
On digital intimacy: redefining provider–patient relationships in remote monitoring

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Abstract Remote monitoring has often been thought to lead to a highly structured and standardised care process. Several studies have stressed that patient–provider communication could be hindered if mediated by technologies, leading to an impoverished relationship. We argue that while remote monitoring leads to a redefinition of the patient–provider relationship, it could also offer the opportunity to develop a more intimate acquaintance not possible via only routine visits. The study is part of a clinical trial aimed at assessing the acceptability of a remote monitoring platform for type 1 diabetes. Drawing on practice-based studies, we focused our analysis on the practice of text message exchange between patients and providers. The 396 conversations were coded with a template analysis, leading to the identification of two main categories: ‘knowing the patient’ and ‘knowing about the patient’. The analysis reveals that the practice of messaging led to the development of a ‘digital intimacy’, a relationship characterised by a thorough familiarity made possible by electronic devices that extends to face-to-face encounters. Drawing on our case, we argue that remote monitoring can foster greater intimacy between patients and providers, which is made possible by the overall increase in the quantity and quality of communication between patients and providers.

Keywords: qualitative methods generally, diabetes, doctor–patient communication/interaction, E-health, emotional labour, information technology

Introduction

In recent years, the remote monitoring of chronic conditions has gained momentum due to the increasing availability of mobile technologies and self-tracking devices, leading to a debate regarding its effects on patient–provider relationships. While techno-enthusiasts consider such technologies an obligatory passage point to more efficient healthcare provision (Swan 2012) and reflective learning (Rivera-Pelayo *et al.* 2012), as well as tools to bridge healthcare

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providers and patients (Eysenbach 2000), others see them as embodiments of a corporate and public health agenda that will eventually lead to the medicalisation of society (Conrad 2007).

The sociology of health and illness and social studies of technology have provided more nuanced analyses, avoiding a polarisation that does not do justice to the rich phenomenology of remote monitoring. Several studies have shown how remote monitoring re-shapes health care rather than merely improving it (Pols 2012). A common trait of these studies is an emphasis on the unintended consequences of the shift from physical to digital proximity (Oudshoorn 2009), which they argue leads to more structured and impersonal patient–provider interactions, guided by protocols and constrained by the limits of the technologies, that is often perceived by patients and caregivers as an impoverished version of traditional care (Mort *et al.* 2008).

While we acknowledge the relevance of these analyses, we argue that little attention has been paid thus far to the emergence of richer forms of provider–patient relationships mediated by remote monitoring technologies. The purpose of this paper is to explore emerging forms of ‘digital intimacy’ between patients and healthcare providers. By digital intimacy, we mean relationships characterised by a thorough familiarity made possible, sustained or reinforced through electronic devices by means of both data sharing and personal communication. We argue that technology-mediated communication can trigger the construction and strengthening of intimacy between patients and providers that extends from online interaction to face-to-face encounters. ‘Digital’, in this context, refers to the locus of emerging intimacy, but this article does not intend to argue that it possesses unique features or that it is limited to computer-mediated communication.

Drawing on a practice-based approach (Gherardi 2010) we will focus on a specific practice of remote monitoring, text message exchange, to show how it can sustain the growth of digital intimacy.

The research reported here is part of a clinical trial aimed at evaluating the acceptability of a remote monitoring platform for type 1 diabetes patients. The platform enabled patients to keep track of and share information about their condition (e.g. glucose readings, insulin, diet) and communicate through an encrypted messaging system with doctors and nurses at the hospital.

The paper is structured as follows: In the next section, we briefly discuss the notion of intimacy with regard to remote monitoring. We shall then introduce the debate around practice-based studies which furnishes the theoretical foundation for the methodology adopted in this paper, the analysis of technology-mediated interactions between patients and healthcare providers. The findings are organised into two sub-sections (knowing the patient and knowing about the patients) to illustrate how intimacy develops in the intricacy of interactions and how remote monitoring practices lead to a closer relationship between patients and providers. In the discussion, we shall reflect on the idea of intimacy as knowing-in-practice and provide a tentative characterisation of intimacy.

Presence at distance: on remote monitoring and digital intimacy

Intimacy has a controversial status in the patient–provider relationship. On the one hand, emotional detachment has been regarded as critical to allowing professionals to play their role adequately (Parsons 1951). Affective neutrality is considered to shield both parties involved from an emotional involvement in the relationship. On the other hand, as the patient-centred paradigm gained momentum, a relationship based solely on clinical data interpretation became considered unsatisfactory and inadequate to unleashing the potential benefits of personalised care.

Intimacy, the feeling of deeply knowing someone and being connected to one another, is elusive in nature and defies a clear definition. In this work, we shall build on Fairhurst and May (2001) to frame it. Fairhurst and May propose a distinction between ‘knowing the patient’ and ‘knowing about the patient’ (2001). ‘Knowing the patient’ refers to a form of deductive knowledge relying on the formulation and validation of hypotheses guided by codified knowledge (e.g. guidelines) and proceeding via the analysis of clinical data and subsequent structured patient interviewing aimed at gathering more information. ‘Knowing about the patient’, on the other hand, refers to the inductive process of becoming familiar with patients with a view to understanding their behaviours, habits, preferences and ways of thinking that emerge from the interactions and are elicited from the patient’s own accounts. While these forms of knowledge coexist, only when providers know ‘about the patient’ do they develop sensitivity to the lived experience of patients and feel they have deeply understood them. Or, to use the words of Fairhurst and May, only ‘when doctors perceive they have discerned the authentic nature of patients as human beings they denote these patients as “known”’ (2001, p. 505).

In this work, extending the notion put forth by Fairhurst and May, we will also consider the ‘knowing about the providers’ developed by patients, considering knowing as reciprocal rather than unidirectional.

Medical technologies, including remote monitoring, are often associated with a reductionist view of medical care that favours the analysis of standardised data while disregarding context. Adopting the conceptual lenses provided by Fairhurst and May (2001), these technologies are regarded as tools privileging knowing the patient while disregarding knowledge about the patient. The debate over the introduction of remote monitoring and care is accompanied by what Jeannette Pols refers to ‘inevitable nightmares’, depictions of care turned into a service where the warm hands of the providers are replaced by cold technologies and alienation (Oudshoorn 2011, Pols 2012, Pols and Moser 2009). These scenarios are reinforced by somewhat simplistic representations of a health care shaped by policymakers that depict it as relying on decontextualised knowledge independent of space and time (see Mort and Smith 2009 for a critique).

These visions can partly be ascribed to the fears of professionals who are accustomed to face-to-face interactions with patients and perceive remote monitoring as a lesser service (Mort *et al.* 2008, Pols 2012), which may be compounded by a lack of specific training (Hart *et al.* 2004). However, the sociological debate around telecare has stressed other relevant dimensions. Foremost, it has been noted that, as technological devices become the cornerstone of the patient–provider relationship, they shape and limit the range of possible interactions.

Social scientists have emphasised how remote monitoring engenders a redistribution of responsibilities in the care network (Prout 1996, Willems 1995). Technologies, however, are rarely designed to support the rich set of relations among all actors involved, and they mostly focus on providing data sharing and analysis features. These limitations reflect an implicit hierarchy between hard/objective and soft data. Nonetheless, as Mark Ackersman noted, despite efforts of requirement gathering, ‘there is a fundamental mismatch between what is required socially and what we can do technically’ (Ackerman 2000, p. 198).

The replacement of face-to-face interaction with telecare delegates responsibilities to ‘intermediary figures’ like nurses (Cartwright 2000) and to technology, leading to more structured interactions (Oudshoorn 2009) and the rise of new forms of patienthood (Danholt *et al.* 2013). Remote monitoring technologies are designed by considering formalised representations of medical knowledge and standardised procedures, but they often fail to support the articulation work of all actors involved in their use. Such artefacts, to avoid becoming ‘technological monsters’, require significant articulation work which is not described nor anticipated by designers (Oudshoorn 2008).

While the programs inscribed in the technology often overlook significant portions of patient–provider communication by limiting themselves to data sharing, a shift from the artefacts *per se* to technologies in practice (Orlikowski 2000) reveals how users can adapt technologies to unanticipated needs (Joyce and Loe 2010, Pols and Willems 2011). Remote monitoring operators and patients can re-create a feeling of being together by mobilising and artfully rearranging the chronic care infrastructures, socio-material elements embedded in the everyday life of disease management (Langstrup 2013). Some studies have shown how patients and providers can manage to create an intimate and non-dehumanised or -disembodied interaction, even though this may require some emotional cost for providers (Roberts *et al.* 2012). Creating an intimate space for communication can require restricting access to parts of one’s house for the duration of the consultation, as relatives might react adversely to provider suggestions (Langstrup *et al.* 2013). Other studies provide a different perspective on digital intimacy, arguing that, in some cases, the introduction of remote monitoring technologies can be perceived as too intrusive and a violation of personal space. Jeannette Pols, for instance, writes of a mutual support group of chronic obstructive pulmonary disease patients created by the clinic to sustain each other, noting that some patients refused to contact ‘just anybody in the phonebook’ (Pols 2013), considering the experience ‘too intimate’. Similarly, Piras and Zanutto (2014) show how teenagers with type 1 diabetes can decide not to share their data with clinicians, considering it too ‘personal’. In both cases, technologies are perceived by users as tools that create unwanted closeness. On the provider side, some studies have investigated the invisible work of telecare operators who attempt to create closeness at distance, showing that achieving this comes at a cost (Roberts *et al.* 2012) and that this work is often unrecognised and taken for granted (Korczynski 2009). Further, other scholars have shown how considering patients’ sensations and experiences, as well as the sensibility of the practitioner, can improve the quality of clinical decisions (Barnes *et al.* 2016), but it is hard to collect this information via remote monitoring (Bjørn and Markussen 2013).

These studies provide some insight into how to frame and investigate digital intimacy. First, they suggest focusing on the socio-material practices of monitoring rather than the technical tools. Second, intimacy must be considered a negotiated and precarious accomplishment which requires experiential learning. As noted by Lopez and colleagues, ‘it takes a lot of time to become acquainted with this practice of caring’ (López *et al.* 2010). Third, intimacy should not be regarded as intrinsically positive or desirable for all actors involved.

Following these insights, we will discuss digital intimacy as it emerged in a remote monitoring trial concerning type 1 diabetes. We will focus on the discursive practices of patients and providers exchanged via the system. Before that, however, we shall briefly introduce the notion of practice and its relationship to knowing.

A practice-based approach to remote monitoring

Over the last 20 years, the so-called ‘practice turn’ (Schatzki *et al.* 2001) has involved different strands of the social sciences. It is not the purpose of this paper to provide an exhaustive account of the heterogeneous debate on practice-based studies (see e.g. Corradi *et al.* 2010, Nicolini 2012, Nicolini *et al.* 2003). We will therefore focus on the main implications of this theoretical framework for the study of the case under analysis.

The distinctive feature of a practice-based approach is that its unit of analysis is ‘practice’, by which is meant ‘a mode, relatively stable and socially recognised, of ordering heterogeneous elements into a coherent whole’ (Gherardi 2006, p. 34). Focusing on practices therefore entails considering organisational structures and roles as products of the actors’ situated

interactions. Every organisational process, including the use of telemonitoring technologies in health care, can be considered a practice produced, reproduced and interconnected through the everyday work of groups of actors both internal (e.g. physicians, nurses, technicians) and external (e.g. patients, familiars and other caregivers) to formal organisations. Drawing on these assumptions, several empirical studies have focused on the practices emerging around objects and technologies in health care, with special interest in the ICTs created to monitor the clinical status of chronically ill patients from a distance (Bruni *et al.* 2007, Gherardi 2010, Nicolini 2007, 2011).

From a practice-based perspective, structures are the result of ‘circuits of reproduction’ (Bourdieu 1972) through which practices, recursively reproduced, construct the structures and the conditions of their very existence. A practice-based perspective sheds light on the ways in which, during the reproduction of practices, social relationships and identities are enacted. Practice-based studies invite setting aside a reified view of knowledge – understood by traditional organisation studies as a cognitive activity – to embrace a view in which doing and knowing are indistinguishable (Gherardi 2010). During the reproduction of a practice, actors know about their social worlds and about other actors and, consequently, refine and redefine their ways of interacting.

The conceptual lens of practice reveals how organised activities are sustained by a shared understanding among practitioners. This shared understanding does not depend on a rigid script, but rather on a shared ‘feel for the game’, the logic of practice (Bourdieu 1990), which allows a ‘repetition without repetition’ (Clot and Béguin 2004). The recursivity of the organised activities, their regularities and the (at least partially) shared meanings attributed to them by both those who practice and those who observe from the outside, enable considering a given practice as an emic unit of analysis of a social phenomenon.

While we can define a practice (mark out its boundaries) for heuristic purposes, a practice cannot exist by itself, instead always being part of a ‘texture of practices’ nested one within the other (Gherardi 2006). In the case under analysis, for instance, we will focus on the practice of computer-mediated communication through a remote monitoring platform performed by patients and healthcare professionals. This practice can be singled out because it possesses some specific features (heterogeneous elements), such as the use of the technology, the constraints and affordances associated with the platform, the formal and informal rules associated with its use, the participants in the practice, the knowledge of diabetes needed to practice it and so forth. All these elements are ordered in a relatively stable way and allow practitioners to practice adequately. The practice of computer-mediated communication is connected to other organisational practices like face-to-face consultations, diabetes education in groups and ward rounds. These practices, just like computer-mediated communication, are assemblages of heterogeneous elements that practitioners and external observers can recognise as different. All these practices are interconnected and together constitute a texture of connected practices.

Practice-based approaches stress the impossibility of making a clear-cut distinction between knowing and practicing. Knowledge is not ‘a set of statements about reality’ (Mol 2002) but a resource for collective action. Pre-existing knowledge (e.g. protocols) is mobilised and reshaped in practicing. Knowing is practicing and participating; it is inextricably interwoven with the situated activities, or, put more elegantly, ‘to know is to be able to participate with the requisite competence in the complex web of relationships among people, material artefacts, and activities’ (Gherardi 2010, p. 35). From this perspective, the knowing of the patient’s clinical condition occurs during the reproduction of this texture of practices, which is profoundly entangled with the communications infrastructure and leads to a definition of the clinical situation under review and the decision to be made (Mol 2002).

Research design and methodology

This work draws on a clinical trial that aimed at quantifying the effectiveness and the acceptability of TreC Diabetes, a digital platform for patients with type 1 diabetes. This larger study was conducted in the Autonomous Province of Trento, Italy (Ministero della Salute DGDSC 0032830-P-22/04/2014, I.5.i.m 2/2014/953).

Type 1 diabetes is a metabolic disorder characterised by an instability of glycaemia (blood glucose level) caused by the destruction of pancreatic cells. The disease causes a deficit of insulin that must be corrected by injecting synthetic insulin. Type 1 diabetes cannot be cured, and patient care largely depends on self-management, holding patients or carers responsible for keeping blood glucose levels within a desired range. To this end, patients and carers operate as diagnostic agents (Oudshoorn 2008) able to ‘become like a doctor’ (Mol 2000). Becoming one’s own doctor requires significant effort because, despite similarities across cases, diabetes is like a ‘snowflake’, different in every individual and also ‘different every single day minute by minute’ (Smaldone and Ritholz 2011). As healthcare professionals turn into educators and the empowered patients become the primary decision-makers (Funnell and Anderson 2004), the majority of care activities become intertwined with everyday activities and cannot be scrutinised by doctors. While doctors might recognise that the ability of the patient to manage the disease surpasses even their own (Piras and Zanutto 2014), telemonitoring offers healthcare professionals the possibility of re-gaining control of the condition when stricter clinical surveillance is recommended.

TreC Diabetes is a technological platform that supports both self-management and remote monitoring. The patient interface, a smartphone application, provides people with diabetes with a diary to keep track of relevant information (e.g. glucose levels, therapy, symptoms, diet) and some algorithm-based support for decision-making (i.e. a carbohydrate count, a bolus calculator, graphs, trend-tracking indexes). The providers’ interface, a web-based dashboard, enables doctors and nurses to monitor at a distance patients’ data through an algorithm-based alarm system triggered by specific events or recurring patterns in the patients’ data.

Patient–provider communication is granted through an asynchronous messaging system (the system does not allow patient-to-patient communication). Messages are free text with no word limit and are not analysed by an automated system. The trial scheme required healthcare professionals to reply to patients within 48 h on weekdays and 72 h if messages were sent just before the weekend. In the departments under analysis, the messaging system was intended to replace emails and telephone calls for non-urgent matters.

Trials lasted 3 months and involved three hospital departments specialising in diabetes care in an Italian region. For this study, we limit our analysis to the only two departments that made use of the messaging system:

- ‘DC-Adult’ recruited 15 patients with poorly controlled diabetes;
- ‘DC-Pregnant’ recruited 10 pregnant women with previous experience of diabetes self-management (women with gestational diabetes were excluded).

These patient profiles, according to doctors, would benefit from the stricter monitoring and suggestions for disease management that the platform could provide.

As mentioned in the previous section, the unit of analysis of this study is the practice of computer-mediated communication through the remote monitoring platform. The analysis is thus focused on the messages exchanged between patients and healthcare professionals.

We analysed 396 text message conversations between patients and healthcare professionals and complemented them with semi-structured interviews conducted with all patients available

(eight in DC-Adults; nine in DC-Pregnant) and with all the clinicians involved in the two settings (two doctors and one nurse in DC-Adults; one doctor and one nurse in DC-Pregnant). For the sake of this work, we have considered all the messages and interviews as a single dataset. Exploring the differences between the clinical settings is beyond the scope of the present work.

Data were coded using template analysis (King 1998, 2004), identifying categories and iteratively regrouping text segments in higher level constructs. The preliminary analysis aimed to discover the topics of the conversations (the reasons for starting the message exchange), thus uncovering the communication needs. Subsequently, drawing on Fairhurst and May (2001), we classified messages and text excerpts according to two categories, 'knowing the patient' and 'knowing about the patient', to explore the development of intimacy. The following section presents the findings structured according to these categories.

Results

Before presenting and discussing how intimacy developed through the practice of messaging, we shall briefly describe the practice of exchanging messages itself. Before the trial, the standard care consisted in programmed visits every 4 months for patients with poorly controlled diabetes and every 2 weeks for women during pregnancy. The 30-min routine visit before the trial was mostly dedicated to ascertaining an overall understanding of the trends. The retrospective analysis of data from weeks or months before the visit is a time-consuming activity and requires relying on other tools such as paper-based logbooks and memory (Piras 2018). In any case, suggestions arrive late when patients have already managed the condition. Communication in-between visits was scarce, and most patients did not recall contacting the hospital in the year before the trial. Telemonitoring makes it possible to establish a supplementary form of patient-provider communication. The trial scheme did not aim at reducing routine visits but offered a tool to increase communication.

Neither healthcare professionals nor patients had prior experience of the practice under analysis, message exchange across a technological platform. Despite some small variations between the two departments, the content of messages was similar. Besides technical issues, we identified four recurring themes: glycaemia control (through insulin therapy and diet), education (general rules for self-management), motivation (encouraging adherence) and context (information regarding patients' daily lives).

Conversations were initiated mostly by healthcare professionals (83.5% of times) alerted by reading the clinical data, and only a small fraction of interactions developed from a request made by a patient. Both patients and providers designated a time for texting. Healthcare professionals confined this practice to the late afternoon, when no visits were scheduled and they deemed it possible to dedicate their full attention to the dashboard. Likewise, patients sent messages mostly at night before bed time, when they had no family or work obligations and could dedicate their time to using the platform.

Knowing the patient

The messaging system was created to provide patients with a tool by which to receive timely suggestions for responses to specific needs and to allow healthcare professionals to be alerted in real time about blood glucose patterns requiring monitoring. Messaging is a discursive practice that emerges around the TreC Diabetes platform and through which clinicians can get a closer look at a patient's data, acquiring knowledge of her clinical conditions and gaining the ability to provide personalised prescriptions.

The platform supports healthcare providers in ‘knowing the patient’, drawing on clinical data entered into the diary and enabling supplemental information gathering via the messaging system. A typical exchange, presented below, is triggered by the desire of the healthcare professional to better understand some pattern.

DC-Pregnant [Patient name]: We have seen your glucose pattern on Friday. They [measurements] are not within a desired range, and we’d like to understand better, but you did not specify what you had for dinner, and also there is no trace of pre-dinner insulin. Post-dinner [glucose level] was low: Did you eat at all? Please, try to be more accurate in compiling the logbook.

Pregnant Woman, 32 years old: On Friday I forgot to take my insulin, and, when I realised it, I took an extra bolus [a shot of insulin] to correct the 293 [high glucose level value], and then I checked my glycaemia at 18.30 and it was 342 [high glucose level value], so I did a 7-unit bolus. At 19.37 it was 186 [glucose level above norm], so I took the usual 8-unit dose and had some bread, fish and salad.

Glucose level measurements and therapies do not speak for themselves. Sometimes providers cannot make sense of data and require more information to fill in the gaps. The deductive reasoning of providers is guided by codified knowledge (‘desired range’), hypothesis formulation (‘did you eat at all?’) and requests for additional information (‘pre-dinner insulin’). The prescriptive attitude of the message is reinforced by the request for the patient to adhere to her role (‘try to be more accurate in compiling the logbook’). While this is a good example of ‘knowing the patient’ by relying merely on clinical data, the response also provides an illustration of the possibility of ‘knowing *about* the patient’ offered by the technology. In this case, the patient does not merely offer the data requested, but she explains why she took some decisions (‘I forgot to take the insulin [. . .] [so] I took an extra bolus’). In this circumstance, however, the provider did not enquire further, simply providing a recommendation.

Several messages show the potential of the platform to provide timely education on therapy and diet. Depending on how the conversation evolves, suggestions can be generic or tailored to the case at hand. In the excerpt below, for instance, the messaging system allows the provider to convey some basic and generic information on carbohydrate count.

DC-Adult: If you eat pizza in a pizzeria, carbohydrates in a pizza vary from 140 to 180 grams . . . depends on the pizzeria. It is hard to tell, but 100 grams [*tracked by the patient in her logbook*] seem too few. Then, keep in mind that if you also drink a beer, you should add 7 grams. Bye.

Patient with poorly controlled diabetes, Woman, 20 years old:

Hello. The pizza was a homemade pizza. About beer, I don’t drink [alcohol].

In most cases, though, the messages are more complex. A lived experience offers the opportunity to send multiple messages.

Pregnant Woman, 32 years old: Good morning Doctor and [nurses names]. I need some information. This afternoon, 2 hours after lunch, at 5 pm, I had 188 [glucose level above norm], so I did not have

my snack, but I went for a 1 h 30 min walk (running errands). After that, I only had a [vitamin supplement brand], 1 capsule with vitamins and minerals (in the box it says 'no sugar') and 2 coffee candies (I bought them because I saw the 'no sugar' logo). Then my glycaemia was 197! How's that possible? It did not go down, not a bit, and that's strange! I measured it at 8 pm. Is it possible that after 3 hours it was still high even if I had walked a lot? Or, was there some sugar in the candies? Thanks.

Dc-Pregnant:

Dear [patient], taking a walk was a great idea. You need to check for carbohydrates on the candies wrapper. 'No sugar' means no sugar added, but they still have some.

In few lines, the doctor was able to do three things: provide feedback on walking to reduce glucose level ('a great idea'), offer some general education on food (meaning of 'no sugar added') and explain that what needs to be considered are not sugars but carbohydrates and where to look for information ('check [...] the candies wrapper').

The excerpts above can be considered from a different perspective. In all cases, patients provide more information than required, offering providers the opportunity to glimpse their daily life. In their responses, the providers only seem to consider the relevant clinical data: Information like the type and the quantity of insulin injected and the composition of meals are used by clinicians to explain the reasons behind out-of-range glycaemia and to rethink previous prescriptions. However, it cannot be ignored that through messaging, providers are informed of some details of the daily lives of their patients. In the next section, we shall see how sharing these data can lead to intimacy.

'Knowing the patient' through data is not a form of intimate knowledge. However, both patients and providers believe that the sharing and discussing of clinical data through messages leads to a form of 'closeness' not experienced before the use of the technology. Closeness, which is not the same as intimacy, is expressed as a feeling of 'being together' made possible by the use of the technology and leading to continuity in the relationship.

The platform is useful because you know there is someone who watches your values in real time ... above all, if there is a value that goes up or down, a message arrives to you [Interview: Adult with poorly controlled diabetes, 41 years old].

Without doubt, it is a time-consuming activity. We have had to prepare the documentation, to write the messages [...] ... it has been a little bit heavy. But the quality of care has changed [...]. If we see the patient after two weeks with the system, it is not like when we see a patient after two weeks without the system. It is like resuming something that has never stopped [Interview: Nurse, DC Pregnant].

Knowing about the patient (and patients 'knowing about the providers')

Messaging was conceived as a tool to provide timely education and feedback to patients. In this section, we shall see how the platform supported healthcare providers in 'knowing about the patient', familiarising them with the patient's way of thinking and context of life.

As described in the previous section, messages often contained more information than just strict clinical data. Sometimes clinicians investigated the reasons underpinning the 'bad' glycaemic values and the meaning attributed by the patients to their clinical condition, thereby interpreting clinical data in view of social, affective and working relations and of perceptions

about the illness. Consequently, the glycaemic values are no longer just the result of therapeutic choices but are strongly interrelated with the particularities of each patient.

[Before this trial] we did not understand some things . . . For example, stress increases glycaemia, and if a patient is fired, obviously this is hugely stressful. But someone could be not so stressed because, for example, he/she already has a job offer. For another person, the same event can be much more serious, and it can be impossible to manage the blood sugar values [. . .]. When you go into detail, you can observe what they eat and what kind of physical activity they do. For example, [with younger patients], you can see that during the holidays they need very little insulin. Then, when school begins, it is necessary to increase the insulin dosage because with school, stress and anxiety increase. [Doctor, DC Adults]

The possibility of ‘knowing about the patient’ is offered by the remote monitoring scheme (‘[before] we did not understand’) and made possible by the practice of exchanging free text messages used by patients to provide information on their daily routines, unusual events and personal interpretations of their condition. This information allows providers to ‘go into detail’, understanding in depth the effects of life events on each patient.

Exchanges of messages strictly focused on self-management practices were accompanied by frequent messages aimed at understanding in depth the overall reasons for the glycaemic trends.

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|-------------------------------|--|
| DC-Adult: | Yesterday was a bank holiday, and a little bit of hyperglycaemia was predictable. Everything else looks good. Bye |
| Patient, Man, 24 years old: | Parties and street food are not easy to manage. I do my best. |
| DC-Adult: | Don’t worry! Take it easy! |
| DC-Adult: | What happened this morning? Stressful situation? :) |
| Patient, Man, 39 years old: | My boss was rushed to the hospital, and he had a heart surgery. Luckily, now he is ok, but in the office we’ve lost a valuable person. Also, consider that Christmas season is the most critical period for us. I hope that they hire someone for the next two months or it will be a living hell. I doubt, though, that someone will come to help us. |
| DC-Adult: | I am sorry about it; don’t lose control! |
| DC-Adult: | Your data could be explained by some illness. I hope not . . . I hope you will be ready to start the new year. [. . .] Happy new year! |
| Patient, Woman, 39 years old: | I have a 40-degree fever. Good analysis! Happy new year. |
| DC-Adult: | These crises are fully manageable. |

In the message exchanges, various topics concerning the private lives of the patients are taken into consideration. In all the cases presented above, clinicians make hypotheses about glycaemia, asking for confirmation and/or additional information. Unlike the cases discussed in the previous section, however, the conversation leads providers to reassure patients (‘these crises are fully manageable’, ‘Take it easy’), express their support (‘I’m sorry about it’) and avoid suggestions. In these and other cases, providers implicitly downgrade the relevance of diabetes management with respect to exceptional events or compelling social obligations. Also,

the overall tone of the conversations is not formal, as made explicit by the use of exclamation points, emoticons and colloquial expressions.

Through the digital platform, clinicians seek explanations of anomalous values, going beyond self-management actions and examining the existence of external events. If abnormal glucose values are not ascribable to errors in self-management, the clinicians reassure patients, encouraging them not to lose motivation and to limit the damage to their health related to largely uncontrollable events. This change in the doctors' behaviours, from clinical advice to emotional support, is perceived by patients, and it paves the way to a different, intimate relationship.

DC-Adult:	'Well done! Keep going!' [analysing a perfect glycaemic trend]
Patient, Man, 33 years old:	Thanks for the technical and human support. If it [glucose level pattern] was always like this, that would be great.
DC-Adult:	It would better, but keep in mind that it is impossible also for the best diabetic patient. I do not want to demoralise you, but I want to tell you that don't have to be discouraged. Some ups and downs are normal.

When the nurse writes me 'well done!', I like it, even if I don't know who is talking with me. I don't care; I know that anyway it is someone who is knowledgeable. Therefore, she writes me 'well done', and I reply 'If it was always like this, that would be great', and she again replies 'It would not be diabetes'; she is right! They don't mislead you, they open your eyes, as it should be [interview with the patient].

Other times while messaging, clinicians come to understand emotions and perceptions that the patient has about the illness. In the dialogue above, we observe that: on the one hand, the patient is quite demoralised because he cannot reach the target glycaemic values every day; on the other hand, the ward reassures him, telling to accept even the 'bad' values since they are part of the disease. In this case, through messaging, the clinicians deeply understand the patient's relationship to the disease and, subsequently, try to change the meanings that the patient gives to their out-of-range glycaemic values. In turn, the patient expresses his gratitude for the emotional support received by 'someone that is knowledgeable' even if, in this particular case, he does not receive any specific clinical advice.

If the remote monitoring offers providers the possibility of 'knowing about the patients', this practice also allows patients to 'know about their care providers'. Patients develop a more nuanced understanding of providers in several respects. As illustrated by some excerpts presented above, exchanging messages regarding unusual situations reveals the limits of codified medical knowledge and displays a provider's willingness to show empathy and support. Moreover, the situations described in this section permit the patient to gain a better understanding of the rationale behind providers' suggestions. For instance, patients experience the fact that ranges and thresholds become less compelling and can be violated with no consequences in some occasions, such as festivities or stressful situations.

In more general terms, patients reframe medical suggestions and prescriptions as not being judgemental but oriented to improving their condition and displaying the providers' willingness to go the extra mile to help—or help patients 'know that they care', in the words of a patient. This attitude is reflected in a more trusting relationship between providers and patients which imparts traits that differentiate these patients from others.

The relationships with them [patients in the trial scheme] has changed, and it is now more confidential, so to say. [...] Now when they come to the centre, they stop by, we talk a bit.

You don't do that with other patients. The problem we have with some patients is that they do not show up to visits. 'I can't, I do not have time right now'. Some people disappear for years. That's not what happens with them [patients in the trial scheme]. We have a bond, and we're sure they will continue . . . we still have this strong relationship [doctor, DC-Adults].

Discussion: practising remote monitoring, cultivating intimacy

In the previous sections, we illustrated how intimacy between patients and providers is achieved through communication mediated by the remote monitoring platform. Intimacy is an emerging trait of the interaction made possible by the introduction of such technology into the patient–doctor relationship.

We refer to this as 'digital intimacy' to stress the primary locus of creation of such intimacy, which did not emerge in prior face-to-face interactions. Nonetheless, 'digital intimacy', despite being made possible by the use of electronic tools, is not confined to online interactions. The vocabulary of practice-based studies adopted to frame this study helps to make this point clear. The intimacy emerges in a specific practice (remote monitoring), but it trickles down into the other practices that form the texture of the patient–provider relationship (i.e. routine face-to-face clinical encounters). In the lived experience of practitioners, once an intimate knowledge of the other is achieved, there is no distinction between vis-à-vis interaction and text messaging. This is clearly expressed by the feeling of seamless connectedness that allows in-person encounters to be described as continuations of online interactions.

The lens of practice invites reflection on the continuous, multilayered and multifaceted knowing process described above. For analytical purposes, we draw on Fairhurst and May (2001) to distinguish two forms of knowing: 'knowing the patient' and 'knowing about the patient'. A third form of knowing could be introduced here: knowing to practice the practice itself. Text messaging was a new form of interaction for both patients and providers, and no strict guidelines were established beforehand. As the practice of text message exchange unfolded, practitioners recursively constructed and reconstructed the practice, negotiating a shared understanding of the rules they established as the conversation proceeded. For instance, providers learned when they had to keep asking detailed questions to gather clinical data and when it was time to show empathy and support. Each message exchange was different, but all somehow shared similarities or remained recognisable to the practitioner (Clot and Béguin 2004), and this provided an opportunity to learn about the other practitioner and about how to be a competent practitioner (Bourdieu 1990, Gherardi 2010).

To this point, we have defined intimacy as a form of knowing and an emerging trait of a recursive practice. Drawing on the data gathered, we can tentatively try to elaborate the concept of intimacy a bit more as it emerges from the interactions under analysis. While the feeling of being connected is experienced as a whole, we can single out three analytic dimensions. First, intimacy is experienced by patients as a feeling of being taken care of, as clearly expressed by the perception of continuity of care in-between visits. Telemonitoring re-creates the closeness between patients and providers usually experienced only during the first months after the onset of the disease (Piras and Zanutto 2014). Moreover, being taken care of manifests not only in the timely provision of clinical counselling but also in the form of emotional support. Second, intimacy involves feeling like more than just clinical data. The routine

clinical encounter is mostly devoted to the analysis of parameters. Exchanging messages allows personal events, previously not taken into account, to be communicated and considered by providers. Salient events from the patient's perspective (e.g. troubles at work) become relevant for clinicians, contributing to the feeling of being on the same page. Third, intimacy emerges as recognising a new, more collaborative partnership. This is the cumulative effect of being taken care of and considered more than clinical data. Patients are perceived as more reliable and deserving of more trust, establishing a new alliance.

Conclusion: the making of digital intimacy

The implementation of remote monitoring schemes is often accompanied by pre-cooked and polarised expectations. Promises of efficiency and process streamlining contrast with the nightmare of a cold, impersonal care (Pols 2012). Previous research has demonstrated that remote monitoring does not inevitably lead either to a richer or to an impoverished patient-provider relationship. Rather, these relationships vary for multiple reasons, and the simplistic opposition between cold technology and warm humanity makes no sense (Pols and Moser 2009). While significant articulation work may be necessary to prevent telemonitoring devices from becoming 'technological monsters' (Oudshoorn 2008), in chronic care management with limited face-to-face clinical encounters, remote monitoring can enable moving from a logic of choice to a logic of care (Mol 2008) favouring providers' attempts to adjust knowledge to the unique and complex life of each patient.

As other authors have shown, intimacy is a practical and always-partial accomplishment (Langstrup *et al.* 2013), and it requires negotiating new thresholds in the social division of care labour between patients and providers to prevent intimacy from becoming intrusiveness (Piras and Miele 2017).

The present work contributes to this debate by investigating the redefinition of provider-patient relationships in remote monitoring, providing a processual view of how digital intimacy is created and how it permeates all interactions, both those mediated by technology and face-to-face encounters. To discuss intimacy, we have anchored this elusive and evocative construct to two distinct but complementary perspectives on knowledge. Building on the distinction proposed by Fairhurst and May (2001) between the deductive 'knowing the patient' and the inductive 'knowing about the patient', we have described intimacy as knowledge 'about each other' (knowing about the patient, knowing about the provider) developed in digital interactions. Drawing on practice-based studies (Gherardi 2010, Nicolini 2011), we have shown the impossibility of distinguishing between knowing and practicing and how, when participating in the practice of remote monitoring, the instrumental data sharing and the understanding of lived experience are inextricably intertwined.

From our perspective, thus, intimacy is to be interpreted not as an additional trait in the interaction but rather as an emerging, intimate patient-provider relationship shaped by the reproduction of textures of telemonitoring practices (e.g. sharing data, prescribing therapies, asking for advice), which are profoundly entangled with the communications infrastructure. If our study shows how intimacy develops while practicing remote monitoring, more research is needed to understand if once developed it becomes a permanent trait of the relationship or if it needs to be continuously created and re-created through interaction.

The development of intimacy is facilitated or hindered by several conditions. One of them is certainly the technology involved, as it can restrict patient-provider interaction by default to standardised and pre-structured formats. However, as we have tried to show, technologies constitute only a part of a remote monitoring practice. The outcomes of a practice can vary

depending on each of the elements of the heterogeneous arrangement that constitutes that practice (e.g. time constraints, concurring task, policies of use).

The peculiarity of the trial scheme adopted in our case was that it allowed providers to decide for themselves how to fit the remote monitoring into their workflow or, to use the vocabulary adopted in this study, to reconfigure the practice of remote monitoring within the texture of other clinical practices. In the case described above, this is made possible by the overall increase in the quantity and quality of communication between patients and providers.

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