organisation from the initial stage of the development and
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43 375 implementation of an innovation to embed the innovation well in the organisation. in line with
44
45 376 that, the Board of Directors should facilitate sufficient capacity and resources (40). These
46
47 377 findings imply that it is vital to invest in sufficient resources from the start of such a project (3).
48
49 378 Previous literature has also shown that *resistance to change* was not only found among HCPs,
50
51 379 but also among the broader stakeholders group (41). Since resistance to change could cause
52
53 380 an implementation to fail, the impact of this perceived barrier should be minimised (42).
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55 381 Explaining what the precise changes are for stakeholders, including end-users, emphasising
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3 382 the added value, and involving different stakeholder groups, including patients, during the
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6 383 design from an early stage can help alleviate resistance (32, 42-49).

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8 384 The perception of *rigidity of the organisation*, mainly due to the size of the organisation, was
9
10 385 also mentioned by different stakeholders. This rigidity negatively influenced the decision-
11
12 386 making speed and action taking. This was also experienced in the collaboration by the external
13
14 387 supplier. Granja et al stated that this rigidity is typical for a healthcare organisation and
15
16 388 adapting and adjusting to eHealth interventions is not suited for these kind of organisations
17
18 389 (50). Our findings nuanced this, as there was a sense of urgency that created the first steps of
19
20 390 organisational readiness and willingness of HCPs to implement this innovation, since the
21
22 391 added value was certainly recognised and acknowledged by almost all stakeholders. However,
23
24 392 as also mentioned by Threapleton et al., implementing a change in an organisation can take
25
26 393 several years (15). Therefore, transformation requires *organisational readiness* for change
27
28 394 among healthcare professionals, including cultural change (51-54).
29
30 395 There were also remarkable differences between stakeholders, for example, regarding the
31
32 396 impact of the *ongoing merger*. Some stakeholders perceived this as an opportunity for change,
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34 397 while others, due to the merger, sometimes felt it was too much change at once. These
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36 398 differences were also reflected in terms of the facilities required.
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46 400 **Strengths and limitations**

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48 401 A major strength of this study is that we incorporated the perspectives of all stakeholders,
49
50 402 including the non-medical (supporting) staff. We collected views and opinions of those directly
51
52 403 involved in implementation from an organisational perspective, and those of external
53
54 404 stakeholders (patients and supplier). The authors chose to include the patient's perspective
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56 405 through the verification of findings with data from existing patient interviews, since these
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3 406 interviews had already been conducted within the same scope. Other recent studies only
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6 407 focused on the organisational perspective or just on the experiences with eHealth
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8 408 implementation and adoption among healthcare professionals and patients. The inclusion of
9
10 409 all perspectives contributed to the representativeness of this study, which took place in the
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13 410 complexity of a large organisation (3, 55-57).

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15 411 Other strengths related to the fact that this study adds to the limited implementation studies by
16
17 412 providing insight into the development and the subsequent implementation process in daily
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20 413 practice (58). The use of co-design in this project enhanced successful implementation as it
21
22 414 ensured input and feedback by stakeholders and end-users and created commitment for
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25 415 further implementation. Furthermore, the data was conducted according to the framework of
26
27 416 CFIR for examining the numerous influences during the implementation of complex
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30 417 innovations, making comparison with other studies possible (59). The final strength of this
31
32 418 study is that investigator triangulation was assured, since the interviews were conducted by
33
34 419 multiple researchers (60).

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39 421 This study also has some limitations. Firstly, participants were recruited using snowball
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41 422 sampling techniques, which could have resulted in selection bias (61). However, this effect
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44 423 was minimised by including stakeholders both familiar and unfamiliar with the PDCP tool.
45
46 424 Secondly, analyses of qualitative data relies on the subjective interpretation of researchers. To
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48
49 425 reduce this bias, two researchers independently analysed the data which positively affected
50
51 426 the validity (62). Thirdly, due to the COVID-19 pandemic, the interviews were conducted both
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53
54 427 by video call and face-to-face, which may have led to differences in understanding and data
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56 428 interpretation between the interviews. Lastly, CFIR's model included the relevant domains
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58 429 intervention, outer setting, inner setting, individuals involved and the implementation, but does
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3 430 not include the patients' perspectives as a separate domain, which is an identified gap in CFIR
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6 431 (59). To include this domain, Flottorp's model could for implementation factors could be
7
8 432 considered in future comparable studies (63). In this study, the authors aspired to add this
9
10 433 perspective by using data from patient interviews.
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15 435 **Practical implications**

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17 436 Based on the results of this study, we have formulated three practical implications to improve
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19 437 and enhance implementation of a PDCP. Firstly, it is essential to translate the facilitating
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21 438 aspects into evidence-based implementation strategies (64). For example, the added value
22
23 439 and effectiveness of the PDCP for HCPs and patients should be made clear to every
24
25 440 stakeholder involved, in a manner tailored to stakeholder. Secondly, it is vital to establish a
26
27 441 multidisciplinary team comprising a wide selection of stakeholders (e.g., patients, technicians,
28
29 442 HCPs and communication experts) right from the start of the project. This facilitates effective
30
31 443 collaboration in the subsequent adoption and implementation phase. In addition, it is
32
33 444 recommended to create change readiness and take advantage of momentum if change
34
35 445 readiness has already been created. This may take the form, for instance, of implementing
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37 446 innovations in parallel or as part of ongoing organisational changes, such as the hospital's
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39 447 merger.
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47 449 **Future research**

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49 450 At the time of data collection, the PDCP was implemented as a pilot phase in three
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51 451 departments. The results of this research contributed to the further co-creation and
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53 452 implementation process and were used to formulate appropriate implementation strategies.
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55 453 Subsequent process and effect evaluation research is planned to assess the full
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57 454 implementation of the PDCP. In addition, conducting research on comparable implementation
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3 455 processes in other departments or organisations to elaborate on the generalisability of our
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6 456 findings is also recommended. This research showed the importance of a tool being user-
7
8 457 friendly and useful. However, more research is needed on usability for a diverse range of users.
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460 CONCLUSION

461 In conclusion, this qualitative study has identified factors facilitating or hindering the
462 implementation of a PDCP in a large Dutch academic hospital. There were several similarities
463 between the experienced facilitators or barriers among all stakeholders (e.g., user friendliness,
464 lack of resources and rigidity of the organisation). Influential factors were related to the
465 perceived usefulness of PDCP, yet need for keeping the content up to date. Resistance to
466 change and expected time investment hindered implementation, whilst possibility of
467 incorporation in daily practice worked as facilitator. Organisational readiness worked both as
468 facilitator and barrier, and clear process agreements and communication are needed in place
469 for strong collaboration. In our case, the co-creation process during adaptive development
470 facilitated this collaboration. Findings were echoed by patients, and their main barriers were
471 duration of first activation and necessity for up-to-date content. Our findings emphasise the
472 importance of gaining insight into the various perspectives of stakeholder groups, including
473 patients. It is recommended to tailor implementation strategies for each stakeholder group,
474 adjusted to their perceived facilitators and barriers. Our findings can be used to improve and
475 enhance PDCP implementation and tailor the development and improvement of other digital
476 patient communication tools.

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478 APPENDIX

479 1. Topic list and interview guide

480 2. Final codebook

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3 484 **ETHICAL APPROVAL**

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6 485 The need for approval for this study was waived by the Medical Ethical Committee at
7
8 486 Amsterdam UMC, Vrije Universiteit Amsterdam (2019.651). Participation was voluntarily and
9
10 487 all respondents gave verbal and written informed consent before taking part in our project.
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17 490 **ABBREVIATIONS**

18 491 SDM: shared decision-making

19 492 VBHC: value based healthcare

20 493 PCC: patient centred care

21 494 PDCP: personalised digital care pathway

22 495 CFIR: Consolidated Framework for Implementation Research

23 496 EHR: electronic health record

24 497 EvA-SC: EvA Service Center, electronic health record service centre

25 498 eHealth: electronic health

26 499 Amsterdam UMC: Amsterdam University Centres

27 500

28 501 **ACKNOWLEDGEMENTS**

29 502 The authors would like to thank all stakeholders for their participation in this study.
30
31 503

32 504 **AUTHOR CONTRIBUTION**

33 505 Each author made substantial contributions to the work and writing of this manuscript: FH,

34 506 FvN, MM, MB and MdB participated in the design of the study; FH and JS were responsible

35 507 for data collection; FH, JS, and FvN participated in the analysis of the interviews; writing the

36 508 initial draft, FH and JS; review and editing, FH, FvN, MM, MB and MdB. All team members
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3 509 approved the version of the manuscript submitted for publishing and have agreed to be
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6 510 accountable for all aspects of the work.
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35 524 relevant to the study are included in the article or uploaded as supplementary information.
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25 696 **FIGURE LEGEND**

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27 697 Figure 1. An example of Personalised Digital Care Pathway (web- and mobile version) in
28 698 Amsterdam UMC.

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For peer review only

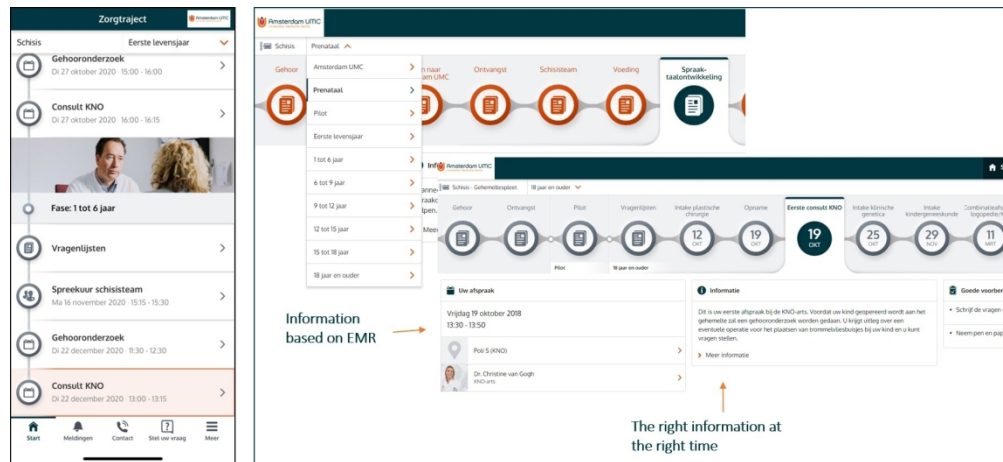


Figure 1. An example of Personalised Digital Care Pathway (web- and mobile version) in Amsterdam UMC.

154x70mm (300 x 300 DPI)

APPENDIX 1. TOPIC LIST AND INTERVIEW GUIDE

Introductie:

Hartelijk dank voor uw deelname aan dit interview. <introdactie van mezelf en doel van onderzoek>
Het interview zal ongeveer drie kwartier tot een uur duren.

Heeft u nog vragen voor we beginnen?

Mag ik dit interview opnemen? Dan kunnen we nu starten met het interview en de opname.

<recorder aanzetten>

<nogmaals bevestiging vragen op recording voor opnemen>

Om u een idee te geven hoe het interview eruit gaat zien zijn dit de onderwerpen die we gaan behandelen: informatievoorziening huidige situatie, de gewenste situatie en MediMapp en wat uw verwachtingen zijn van MediMapp

Ik zou graag willen beginnen met de vraag of u kunt vertellen wie u bent en wat u doet?
(*geslacht, welke afdeling, functie: hoe lang en eindverantwoordelijke, patiëntgroep*)

Omdat dit interview over een digitale tool gaat, namelijk MediMapp, ben ik benieuwd of u affiniteit heeft met het gebruik van eHealth? Kunt u dit scoren van 1-5?

- En hoe kijkt u aan tegen het digitaliseren van informatievoorziening voor patiënten?
- Bent u al eens in aanraking geweest met MediMapp?
 - o In hoeverre bent u betrokken geweest bij de ontwikkeling van MediMapp?

Informatievoorziening huidige situatie

Kunt u kort beschrijven hoe de informatievoorziening er op dit moment uit ziet? Wij definiëren informatievoorziening als het faciliteren van informatie voor patiënten, met de beschikbare middelen, zowel mondeling als schriftelijk.

- Wat vindt u hier goed gaan? En wat kan nog verbeterd worden?
- Wat denkt u dat patiënten zouden willen veranderen?

Gewenste situatie

- Als u nu de informatievoorziening *opnieuw* zou mogen *inrichten*, hoe ziet dit er dan voor u uit? (*vorm, proces, hoeveelheid, kwaliteit, begrijpelijkheid, toegankelijkheid, personalisatie*)
- Wat hoopt/denkt u dat goede informatievoorziening kan *opleveren*? (*vertrouwen, gesprek, arts-patiëntrelatie, overzicht, verwachtingen, voorbereiding*)
- Wat ziet u als de belangrijkste risico's in deze gewenste situatie?

Kan MediMapp de oplossing zijn?

<korte uitleg MediMapp, digitaal patiëntpad waar nodig>

Verwachting MediMapp

- Wat verwacht u dat MediMapp kan bijdragen aan uw dagelijkse werkzaamheden?
 - o Voor u om informatie makkelijker te voorzien? (*kennis, vaardigheden, motivatie, tijd, ondersteuning, patiënt kenmerken*)
 - o Voor patiënt? (*vertrouwen, gesprek, arts-patiëntrelatie, overzicht, verwachtingen, voorbereiding*)
 - o Wat zou voor u de meerwaarde zijn? (*En voor verpleegkundige / baliemedewerker / overig*)
- Verwacht u MediMapp te gaan gebruiken?
 - o *Hoe? Geloof in MediMapp?*
- Als u MediMapp wilt gaan gebruiken, wat heeft u dan nodig in de praktijk?
Voordeel t.o.v. huidige situatie / aanpasbaarheid, veranderbaar, verfijndheid etc. / complexiteit
- Verwacht u dat er veel gaat veranderen aan uw dagelijkse werkzaamheden als u MediMapp gaat gebruiken?
 - o Hoe kijkt u aan tegen zo'n verandering?
- Hoe verwacht u dat uw collega's zullen reageren op het gebruik van MediMapp?

kennis en geloof in innovatie / *Mening over MediMapp / Kijk tegenover **verandering** / **verhouding** met organisatie / Andere persoonlijke kenmerken (motivatie, capaciteit, leiderschap stijl)*

- Denkt u dat MediMapp kan landen binnen uw afdeling?
 - o *Waarom? Hoe?*
 - Netwerk en communicatie / bereidwilligheid van afdeling t.o.v. implementatie (cultuur, normen, waardes en aannames) / implementatie klimaat van afdeling**
- Is MediMapp **passend** bij het Amsterdam UMC? (normen, waardes, werksystemen en stromen)

Bereidwilligheid van Amsterdam UMC t.o.v. implementatie / verbintenis van medewerkers / informatie en kennis beschikbaar

Implementatie:

- Hoe denkt u dat MediMapp het best geïmplementeerd kan worden? En waarom?
 - o Wat heeft uw afdeling hiervoor nodig?
 - Netwerk en communicatie / cultuur, normen, waardes en aannames / implementatie klimaat / kijk tegen verandering / actieve implementatie**
 - o Waar gaan we tegenaan lopen tijdens de implementatie?
 - o Wat gaat ons helpen tijdens de implementatie?
 - o Waar ging het mis bij de implementatie van vorige projecten / oplossingen?

Klinische formulieren in Epic
 - o Tijdens een implementatieproces is het belangrijk dat er actieve betrokkenheid is van de organisatie. Hoe ervaart u dat dit wordt gedaan bij het Amsterdam UMC?

Planning / (actief) meedoen / (actief) meegenomen worden (door manager, leider, collega) / uitvoering / terugkijken en evalueren
- Zijn er nog factoren in het Amsterdam UMC die de implementatie van MediMapp makkelijker maken of moeilijker maken?

(beleid, draagvlak, expertise, samenwerking andere afdelingen, financiën, EPD, etc).
- Zijn er nog andere factoren in de *brede context* die invloed hebben op de implementatie van MediMapp?

(everancier, zorgverzekeraar, betaalbaarheid voor organisatie etc.)
- **DUS** Wat zijn bevorderende factoren voor de implementatie van MediMapp? En wat zijn belemmerende factoren?

Op de afdeling, gehele organisatie en bredere context

Afsluiting

Dit was mijn laatste vraag. Zijn er nog dingen die we niet besproken hebben, maar waarvan u denkt dat deze wel relevant zijn voor dit project?

Vervolg uitleggen: verdere interviews doen en het verwerken van deze interviews, bevorderende en belemmerende factoren in kaart brengen. Hierop ga ik dan een advies uitbrengen voor implementatie strategieën die we kunnen toepassen.

Mochten we nog meer deelnemers nodig hebben, mag ik u dan benaderen voor contactlegging met andere collega's?

APPENDIX 2. FINAL CODEBOOK

Appendix 2: Final codebook with domains, sub-domains and definitions (in Dutch).

<i>Domain</i>	<i>Sub-domain</i>	<i>Code Atlas.ti</i>	<i>Definition</i>
1. Inner setting	<i>1.1 Afdeling</i>	1.1.1 + Draagvlak voor PDCP	Alles wat er gezegd wordt over de aanwezigheid van draagvlak op afdelingen (werknemers op afdeling zijn enthousiast over PDCP)
		1.1.2 - Draagvlak voor PDCP	Alles wat er gezegd wordt over afwezigheid van draagvlak op afdelingen (werknemers op afdeling zijn niet enthousiast over PDCP)
		1.1.3 + Teamsamenwerking afdeling	Alles wat gezegd wordt over factoren die een positieve invloed hebben op samenwerking binnen Amsterdam UMC
		1.1.4 - Inspanning door afdeling	Alles wat gezegd wordt over de inspanning die een afdeling levert met negatief effect
		1.1.5 + Inspanning door afdeling	Alles wat gezegd wordt over de inspanning die een afdeling levert
		1.1.7 + Kijk tegen verandering	Alles wat wordt gezegd over veranderingen binnen een afdeling met een bevorderende effect
		1.1.8 - Kijk tegen verandering	Alles wat wordt gezegd over veranderingen binnen een afdeling met een belemmerend effect
		1.1.9 - Medewerkers moeilijk te bereiken	Alles wat wordt gezegd over de bereikbaarheid van medewerkers
		1.1.10 - Resultaat van fuseren op samenwerking	Alles wat gezegd wordt over de nadelige invloed van de fusie op samenwerking binnen een team / afdeling
		1.1.11 - Verandering moe	Alles wat gezegd wordt over veranderingen wat aanduidt dat medewerkers klaar zijn met de veranderingen
		1.1.12 - Onbekendheid van medewerkers over zorgproces en informatie binnen aandoening	Alles wat gezegd wordt over de onbekendheid die medewerkers ervaren over wat er binnen een aandoening precies gebeurt in het zorgproces

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3	1.2	1.2.1 - Amsterdam UMC loopt	Alles wat gezegd wordt over het
4	Ziekenhuis-	achter qua innovatie	innovatieve karakter van Amsterdam
5	breed		UMC t.o.v. andere organisaties en de
6			samenleving
7			
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9		1.2.2 + Capaciteit om te	Alles wat gezegd wordt over het hebben
10		innoveren	van voldoende capaciteit van afdelingen
11			om te innoveren
12			
13		1.2.3 - Capaciteit om te	Alles wat gezegd wordt over de
14		innoveren	capaciteit van afdelingen om te
15			innoveren
16			
17		1.2.4 - Cultuur Amsterdam UMC	Alles wat gezegd wordt over de cultuur
18			van Amsterdam UMC
19			
20		1.2.5 - Dingen opleggen werkt	Alles wat gezegd wordt over dat
21		niet	medewerkers het idee krijgen dat ze iets
22			wordt opgelegd door besturende
23			organen (RvB, managers etc.), waar ze
24			zelf geen mening over hebben kunnen
25			geven
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28		1.2.6 + Draagvlak nodig voor	Alles wat gezegd wordt over het
29		uitvoering	draagvlak wat nodig is voor het gebruik
30			van een innovatie
31			
32		1.2.7 - Draagvlak nodig voor	Alles wat gezegd wordt over het
33		uitvoering	draagvlak wat nodig is voor het gebruik
34			van een innovatie
35			
36			
37		1.2.8 + Eerdere ervaringen met	Alles wat gezegd wordt over eerdere
38		innovaties beïnvloeden adoptie	ervaringen met soortgelijke innovaties,
39			wat adoptie van innovatie positief kan
40			beïnvloeden
41			
42			
43		1.2.9 - Eerdere ervaringen met	Alles wat gezegd wordt over eerdere
44		innovaties beïnvloeden adoptie	ervaringen met soortgelijke innovaties,
45			wat adoptie van innovatie negatief kan
46			beïnvloeden
47			
48		1.2.10 + Financieren innovaties	Alles wat er gezegd wordt over het
49			financieren van innovaties en de invloed
50			hiervan op adoptie
51			
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53		1.2.11 - Financieren innovaties	Alles wat er gezegd wordt over het
54			financieren van innovaties en de invloed
55			hiervan op adoptie
56			
57		1.2.12 - Fusen twee huizen	Alles wat gezegd wordt over het fusen
58			van het VUmc en AMC (op
59			organisatieniveau)
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		1.2.13 + Helderheid in verdeling van rollen	Alles wat er gezegd wordt over dat het voor stakeholders duidelijk is wat de rolverdeling is
		1.2.14 - Helderheid in verdeling van rollen	Alles wat er gezegd wordt over dat het voor stakeholders duidelijk is wat de rolverdeling is
		1.2.15 + Informatie voorziening voor patiënten	Alles wat wordt gezegd over de informatie dat wordt aangeboden aan patiënten
		1.2.16 - Informatie voorziening voor patiënten	Alles wat wordt gezegd over de informatie dat wordt aangeboden aan patiënten
		1.2.17 + PDCP past binnen beleid Amsterdam UMC	Alles wat gezegd wordt over het passen van PDCP bij het beleid van Amsterdam UMC
		1.2.18 - PDCP past binnen beleid Amsterdam UMC	Alles wat gezegd wordt over het passen van PDCP bij het beleid van Amsterdam UMC
		1.2.19 - Onbekendheid ziekenhuis breed	Alles wat er gezegd wordt over de onbekendheid die medewerkers ervaren over processen en beleid keuzes
		1.2.20 - Teamsamenwerking ziekenhuis	Alles wat gezegd wordt over factoren die een negatieve invloed hebben op samenwerking (ook onderlinge communicatie bijv.) binnen Amsterdam UMC
2. Outer setting		2.1 Landelijk uitwisseling	Alles wat gezegd wordt over de uitwisseling tussen verschillende ziekenhuizen (van patiënt informatie, van informatie, filmpjes etc.)
		2.2 Landelijke druk eHealth	Alles wat gezegd wordt over de druk die de overheid uitoefent op het innoveren in eHealth
		2.3 Leverancier	Alles wat gezegd worden over samenwerking met een externe leverancier
3. Intervention	<i>3.1 Geen meerwaarde PDCP zorgverlener</i>	3.1 - Geen meerwaarde PDCP zorgverlener	Alles wat gezegd wordt over de meerwaarde van PDCP voor zorgverleners(groepen)

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3	3.2	3.2.1 + Goede	Alles wat gezegd wordt over de
4	<i>Meerwaarde</i>	informatievoorziening voor	toegankelijke en betrouwbare
5	<i>PDCP</i>	patiënt	invoorziening (voor patiënt) met
6			kwaliteit en de juiste hoeveelheid, door
7			PDCP verzorgt
8			
9			
10		3.2.2 + Maatwerk voor patiënt	Alles wat gezegd wordt over de
11			mogelijkheid die PDCP biedt om
12			maatwerk te leveren aan de patiënt
13			
14		3.2.3 + Meerwaarde	Alles wat gezegd wordt over de
15		zorgverlener	meerwaarde van PDCP voor
16			zorgverleners(groepen)
17			
18			
19		3.2.4 + PDCP draagt bij aan	Alles wat gezegd wordt over andere
20		andere doelen	doelen die bereikt kunnen worden door
21			PDCP (SDM, koppeling PROMs, meer
22			grip zorgtraject voor patiënten)
23			
24		3.2.5 + Tijdbesparing /	Alles wat gezegd wordt over dat PDCP
25		efficiënter werken	efficiëntie stimuleert
26			
27		3.2.6 + PDCP past in huidige	Alles wat gezegd wordt over de
28		werkwijze	passendheid van PDCP in de huidige
29			werkwijze
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32		3.2.7 - PDCP past in huidige	Alles wat gezegd wordt over de
33		werkwijze	passendheid van PDCP in de huidige
34			werkwijze
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36		3.2.8 - Patiënt- arts relatie	Alles wat gezegd wordt over de invloed
37			van PDCP op de arts-patiënt relatie
38			
39	3.3 <i>Gebruiks-</i>	3.3.1 + Aansluiten behoeftes	Alles wat gezegd wordt over de
40	<i>vriendelijkheid</i>	patiënt	behoefte van de patiënt aan PDCP
41			
42		3.3.2 - Aansluiten behoeftes	Alles wat gezegd wordt over de
43		patiënt	behoefte van de patiënt aan PDCP
44			
45		3.3.3 + Aansluiten	Alles wat gezegd wordt over de
46		informatiebehoefte patiënt	informatiebehoefte van de patiënt
47			
48			
49		3.3.4 - Geschiktheid voor	Alles wat gezegd wordt over de
50		iedereen	geschiktheid van PDCP bij ieder type
51			patiënt (zoals laaggeletterden, andere
52			talen)
53			
54	3.4 <i>Beheer</i>	3.4.1 - Beheer PDCP	Alles wat gezegd wordt over het beheer
55			van PDCP
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57		3.4.2 + Koppeling met Epic	Alles wat gezegd wordt over de
58			koppeling tussen EPIC en PDCP
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	3.4.3 - Koppeling met Epic	Alles wat gezegd wordt over de koppeling tussen EPIC en PDCP
	3.4.4 + Kosten	Alles wat gezegd wordt over de kosten van PDCP
	3.4.5 - Kosten	Alles wat gezegd wordt over de kosten van PDCP
	3.4.6 - Meerdere apps nodig	Alles wat gezegd wordt over dat er meerdere apps nodig zijn voor patiënten om meer te weten over hun zorg en zorgtraject
	3.4.7 + Gebruik van PDCP	Alles wat er gezegd wordt over hoe PDCP te gebruiken is
	3.4.8 - Gebruik van PDCP	Alles wat er gezegd wordt over hoe PDCP te gebruiken is
	3.4.9 + Uiterlijk PDCP	Alles wat gezegd wordt over de ervaring van hoe PDCP eruit ziet
	<i>3.5 Risico's</i> 3.5.1 + Effect en risico	Alles wat gezegd wordt over risico's van informatie digitaliseren (wat invloed kan hebben op de implementatie van PDCP)
	3.5.2 – Effect en risico	Alles wat gezegd wordt over risico's van informatie digitaliseren (wat invloed kan hebben op de implementatie van PDCP)
	4.1 + Attitude eindgebruikers t.o.v. PDCP	Alles wat gezegd wordt over hoe eindgebruikers tegenover PDCP staan
	4.2 - Attitude eindgebruikers t.o.v. PDCP	Alles wat gezegd wordt over hoe eindgebruikers tegenover PDCP staan
	4.3 + Betrokkenheid van eindgebruikers	Alles wat gezegd wordt over de invloed van de betrokkenheid van eindgebruikers op de implementatie
	4.4 - Betrokkenheid van eindgebruikers	Alles wat gezegd wordt over de invloed van de betrokkenheid van eindgebruikers op de implementatie
	4.5 + Karakteristieken eindgebruikers	Alles wat gezegd wordt over de eigenschappen van eindgebruikers, zoals leeftijd, skills met omgaan eHealth
	4.6 - Karakteristieken eindgebruikers	Alles wat gezegd wordt over de eigenschappen van eindgebruikers, zoals leeftijd, skills met omgaan eHealth

		4.7 + Ervaringen delen motiveert	Alles wat gezegd wordt over ervaringen delen (van eindgebruikers) met de ondersteunende diensten, wat als motiverend wordt ervaren
		4.8 + Motivatie om te veranderen	Alles wat gezegd wordt over de motivatie van medewerkers om hun dagelijkse werkzaamheden te veranderen
		4.9 - Motivatie om te veranderen	Alles wat gezegd wordt over de motivatie van medewerkers om hun dagelijkse werkzaamheden te veranderen
		4.10 + Herinnering voor PDCP nodig	Alles wat gezegd wordt over het herinneren van eindgebruikers aan PDCP
		4.11 - Herinnering voor PDCP nodig	Alles wat gezegd wordt over het herinneren van eindgebruikers aan PDCP
5. Process	<i>5.1 Bevorderend</i>	5.1.1 + Randvoorwaarden gebruik	Alles wat gezegd wordt over wat nodig is voor eindgebruikers om PDCP (praktisch) te gebruiken in dagelijkse werkzaamheden
		5.1.2 + Suggesties voor implementatie en gebruik	Suggesties hoe de implementatie en gebruik het best vormgegeven kan worden
		5.1.3 + Suggesties voor verbetering inhoud / ontwikkeling	Suggesties hoe verbeteringen het best aangepakt kunnen worden (feedbackloops)
		5.1.4 + Sense of urgency nodig voor succes	Alles wat gezegd wordt over het gevoel van urgentie, wat een organisatie nodig heeft om een innovatie te laten slagen
	5.2 Belemmerend	5.2.1 - Onduidelijkheid rondom proces PDCP	Alles wat gezegd wordt over onduidelijkheid rondom gebruikers proces van PDCP
		5.2.2 - Randvoorwaarden gebruik	Alles wat gezegd wordt over wat nodig is voor eindgebruikers om PDCP te gebruiken in dagelijkse werkzaamheden
		5.2.3 - Selectie maken is moeilijk	Alles wat wordt gezegd over de selectie welke afdelingen mee mogen doen met gebruik PDCP
		5.2.4 - Uitvoering moeizaam	Alles wat gezegd wordt over hoe de uitvoering van PDCP gaat

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5.2.5 - Verschil in definities

Alles wat gezegd wordt over definities en termen rondom het proces van implementeren van PDCP

For peer review only

COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the interview or focus group?	
Duration	21	What was the duration of the interviews or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.