9 July 2011

Consumer Health ICT And The Patient In The Middle: Adopter And/Or Influencer?

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ISBN: [978-1-86435-644-1]; Full paper

Recommended Citation

http://aisel.aisnet.org/pacis2011/165

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Abstract

ICT can play a vital role in facilitating quality care and support for people living with chronic illness. Recently, there has been a proliferation of ICT-enabled consumer health devices. These devices can enable individual patients more precise monitoring and control of chronic conditions, and can generate information and statistics for analysis by health professionals. The adoption of the ICT-enabled consumer technologies by patients often relies on the co-adoption of related innovations, work practices, analytical tools and information systems by their health professionals. In healthcare, adoption is influenced by other stakeholders such as health insurers, the patient's family, chronic disease support groups, etc. This paper addresses the individual adoption of ICT-enabled innovations when multiple stakeholders are involved. We report on a case study of the adoption of ICT-enabled “smartpumps” by pregnant women with Type 1 diabetes. We find that the patient should be theorised as adopter, but also as influencer under certain conditions. We develop propositions to explain adoptive behaviour as the adopter/influencer seeks to achieve congruence of interests in a stakeholder network. Our findings help explain why the adoption of ICT-enabled health innovations can occur swiftly in some situations, yet proceed slowly in others.

Keywords: Adoption, Healthcare, ICT, Consumer.
1 INTRODUCTION

ICT can play a vital role in facilitating quality care and support for those affected by chronic diseases such as asthma and diabetes. In recent years, various consumer health devices have become commercially available, drawing on advances in sensor technology, wireless communications, low-powered integrated circuits, mobile technology, etc. (Milenković et al., 2006). These devices can afford the patient more precise and continuous health monitoring and control of their chronic condition (Lenhard and Reeves, 2001). Consumer healthcare devices are often IT-enabled, enabling the patient to extract and transmit information generated by the device electronically to their healthcare professionals. It is foreseen that consumer healthcare would ultimately integrate in real-time with medical information systems in the future (Milenković et al., 2006). To realise such a compelling vision, a more in-depth understanding of consumer healthcare adoption within the wider context of organisational and institutional practices in healthcare becomes essential.

From the perspective of individual potential adopter (i.e., the patient), several factors complicate the adoption of consumer health ICT. First, adoption actions “do not occur in a vacuum” (Orlikowski, 1993, p. 318); they often impact other stakeholders such as the patient's physician, specialists, other health professionals, family, support groups, etc. Adoption may necessitate changes to these stakeholders’ work processes and routines, and may even require co-adoption of related innovations or practices. For example, an endocrinologist might need to adapt his/her work practices, or co-adopt information systems to acquire and analyse electronic information transmitted from the patient's health care device. In this regard, Alter (2010) suggests the term congruence as a measure of the interactions between different work practices or systems in terms of consistency in their form, logic, or details (i.e., two entities’ systems/work practices can be considered congruent if their information is consistent, their technology is interoperable, etc., even though each entity might have different overarching goals and objectives).

Second, consumer healthcare innovations can involve significant financial outlays. These costs are typically borne by third parties such as private and public health insurers who usually require extensive evidence of the need, etc. Lastly, considerations such as privacy rules, possible litigation, differing standards, etc., all represent barriers to adoption (Rogers, 1995) that can slow down and complicate adoption in the healthcare context.

The objective of this paper is to extend the theory on individual adoption when multiple parties contribute to an individual’s adoption process (a situation typical of healthcare but also other contexts). Given that the various stakeholders in this situation are effectively independent/autonomous agents in their own right, those seeking to advance adoption have to resort to influence as their primary mode of agency (See King et al., 1994 for the distinction between power-based and influence-based agency). Influence can be exerted in a variety of ways (Kipnis et al., 1980; Lee and Sweeney, 2001; Yukl et al., 1993), but overall the intent is to achieve a desired behavioural response from the party under the sway of influence.

The paper is structured as follows. First, we provide some background on our specific study context (the adoption of IT-enabled smartpumps by pregnant women with Type 1 diabetes). We review the literature, focusing on theoretical perspectives on the individual adoption of innovations, adopter interdependencies, and the literature on influencing tactics. We describe our research method and discuss our findings given the extant literature. Based on our study, we put forth a number of propositions for further theoretical exploration. We discuss how our findings can help explain why the health innovation adoption process can be either swift or protracted depending on the intrinsic motivation of the adopter and degree of congruence in a stakeholder network.

2 THE STUDY CONTEXT

Type 1 diabetes is an auto-immune condition which can present at any age, although most commonly onset begins under 40. It is a significant health problem worldwide. In Australia nearly 1 million
people are currently diagnosed with diabetes; about 10-15% of all cases are of Type 1 (Diabetes Australia, 2011). People diagnosed with Type 1 diabetes must maintain a regimen of insulin, diet and physical activity in order to remain healthy.

2.1 Diabetes and pregnancy

Pregnant women with Type 1 diabetes (hereafter PWT1D) and those planning a pregnancy face additional medically related challenges and risks. Due to their 'high risk' pregnancy they are dependent on the support of a range of health professionals. The risks can be ameliorated by achieving extraordinary control of their diabetes. One element of this is by more frequent monitoring of their blood sugar levels (e.g. from 3 up to 10 times daily) and precise adjustments to insulin doses, during pregnancy and while breastfeeding. These considerations impact on the health and wellbeing of both mother, and unborn child.

2.2 Smartpumps

Smartpumps play a role in the management of Type 1 diabetes for women considering pregnancy and those who are pregnant. Smartpumps (Lenhard and Reeves, 2001) used in conjunction with electronic blood glucose level (BGL) meters enable much more precise control of blood glucose levels (compared to traditional insulin delivery methods such as insulin pens/injections), and in combination, can record information/trends for subsequent analysis by health professionals.

Specifically, in multiple daily injection therapy, it is not always clear how much insulin is being used for background and how much is being used for food. In insulin pump therapy, the two are clearly separate. Smartpumps allow the user to set a basal rate, or background insulin, to be delivered continuously throughout the day and night for the normal body functions without food and allows the user to give a bolus, or delivery of insulin, "on demand", when food is eaten. While reports indicate that smartpumps have positive outcomes during pregnancy, smartpump adoption is not unproblematic. There is a high setup cost to women in terms of both the financial cost of acquiring a smartpump and a team who are supportive of smartpump use.

The adoption of a smartpump impacts on the person with diabetes, but also potentially on the work practices of other stakeholders (Goldberg et al., 2010) such as their diabetes educator, endocrinologist, and related health professionals (e.g., ophthalmologists, obstetricians). The electronic exchange and analysis of blood glucose information pre-consultation, and the discussion of electronic information during consultations both imply changes in work practices and the nature of the typical consultation between the health professional and patient. Not all health professionals working in the diabetes area are necessarily ‘pro-pumping’ (Schade and Valentine, 2006). Due to entrenched work practices, lack of awareness, the high cost of the technology, possible legal concerns, the need to change routines, etc., many prefer traditional control approaches such as injections/insulin pens and paper-based logs of blood sugar levels and other pertinent data.

2.3 Stakeholders in the diabetes context

It has long been recognised that the provision of care and support to people with a chronic disease such as diabetes is a collaborative team effort (Wilson et al., 2009). In the case of diabetes this includes contribution from the person with diabetes, the endocrinologist, the general practitioner, related health care specialists, diabetes educators, healthcare insurers, manufacturers of smart pumps and related diabetes control technologies, family members and support groups. This complex network represents individuals and communities with divergent values and objectives. There are three primary activities to facilitate quality care and support: (a) collection of information on the state of the mother and baby; (b) dissemination and sharing of relevant information to the healthcare specialists and supporters; and (c) collaboration and coordination between different team members for the provision of care and support.
3 LITERATURE REVIEW: INDIVIDUAL ICT ADOPTION AND ADOPTER INTERDEPENDENCIES

In this section we review research literature that relates to the adoption of consumer health IT innovations by individual patients.

A significant body of research exists on the adoption of innovations by individuals in general (e.g., Rogers, 1995) and the individual adoption of IT-related innovations by individuals in particular (Brown and Venkatesh, 2005; Davis, 1989; Fichman, 1992; Iivari, 1993; Jeyaraj and Sabherwal, 2008; Karahanna et al., 1999; Moore and Benbasat, 1991; Prescott and Conger, 1995; Sarker and Wells, 2003; Venkatesh et al., 2003).

Rogers (1995) argues that certain characteristics of innovations, such as relative advantage, compatibility, complexity, trialability, and observability, as perceived by individuals, help explain their differing rates of adoption. He also categorises adopters according to the average time at which they typically adopt an innovation; innovators adopt the earliest, then early adopters, early majority, late majority, and finally laggards.

Sources such as Fichman (1992), Prescott and Conger (1995), and Jeyaraj and Sabherwal (2008) provide extensive reviews of the literature that relate to IT adoption in particular. The IT adoption studies typically focus on the factors that influence or hinder the adoption of IT-related innovations by individuals (Jeyaraj and Sabherwal, 2008). The unit of analysis in these studies is typically the “individual”, against a backdrop of a variety of contexts such as the organisation, home, communities of practice, etc. (ibid).

While a significant number of health IT adoption studies exist, to date much of this research have been situated in organisational contexts (such as hospitals, general practice, etc) and are often focused on patients’ and healthcare workers’ perceptions of the various innovations (e.g., Bhattacherjee et al., 2008; Sherer, 2010). As is typical of an emerging research field, there are very few literature sources that focus specifically on consumer health IT adoption. The current literature on consumer health IT mostly relate to the health technology itself (e.g., design, functionality, benefits for the patient) (Lenhard and Reeves, 2001), the integration of the consumer technology with hospital systems (e.g., Goldberg et al., 2010; Milenković et al., 2006), and general adoption trends of the e-health consumer services (e.g., Wilson et al., 2009). For example, Wilson et al. (2009) report on trends in the adoption of consumer e-health services in the US. They found that the adoption of informational e-health services outside healthcare organisations (i.e., by individuals in their personal capacity) increased significantly over the four-year period of their study. Given the sparse literature dealing with consumer health IT specifically, we turn to the general and IT adoption literature to frame the research issues in the present study.

Several streams of research exists within the area of individual IT adoption, including the importance of the context in which adoption is taking place (Orlikowski, 1993) and adopter interdependencies (Fichman, 1992; Jeyaraj and Sabherwal, 2008). Adopter interdependencies and the role of other stakeholders within the broader adoption context are of particular relevance to the present study.

3.1 Adopter interdependencies

Adopter interdependencies exist when others, apart from the focal adopter, co-adopt, or are influenced by the innovation in some way. We refer to these other parties as stakeholders throughout the paper. For example, some innovations exhibit network externalities (Oliva, 1994) and only become useful when others co-adopt the same innovation (e.g., the telephone, fax and e-mail) (Markus, 1987). In the healthcare context, it can be argued that electronic health records exhibit some network externalities (i.e., benefits accrue only when GPs, specialists, health institutions, etc., all co-adopt the innovation).

Adopter interdependencies also exist when an innovation is adopted by one party, but related innovations/practices need to be co-adopted by others for benefits to accrue. For example, the adoption of a hearing aid by patient depends on the adoption of hearing-aid calibration equipment by providers,
etc. Similarly, adopter interdependencies exist when an innovation is adopted by one party, but others are also influenced/affected in some manner, even though they are not adopting the innovation themselves. Adopter interdependencies are particularly prevalent in the healthcare context. Consider a patient with asthma who relies on a specialised ventilator. Adopter interdependencies could exist between the patient and a number of other stakeholders such as the prescribing doctor, healthcare technology vendor, and even family members who might need to assist the patient in case of an emergency.

3.1.1 Influencing tactics

Jeyaraj and Sabherwal (2008) examined individual IT adoption when adopter interdependencies exist. In particular they studied the contextual actions of stakeholders and the adoptive behaviour of the focal adopter. They highlight the behaviour of one category of stakeholders which they label influencers. Jeyaraj and Sabherwal define influencers as “...those individuals who are responsible for enforcing the mandate for the innovation, or those individuals who function as “champions” of the innovation, or those individuals designated as “change-agents” for the innovation, or those technically savvy individuals who possess the expertise to assist others with the innovation (Howell & Higgins, 1990; Rogers, 1995). Influencers are generally enthusiastic about the innovation and would attempt to influence others to adopt the innovation. Influencers are important in the innovation adoption process since they reinforce the innovation and its adoption to specific potential adopters in the organization on a one-to-one basis over and above the communal actions in the context.” (p. 213-214).

According to Jeyaraj and Sabherwal (who draw on the work of Kipnis et al., 1980), influencers influence other individuals to change their behaviours using a variety of tactics. In their study, the tactics of influencers include building coalitions, appealing to higher authority, bargaining, acting in a clandestine manner, presenting rational arguments, applying sanctions, using friendliness and ingratiating, and being assertive (c.f., Kipnis et al., 1980). Jeyaraj and Sabherwal view the influencing relationship as unidirectional; the influencer engages in tactics in order to exert influence on the possible adopter to encourage adoption of innovation.

3.2 Summary and research questions

Although there is a significant body of health IT adoption-related research, the majority of the research to date has examined health IT adoption from the perspective of health professionals, or in the context of healthcare organisations. Less is known about consumer health IT adoption from the perspective of the patient who is living with the chronic condition. A more in-depth examination of the adopter role seems especially applicable for those who live with a chronic condition and therefore have an intrinsic motivation to adopt innovations that could improve their own health and quality of life outside the hospital context.

Furthermore, consumer health IT adoption typically occurs in a context where multiple stakeholders may be involved. How does this network of other stakeholders influence the patient’s adoptive behaviour? In turn, this raises the question whether adopters themselves are at the same time also influencing stakeholders in such contexts. Should the patient (as focal adopter) therefore be theorised as an adopter and/or an influencer?

4 METHODOLOGY

We used the case study method in this research (Yin, 2003). The case study method enables an in-depth exploration of a particular phenomenon (in this study, the adoption of smartpumps by PWT1D) within a context (in this study, the various other stakeholders involved, specific health issues that these adopters face, etc.) (Benbasat et al., 1987; Eisenhardt, 1989).
4.1 Research setting and design

For this study, we chose the PWT1D as the focal unit of analysis (Yin, 2003). In collaboration with Diabetes Australia (the peak consumer body and advocacy group representing all people affected by diabetes in the country), and in particular their branch in the state of Victoria (hereafter, DA-Vic), we assessed the typical stakeholders involved in the decision of PWT1D to adopt smartpumps. These stakeholders include the PWT1D’s partner/family, diabetes educators, endocrinologists, related health professionals (e.g., her general practitioner, ophthalmologist, obstetrician), technology vendors (who manufacture, supply and market smartpumps), and health care insurers (see the stakeholder map depicted in Figure 1).

In the figure, the double headed arrows represent the primary relationships of interest in this study, given our focus on the individual as focal adopter. However, it should be noted that formal or informal relationships exist between many of the stakeholders in this network (e.g., a diabetes educator may involve members of the patient's family as part of the educational process around the treatment; vendors tend to provide technical and marketing information to health professionals and health insurers, etc). This illustrates the complex dynamics that are typical of such networks.

![Stakeholder Map with Pregnant Woman with Type I Diabetes as Focal Node](image)

Figure 1. Stakeholder Map with Pregnant Woman with Type I Diabetes as Focal Node

4.2 Data Collection and Analysis

We obtained multiple sources of evidence (Yin, 2003) relating to smartpump adoption in metropolitan and regional Victoria (Australia). The data collected includes background information (arising from our collaboration with DA-Vic) about the use of smartpumps, a DA-Vic documentary on DVD about pregnancy and diabetes, demographic information about the number of women aged 18 to 45 (primary childbearing ages) with type I diabetes in Victoria and the spread in terms of PWT1D located in metropolitan and regional parts of the State. The regional perspective was included because women in these areas often have fewer opportunities to access the specialist care, diabetes education, etc., compared to their metropolitan counterparts. All this background deepened our understanding of the context of PWT1D, and the issues faced pre-pregnancy, during pregnancy, and postpartum. In addition, we obtained an understanding of the international perspective in diabetes technology adoption through further contextual information supplied by DA-Vic and other sources.

Data collection occurred between October 2009 and April 2010. The main data source included a range of interviews, primarily with PWT1D and some of the stakeholders depicted in Figure 1. Specifically, we interviewed 16 PWT1D, 3 Diabetes Educators, 2 Endocrinologists and one partner of a PWT1D (refer Table 1). In terms of the other stakeholders in the figure, we consolidated information obtained through our interviews, utilised web-based resources, gathered written literature (including smartpump brochures) spoke to Diabetes advocates, and attended relevant presentations.
where technology-related vendors presented at two pregnancy information evenings for PWT1D (refer Table 2). This gave us a sense of the perspectives of all the nodes in the stakeholder map.

In recruiting our interviewees, we sought a balance of regional and metropolitan women, women who adopted pumps versus traditional methods (refer Table 3), and women at different stages of pregnancy i.e., pre-pregnancy, pregnant, post-partum (Table 1). PWT1D were recruited via DA-Vic pregnancy evenings, an advertisement placed in DA-Vic newsletters and using the snowball method (i.e., subsequent references by participants). Endocrinologists and diabetes educators were also suggested to us by DA-Vic, and again the snowball method was applied. It should be noted that it was quite difficult to recruit health professionals as they tend to be time-poor due to clinical pressures, with many on-call on a 24/7 basis. Interviews were audio recorded and transcribed for subsequent analysis.

We conducted a thematic analysis (Miles and Huberman, 1994) of the evidence, working through individually and collectively in the research team. In particular, we identified themes pertaining to the adoptive behaviour/actions of PWT1D, the different stakeholders involved during adoption, and the PWT1D’s interaction with these stakeholders. We then validated our observations and interpretations of the data in a workshop with DA-Vic.

<table>
<thead>
<tr>
<th>Geographic Location</th>
<th>Pre-pregnancy</th>
<th>Pregnant</th>
<th>Post-partum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Regional</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Number of Interviews with Women with Type I Diabetes

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Educators</td>
<td>3</td>
</tr>
<tr>
<td>Endocrinologists</td>
<td>2</td>
</tr>
<tr>
<td>Partners of PWT1D</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2. Number of Interviews with Other Stakeholders

<table>
<thead>
<tr>
<th>Interview Method</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using traditional methods</td>
<td>5</td>
</tr>
<tr>
<td>Using pumping technology</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 3. Number of Interviews Using Pumping Technology

5 CASE STUDY: THE ADOPTION OF SMARTPUMPS BY WOMEN WITH TYPE I DIABETES (PRE-PREGNANCY, DURING PREGNANCY AND POST-PARTUM)

In this section we present the key findings from the case study. We describe the relative advantage of smartpumps (compared to traditional treatment approaches) and the barriers to adoption (Rogers, 1995) of the new technology as reported by the PWT1D. We then present themes (Miles and Huberman, 1994) emerging from the data analysis, pertaining to how PWT1D influence and seek to achieve congruence between the various stakeholders in order to adopt smartpump technology.

5.1 The Relative Advantage and Barriers to Adoption of Smart Pumps

Smartpumps allow women to gain better control of their blood sugar levels as they fine-tune insulin delivery with much more precision. This has been the experience of many of the participants in this study. Other advantages to smartpumps are that they allow women more flexibility and spontaneity in terms of eating and exercise and have the added benefit of helping to control morning sickness.
PWT1D using syringes/pens have to eat at set times, even when feeling nauseous, while smartpump users have a continuous basal dose running in the background which provides some protection, allowing more flexibility in the timing of meals. Simply put, PWT1D using smart pumps can eat when hungry, and when not feeling nauseous, as long as they continue to count carbohydrates and check/respond to prompts on their pumps.

Better control of blood sugars in PWT1D, particularly in the early stages of pregnancy, leads to more positive outcomes of the baby i.e., a decreased chance of malformation, less chance of miscarriage, and less chance of a very large baby which may result in increased surgical intervention during delivery. For many PWT1D these factors provide a powerful motivation to use a pump to ensure as much as possible, that they have a healthy baby.

At the same time, there are a number of factors which make the adoption of a smartpump difficult. Firstly, a major consideration is the cost of buying and maintaining a smartpump - smartpumps range from around A$6,000 for a very basic model, to over A$8,000 for more sophisticated ones. Australia generally, has a low rate of private health insurance uptake, particularly among those aged 15-34 years (28%). PWT1D without private health insurance have to pay privately or take out private health insurance, and wait a year to be eligible to apply for coverage. Ongoing consumable costs are also associated with smartpump use.

Smartpumps are largely user-friendly devices in terms of programming and daily use. Users must learn the skills to program, make changes to basal rates, set bolus doses and alarms and change cartridges and infusion sets. This requires a high degree of discipline from users who must regularly check and respond to the information provided by the device. PWT1D attend a range of medical appointments prior to adopting a smartpump, they learn to count carbohydrate intake and test their Blood Glucose Levels frequently (10-12 times a day when pregnant), and make constant changes to their rates once pumping.

Other factors that complicate the adoption of smartpumps in Australia include a shortage of qualified smartpump trainers, particularly in regional and rural areas. Further, some health professionals working in the diabetes space are unsure about the efficacy of smartpumps compared to other traditional interventions; consequently they do not actively support their use. Finally, it is important to note that there appears to be one primary motivation for PWT1D to adopt a smartpump - to ensure a healthy pregnancy and a healthy baby. However, the decision to adopt a smartpump is not made independent of other parties, rather PWT1D have to manoeuvre other key stakeholders in position to ensure that adoption can occur.

The following section will discuss these attempts to achieve congruence of stakeholder interests in more detail.

5.2 Influencing Various Stakeholders

PWT1D learn about smartpumps from a variety of sources; via a health professional, through additional diabetes training (e.g. diabetes courses, word of mouth, or Diabetes Australia information provision). While PWT1D considering pregnancy may wish to adopt a smartpump, one of our interviewees commented on the aspect of timing as part of the adoption decision:

“I want to get onto the (smart)pump first. The pump is what is forward in my mind at the moment. Get onto the pump. Get everything settled down...and under control for about a year and then maybe look at starting the whole pregnancy thing.”

The adoption of a smartpump is not an isolated event for PWT1D; it is a process which has to be negotiated and managed within the larger context of the stakeholder network as illustrated with further evidence below.

5.2.1 Convincing Private Health Insurance to Cover Costs

We found that one of the barriers to adopting a smartpump was the cost of the technology. Our interviewees who did not have private health insurance had to meet the cost themselves or join a
private health insurance scheme, wait one year to meet timing requirements, and then begin the process of applying. One participant outlines this process:

“I’d been planning on getting a (smart)pump for probably 3 years beforehand. I’d picked the model... it was just a matter of getting insurance and waiting a year.... (but) It’s not that easy. You’ve got to go on a waiting list. You’ve got to make hospital appointments; you’ve got to make sure that the doctors are there or the diabetes nurse educators are there, and a representative from the company, because all pumps are slightly different.”

Interviewees reported trying to convince private health insurance companies that it was in their best interests to support the adoption of the technology, including submitting documentation as proof that their diabetes was serious enough to require technological intervention:

“You need at least eight weeks of documentation to go to the [private health insurance] to show the highs and lows - your HbA1c may not tell them that. My last HbA1c was 6.5 and that’s too good to get [private health insurance] support. So now I’m having (to document) highs and lows to show them that I actually should have a (smart)pump. Some people let it slide for a while to get that. I think that’s just ridiculous. Causing yourself intentionally bodily harm to get better (results for them) seems quite odd to me.”

Our interviewees argued that while the outlay for smartpumps was costly; over their pregnancy and lifespan, the cost was less than private health insurance companies would have to pay for traditional treatment. One PWT1D said:

“It is a large cost... at the same time $5000 to $8000 for a pump reducing complications later in life is not much money at all. So (when) you actually have to prove eligibility for it to me it seems a little bit of an unnecessary hurdle. But I guess that’s health insurance.”

5.2.2 Persuading General Practitioners and Other Allied Health Professionals

Some PWT1D discussed “educating” and informing their General Practitioners and other allied health professionals about smartpumps. One interviewee said

“I went to see my GP and I was talking about the (smart)pumps; he said ‘I really haven’t heard anything about it. I don’t know what you’re talking about.’”

Ultimately this PWT1D persuaded her GP that the adoption of a smartpump was in her best interests, and he became a valuable ally, providing documentation to support adoption.

5.2.3 Persuading Diabetes Educators

Anecdotal evidence from our interviews with Diabetes Educators and PWT1D show that some Diabetes Educators do not support the use of smartpumps due to a number of factors including little contact with PWT1D (i.e., focusing on type 2 or gestational diabetes instead), rapid changes in smartpump technology and personal beliefs. For some PWT1D this means that they have to actively persuade their Diabetes Educator that they are a suitable candidate to adopt and manage a smartpump. The Diabetes Educator is a key stakeholder in the PWT1D’s network, as he/she provides essential training in applying, using and managing a smartpump on a daily basis. Other Diabetes Educators are however positive about the use of smartpumps, particularly during pregnancy. One Diabetes Educator elaborated:

“We’re working with smartpumps now that can adjust rates by as little as 0.025 per unit. You get much finer control and it does handle things like vomiting (due to
morning sickness), poor appetite, up in the middle of the night and then after you’ve had the baby for things like breastfeeding and all those sorts of things. It just makes life easier.”

5.3 Tactics for Establishing Congruence between Stakeholders

Given the contextual complexities in terms of smart pump adoption, our data analysis then turned towards specific tactics that the PWT1D engage to establish congruence in their specific stakeholder networks in order for the adoption to proceed.

5.3.1 Educate/ inform stakeholders

Key stakeholders already working within the Diabetes space are usually aware of smartpumps (even if they do not necessarily agree with it). However partners and close family members are often unaware of the technologies open to PWT1D. Many of our participants reported that they sought to educate or inform family members, particularly husbands or partners, about smartpumps and the implications adoption would have for them e.g. cost, time commitment, emergency support etc. PWT1D educated/informed others through a variety of means including jointly attending information sessions, practical explanations of the technology etc.

5.3.2 Play Stakeholders against each other

PWT1D may have to position their various stakeholders against each other in order to facilitate the adoption of smartpumps by, for example, enlisting the aid of their GP in sourcing an endocrinologist willing to support smartpump adoption. A PWT1D noted:

“I’m not happy with my endo… I’m trying to work with my GP and get another endo that’s familiar with smartpumps and will be able to help me through pregnancy and everything.”

5.3.3 Replacing stakeholders

We found evidence indicating that some PWT1Ds will actively seek to replace existing stakeholders for others who will support their bid to adopt a smartpump. For example, a PWT1D stated:

“… so I just swapped endos (endocrinologists)... for the duration of my pregnancy.”

5.3.4 Migrate to a different stakeholder network

Compared to replacing one or two stakeholders, we also found evidence that PWT1D migrate from their existing stakeholders to a whole new network of stakeholders who are known to be pro-pumping. That is, they ally with a whole new set of health care providers (Diabetes Educators, endocrinologists, Obstetrician) who are known to be positive about the role of smartpumps during pregnancy. One Diabetes Educator in such a pro-pumping network observed:

“The endocrinologist will usually recommend that they do go on (smart)pumps to optimize their glycemic control... we have three that work in our diabetes and pregnancy service and the policy is... if at all possible and with the women’s consent of course, they go onto a pump.”

5.3.5 The intrinsic motivation to adopt

We found evidence that some PWT1D are highly motivated potential adopters who would go to extraordinary lengths in order to gain access and ultimately adopt the new technology. Some participants independently researched and contacted smartpump vendors independently of their
healthcare team, negotiating ways to adopt the technology even prior to informing their Diabetes Educator.

6 DISCUSSION

This study highlights some of the complexities faced by PWT1D who seek to garner support amongst their stakeholders for the adoption of smartpumps. The women in this study made very purposeful decisions in seeking to achieve congruence among the various stakeholders involved in their decision to adopt smartpumps. Apart from health professionals, other stakeholders included the patient's partner/family, health insurers, vendors of smartpumps, diabetes educators, and diabetes advocacy groups in the Australian context.

The extraordinary lengths that the potential adopters would go to in order to gain access to the new technology can be understood in the light of the intrinsic motivation to achieve a healthy outcome for the mother and baby. This intrinsic motivation, combined with the relative advantage of the new technology during a critical period in terms of health, adds a new theoretical perspective on these adopters. They are not “passive” potential adopters, just under the sway of other influencers (Jeyaraj and Sabherwal, 2008). Rather, they are highly motivated adopters, and in fact, also influencers of other stakeholders (almost as innovators/early adopters in the terminology of Rogers, 1995). They actively pursue avenues to engage the stakeholders they need to rely upon, drawing on a range of influence tactics in order to ensure adoption of the new innovation.

The various tactics employed by the PWT1D observed in this case have been documented in the literature (Jeyaraj and Sabherwal, 2008; Kipnis et al., 1980; Lee and Sweeney, 2001; Yukl et al., 1993), albeit in the context of organisational behaviour. What is novel though, is that these tactics are employed by the adopters themselves rather than those seeking to influence adopters (in contrast with some sources, e.g., Jeyaraj and Sabherwal, 2008). This suggests that the adopter and influencer role is actually conflated in these situations, deepening the insight about the complex, dual nature of the relationship between adopter and stakeholder.

Our empirical evidence suggests a number of implications for further theory development, especially when such ICT-enabled technology adoption hinges on congruence of work practices or viewpoints across several stakeholders in a network. We believe the difficulties in achieving this congruence of work practices/viewspoints across stakeholder networks, especially prominent in healthcare, can help explain the many failures and slow progress in the adoption of ICT innovations often reported in this context (e.g., Middleton, 2005). Our evidence in this healthcare study currently supports the following propositions, reflecting the situations of (1) complete, (2) partial, and (3) little/no congruence of work practices/views regarding the innovation across the stakeholder network:

- **Proposition 1:** If there is a high degree of congruence between all stakeholders in terms of their work practices/views regarding the healthcare innovation, then adoption proceeds according to the predictions of classical adoption theory (relative advantage, observability, trialability, etc.) (Rogers, 1995) for those stakeholders who adopt/co-adopt or the innovation/related innovations and associated work practices.

- **Proposition 2a:** If some congruence exists in terms of work practices/views across the network, a highly motivated potential adopter will seek to establish a stakeholder network with a high degree of congruence. (In the case study this occurred on several fronts, e.g. by substituting non-congruent nodes (such as changing to an endocrinologist/GP who is pro-pumping), raising awareness of uninformed stakeholders, and playing stakeholders off against each other).

- **Proposition 2b:** If some congruence exists in terms of work practices/views across the network, then the adoption process can be protracted, but will likely be successful, as long as the potential adopter remains motivated to establish congruence between stakeholders.
• Proposition 3: If little/no congruence exists between stakeholders in terms of work practices/views, and prospects for establishing congruence are limited (e.g., substituting nodes or migrating to a more congruent network), then it is likely that the potential adopter will abandon the attempt to adopt the innovation.

6.1 Limitations and further research

The findings reported here should be understood against a backdrop of the specific healthcare context of this study. Since we focused on the issues facing pregnant women with Type 1 diabetes who adopt smart pumps, the empirical base for the study was fairly narrow. However, we anticipate that the propositions would be helpful in guiding research in other contexts that involve motivated potential adopters, and where congruence between other stakeholders is also a prerequisite for adoption. The propositions need to be tested empirically in further research, and against a larger body of empirical evidence.

7 CONCLUSION

We studied the individual adoption of ICT-enabled innovations when multiple stakeholders are involved. We reported findings from a specific case study involving the adoption of ICT-enabled “smartpumps” by pregnant women with Type 1 diabetes, and their interactions with multiple stakeholders in this healthcare context. We found that these patients should be theorised as adopters, but also as influencers under certain conditions. We developed propositions to explain the adoptive behaviour of these adopter-influencers in their efforts to achieve congruence of interests in a stakeholder network.

The notion of congruence (or the lack thereof) between stakeholders in this study presents a fruitful area for further research and refinement of the understanding of “the adoption context”. Our findings suggest that the adoption process will be either swift or protracted depending on the intrinsic motivation of the adopter and degree of congruence in a stakeholder network. We conclude that the predictions of classical adoption theory (in terms of the time it takes to adopt, etc.) only applies when contextual considerations are conducive to adoption (i.e., congruence of stakeholder interests exist). These observations can help explain the reasons behind the lack of progress that is often reported when novel ICT innovations are introduced in healthcare contexts.

Acknowledgements

The authors thank Virginia Hagger and Renza Scibilia of Diabetes Australia – Victoria for contributing their expertise and for providing great assistance with subject recruitment; Gil Tidhar of SeeCare for his contribution to the early ideas; and Professor Steven Alter for his comments on this research. This work was funded by the Australian Research Council (grant DP0880699). Lastly, we also thank the anonymous reviewers for their insightful comments and suggestions.

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