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The integration of information and communication technology into community pharmacists practice in Barcelona

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SUMMARY

The study aims to identify community pharmacists' (CPs) utilization of information and communication technology (ICT); to develop and characterize a typology of CPs' utilization of ICT and to identify factors that can enhance or inhibit the use of these technologies. An online survey of the 7649 members of the Pharmacist Association of Barcelona who had a registered email account in 2006 was carried out. Factor analysis, cluster analysis and binomial logit modelling were undertaken. Multivariate analysis of the CPs' responses to the survey (648) revealed two profiles of adoption of ICT. The first profile (40.75%) represents those CPs who place high emphasis on ICT within their practice. This group is therefore referred to as 'integrated CPs'. The second profile (59.25%) represents those CPs who make less use of ICT and so are consequently labelled 'non-integrated CPs'. Statistical modelling was used to identify variables that were important in predisposing CPs to integrate ICT with their work. From the analysis it is evident that responses to questions relating to 'recommend patients going on line for health information'; 'patients discuss or share their Internet health information findings'; 'emphasis on the Internet for communication and dissemination' and 'Pharmacists Professional Association information' play a positive and significant role in the probability of being an 'integrated CP'. The integration of ICT within CPs' practices cannot be adequately understood and appreciated without examining how CPs are making use of ICT within their own practice, their organizational context and the nature of the pharmacists–client relationship.

Key words: community pharmacists; internet; health communication; health promotion

INTRODUCTION

Health policy across European Union (EU) Member States places an emphasis on individual responsibility for health and self-care combined with the desire to reduce visits to general practitioners and provide a cost-effective health service. Consequently, the role of community pharmacists (CPs), who are increasingly seen as providing efficient health care to consumers, has been transformed (Turner, 1986). This has been accompanied by the deregulation of the distribution of medicines (Lluch and Kanavos, 2010) and an expansion of information about sickness and potential treatments available to the public through the Internet (Andreassen

et al., 2007; Kummervold *et al*., 2008). In many countries the provision of electronic patient records (EPRs) or electronic medical record, and other information systems are replacing paper-based communication among doctors, clinics and pharmacists (Scott *et al*., 2005; Rahimi and Timpka, 2011). In addition, some healthcare systems have introduced ePrescription services or computerized physician order entry systems for both hospital and community medical practices (Lapane *et al*., 2008).

The traditional role of community pharmacies is constructed around the dispensing of prescription drugs, selling 'over-the-counter' medication and providing healthcare advice. During the 1990s the notion of 'pharmaceutical care' was developed to provide a philosophy of pharmaceutical practice built around a patient-centred approach and the adoption of a caring therapeutic relationship (Strand, 1997). However, the role of CPs varies across the EU (van Mil and Schulz, 2006) and more broadly internationally, where there is a tension between the retailer role that is focused on effective product provision and a health professional role that is patient centred and altruistic (Hughes and McCann, 2003). Although regulations about the scope of community pharmacy practice reflect national differences in health care, CPs are often the first point of contact for the patient with a health professional. The rise in the age profile of the European population is escalating the need for services that can provide support and advice for those with chronic conditions and expected to lead to an increase in the demand for community pharmacy services (Volkerink *et al*., 2007). For example, CPs have increased their role in health promotion, disease prevention and the provision of advice to consumers (Paluck *et al*., 2003). As more patients turn to the Internet for information and advice (Andreassen *et al*., 2007) and health policy continues to encourage self-care and patient choice (Detmer *et al*., 2003; Weiss, 2007; van-den-Berg and Donyai, 2010), information and communication technology (ICT) will be have an increasingly prominent role in shaping the role pharmacists and public demands on them (Gandecha *et al*., 2005).

A number of theories, from a range of disciplines, each focusing on a different element of engagement with new technologies have been used to identify and explain the processes of adoption. Doctors and other health practitioners have been subject to research informed by Rogers' (Rogers, 1995) Diffusion of Innovations theory and the Science and Technology Studies paradigm (Woolgar, 1991; Berg and Toussaint, 2003). Indeed, Davis's (Davis, 1989) Technology Adoption Model (TAM) (Davis *et al*., 1989), the Unified Theory of Acceptance and Use of Technology, Technology Acceptance Model 2 (TAM2) and Theory of Planned Behaviour have been applied to recent research focused on healthcare practitioners (Holden and Karsh, 2010). For example, TAM has been used in predicting and understanding practitioner acceptance and use of health ICT. Such research has not identified one specific factor that encouraged or discouraged the use of ICT but rather revealed a set of interrelated practices, experiences and opportunities (Gagnon *et al*., 2009) as well as external factors (Yarbrough and Smith, 2007) that enhance ICT integration. However, findings on the effectiveness, efficiency and benefits of these technologies remain inconclusive (Lapointe *et al*., 2011). Moreover, as Simon *et al*. (Simon *et al*., 2007) note, much of the focus of such work tends to be on the adoption rather than the actual use of ICT by health practitioners (Simon *et al*., 2009). However, there is no similar work that takes CP as the subjects of research into the adoption and use of information technology. Indeed, there is relatively little systematic work, compared with the range of research concerned with doctors, that identifies what information technology is utilized by CPs in Europe or elsewhere.

The aim of this paper is to describe the set of interrelated practices, experiences, opportunities and external factors that facilitate the adoption and use of ICT in community pharmacy practice in Catalonia, Spain. The main objectives are as follows: (i) to identify the current use and role of ICT in community pharmacy practice; (ii) to develop and characterize a typology of CPs in relation to adoption of ICT and (iii) to identify factors that can enhance or inhibit the use of these technologies.

METHODS

Population

Membership in the Pharmacists Association of Barcelona is mandatory for all pharmacists working in the Barcelona area (5,416,447

inhabitants) in Catalonia. Catalonia (7 million inhabitants) is one of the 17 regions within Spain. The Spanish National Health Service (SNHS) provides almost universal healthcare coverage, through a wide variety of services and a network of health centres including hospitals, primary care centres and community pharmacies (Martin-Moreno *et al*., 2009). The provision of community pharmacies is one of the areas of health care that have been devolved to the regions within Spain. However, there are no significant regional differences in terms of pharmacy provision to the public and CPs engagement with the healthcare system. There are 20 579 community pharmacies in Spain, which represents 2143 inhabitants for each pharmacy. This is one of the lowest ratios of number of inhabitants per pharmacy in Europe. It is should be noted that the pattern of ICT implementation in the Catalan health sector is, as in other EU healthcare systems, diverse and includes the dissemination of electronic health records, ePrescription, telemedicine and the promotion of citizens' access to health information and personal health records online (Cornet, 2009; Lupiáñez-Villanueva *et al*., 2010).

Survey instrument and ethics

The research reported here is the result of a joint project between the Internet Interdisciplinary Institute at Open University of Catalonia and the Col.legi Oficial de Farmacèutics de Barcelona (Pharmacists Association of Barcelona). Appropriate ethical approval was provided by each institution, which was also involved in the design and distribution of the survey instrument. Procedures were put in place to ensure that all responses were rendered anonymous to both the researchers and the Association. The survey instrument was piloted and, following consultation with the Association, the final versions were sent to all registered members. The final survey instruments were organized into three sections: (i) socio-demographic and practice details; (ii) access and use of ICT and (iii) perceptions and barriers of ICT utilization. Section 1 identifies personal and professional context of ICT utilization; section 2 identifies practice and experience of ICT utilization while section 3 deepens perceptions, opportunities and challenges of ICT. The questionnaire (translated into English) is reproduced in the Supplementary data, Appendix A.

Data collection

The recruitment of the study participants was undertaken in collaboration with the Pharmacists Association of Barcelona. The Pharmacists Association of Barcelona sent an email invitation in November 2006 to all 7648 pharmacists. A second invitation was emailed in February 2007. The invitations outlined the nature of the study, the confidentiality of individual responses and ethical safeguards. There was no financial inducement to take part in the survey.

The survey distributed by the Pharmacists Association of Barcelona resulted in 898 responses (11.74% of the registered membership of 7649), 72.5% of the responses were from women members of the Association and 27.5% were from men. A comparison between the Association's total membership and the survey responses revealed a difference of 1.2% in gender and <5.5% in age. For the purposes of this paper those pharmacists who did not work within community pharmacies have been excluded, as they have no direct role in the delivery of care to patients or the public. Pharmacists working in hospital pharmacies have also been excluded due to their institutional setting and clinical nature of their practice. The final sample size was 648 CPs (8.47% of the registered membership).

Data analysis

Statistical analyses were performed using SPSS version 18.0. In order to identify CPs' utilization of ICT, an analysis of frequencies of items related to most commonly used information sources, Internet utilization, frequently performed ICT led tasks and perception of ICT was undertaken.

To confirm the several internal complementarities of these grouped items, the means and their significant correlation were checked. Factor analysis was used to assess item correlations and identify common relationships between similar items, allowing the items to be categorized into various themes or factors. An analysis of the correlation matrix was carried out to check that the correlation matrixes were factorable using the Kaiser-Meyer-Olkin measure of sampling adequacy, an index for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients, and Bartlett's

test of sphericity, used to test the null hypothesis that the variables in the population correlation matrix are uncorrelated. Data reductions were undertaken by principal components analysis using the Varimax option to identify possible underlying dimensions.

To develop a typology of CPs' utilization of ICT, identifying distinct, yet homogeneous, groups of CPs on the level of ICT utilization a non-hierarchical cluster analysis of K-means was applied. ANOVA test results showed that the means of contextual variables differ significantly across clusters. To attribute statistical significance to the differences obtained, an associated chi-square test was carried out.

Finally, to estimate the overall effect of individual variables and factors on the group of CPs with higher level of utilization of ICT (dependent variable), a binomial logit was applied, providing a useful means for modelling the dependence of a binary response variable on one or more explanatory variables (independent variables). The interpretation of standardized regression coefficients determines the probability that the independent variables explain the higher integration of ICT within their professional practice.

RESULTS

Information sources, Internet and ICT adoption

More than a half of the participants (55.8%) reported that they used Internet everyday as part of their routine pharmacy practice. Only just over 10% of CPs reported that they used the Internet only 1 day a month or less. Half (52.9%) of the study participants had begun using Internet between 1995 and 2001 but the use outside work was less common with only a third (34.7%) of CPs reporting daily access. However, half (51.5%) of the CPs had an Internet presence either through the institutional website (32.7%), a personal website (15.7%) or a blog (3.1%).

The information resources that CPs utilized are outlined in Table 1. By far the most used resource was the Pharmacist Professional Association, which provides up-to-date information on health campaigns together with regulatory and clinical issues. This was followed by national information sources and material provided by the pharmaceutical industry. The majority of CPs used the Internet to interact with Pharmacists Professional Association frequently or very frequently (95.5%); to undertake searches on pharmaceutical practice databases and web pages (76.6%) and to search for pricing and invoicing information (65.5%). In contrast, 80.7% of CPs stated that they never use the Internet to publish information and 69.3% never interacted with healthcare professionals outside Spain. Indeed, the majority of CPs had infrequent interaction with healthcare professionals within Spain (33.8% never and 38.0% rarely). Interestingly, over a quarter (26.7%) of CPs frequently used ICT to interact with clients.

About a third of CPs reported barriers to ICT use, such as the lack of Internet connection (15.1%) or a low speed of the connection (14.8%). However, the lack of time was perceived as the main barrier to use ICT by the majority of CPs (70.4%). Despite these issues, over half (55.2%) of the CPs believed that ICT could increase their efficiency and productivity. Just under half (44.4%) of CPs felt that ICT improved patient care and client communication.

The majority (82.7%) of CPs believed that the information they accessed on the Internet was useful and relevant to their practice. Despite this positive perception of the utility of information to their work CPs were less inclined to recommend such material to their clients (only 0.8% usually recommended it). However, nearly a half (47.6%) had experienced clients discussing health information retrieved from Internet with them. The same proportion of CPs (47.7%) believed that such information could have a positive impact on patient self-care and quality of life. Overall, CPs considered that patient use of ICT posed a lesser challenge to their practice than in the case of other health professionals (31.5% not challenging CPs at all versus 13.9% for health professionals in general).

Factors, typology and the characteristics of ICT and the internet adoption

A factor analysis was undertaken to identify common relationships between information sources utilization facilitating items to be categorized into various themes or factors. The analysis yields four statistically significant and conceptually meaningful factors. The first factor grouped sources related to international information such as international academic journals; international

Table 1: Information sources, ICT and Internet utilization and perceptions of CPs in Barcelona ($n = 648$)

	Never	Rarely	Frequently	Very frequently
How often do you use the following sources of information to update your technical and scientific expertise?				
International public institutions	49.8% (323)	39.5% (256)	9.0% (58)	1.7% (11)
International academic journals	45.5% (295)	43.8% (284)	9.0% (58)	1.7% (11)
International information sources	43.4% (281)	44.3% (287)	10.0% (65)	2.4% (15)
Workplace information	33.0% (214)	17.9% (116)	30.7% (199)	18.4% (119)
National public institutions	23.0% (149)	39.8% (258)	30.6% (198)	6.6% (43)
National academic journals	21.5% (139)	37.6% (244)	33.8% (219)	7.1% (46)
Conference, Seminars, Professional education	16.3% (106)	40.0% (259)	36.9% (239)	6.8% (44)
Other information sources	13.7% (89)	32.1% (208)	45.2% (293)	9.0% (58)
Pharmaceutical industry information	11.6% (75)	17.0%(110)	45.2% (293)	26.2% (170)
National information sources	6.6% (43)	17.4% (113)	53.7% (348)	22.3% (144)
Pharmacists Professional Association information	1.4% (9)	5.6% (36)	34.4% (222)	58.6% (381)
How frequently do you use the Internet to carry out the following activities?				
Publishing information	80.7% (523)	15.6% (101)	2.5% (16)	1.2% (8)
Interaction with healthcare professionals internationally	69.3% (449)	27.0% (175)	2.3% (15)	1.4% (9)
Searching for international public institutions	41.4% (268)	43.8% (284)	11.6% (75)	3.2% (21)
Searching for international academic journals	33.8% (219)	46.5% (301)	16.3% (105)	3.5% (23)
Interaction with healthcare professionals within Spain	33.8% (219)	38.0% (246)	20.6% (134)	7.6% (49)
Interaction with clients	27.3% (177)	33.6% (218)	26.7% (173)	12.4% (80)
Searching for national public institutions	20.6% (134)	42.6% (276)	30.6% (198)	6.2% (40)
Searching for national academic journals	17.1% (111)	43.7% (283)	32.7% (212)	6.5% (42)
Searching for prices and invoices	11.0% (71)	23.6% (153)	43.7% (283)	21.7% (141)
Searching for pharmaceutical practice databases and web pages	7.6% (49)	15.8% (103)	53.1% (344)	23.5% (152)
Interaction with Pharmacists Professional Association	1.2% (8)	3.3% (21)	28.2% (183)	67.3% (436)
The use of ICT and the Internet in your daily work . . .				
Improves communication with other healthcare professionals				29.9% (194)
Improves patient care				33.8% (219)
Improves communication with clients				10.6% (69)
Improves efficiency and productivity of your work				55.2% (358)
Barriers				
Lack of time				70.4% (641)
Concerns about security and confidentiality				24.2% (157)
Do not experience any difficulties				17.9% (116)
Lack of training				16.4% (106)
Lack of computers connected to the Internet				15.1% (98)
Lack of speed connection				14.8% (96)
How do you consider health information available on the Internet?				
Very relevant				9.7% (59)
Relevant				73.0% (446)
A little relevant				16.8% (103)
Not relevant				5% (3)
Do you recommend your clients to go online for health information?				
Yes, usually				8% (5)
Yes, often				3.4% (22)
Yes, sometimes				39.5% (252)
No, never				56.3% (359)
Do your clients discuss or share their Internet health information findings with you?				
All of them				6.6% (42)
Many of them				47.6% (304)
Some of them				28.4% (181)
A few of them				17.4% (111)
Do you think that individuals who go online for health information. . .				
Improve their self-care and quality of life a lot				5.0% (29)
Improve their self-care and quality of life				42.7% (247)
Improve their self-care and quality of life a little				33.0% (191)
Do not improve their self-care and quality of life				14.2% (82)

Continued

Table 1: *Continued*

	Never	Rarely	Frequently	Very frequently
Make their self-care and quality of life worse				5.1% (29)
Do you think that individuals who go online for health information...				
Improve their knowledge and facilitate their treatment a lot				3.8% (23)
Improve their knowledge and facilitate their treatment				36.5% (222)
Improve their knowledge and facilitate their treatment a little				43.1% (262)
Do not improve their knowledge and facilitate their treatment				16.6% (101)
Do you think that individuals who go online for health information...				
Challenge health professionals' knowledge a lot				9.7% (60)
Challenge health professionals' knowledge				41.9% (260)
Challenge health professionals' knowledge a little				34.5% (214)
Do not challenge health professionals' knowledge				13.9% (86)
Do you think that individuals who go online for health information...				
Challenge CPs' knowledge a lot				6.3% (36)
Challenge health CPs' knowledge				23.7% (135)
Challenge CPs' knowledge a little				38.5% (219)
Do not challenge CPs' knowledge				31.5% (179)
Do you think that individuals who go online for health information...				
Improve health professional/patient relationship a lot				3.2% (19)
Improve health professional/patient relationship				22.7% (135)
Improve health professional/patient relationship a little				53.6% (319)
Do not improve health professional/patient relationship				20.5% (18.8)
Do you think that individuals who go online for health information...				
Improve pharmacist/client relationship a lot				2.8% (17)
Improve pharmacist/client relationship				25.5% (154)
Improve pharmacist/client relationship a little				50.6% (305)
Do not improve pharmacist/client relationship				21.1% (127)

information sources and international public institutions. The factor was labelled as representing 'Emphasis on international information sources' (30.51% variance explained). The second factor includes, other information sources, national information sources and national academic journals. This information is interpreted as 'Emphasis on national information sources' (11.95% variance explained). The third factor grouped Pharmacists Professional Association information and Conference Seminars, Professional education and was labelled as 'Emphasis on professional education and Pharmacist Association information sources' (9.17% variance explained). Finally, the fourth factor grouped jointly Workplace information and Pharmaceutical industry information. Therefore, it was categorized as representing 'Emphasis on workplace and pharmaceutical industry information' (8.49% variance explained).

A second factor analysis was undertaken in order to examine the pattern of engagement with Internet utilization and ICT resources. From this analysis three factors emerged. The first factor, 'Emphasis on Internet for information' (35.64% variance explained), grouped jointly Internet activities related to information search. The second factor, 'Emphasis on Internet presence for communication and dissemination' (10.99% variance explained), is related to the utilization of email and the Internet to interact with clients and publish information. The third factor grouped the use of the Internet to interact with Pharmacists Professional Association and search for prices and invoices. This factor was labelled as representing 'Emphasis on Internet for corporate activities' (10.07% variance explained) (Table 2).

In order to develop a typology of CPs' utilization of ICT, a non-hierarchical cluster analysis of K-means was undertaken to seven factors of the factor analysis identified above (Table 3). These factors were selected due to their significance ($p < 0.001$) within the cluster analysis.

Cluster 1 consists of CPs who placed a greater emphasis on international and national information; on activities related to professional education and information from the Pharmacists Association as well as workplace and pharmaceutical industry material. This group also

Table 2: Factor analysis of information sources, information and communication technology and internet utilization of CPs in Barcelona

(a) Information sources: varimax rotated factor matrix

	1. Emphasis on international information sources	2. Emphasis on national information sources	3. Emphasis on professional education and Association information sources	4. Emphasis on workplace and pharmaceutical industry information	Commonalities
International academic journals	0.839	0.095	0.06	0.076	0.723
International information sources	0.809	0.136	0.034	0.055	0.677
International public institutions	0.782	0.138	0.131	0.072	0.653
National public institutions	0.461	0.3	0.329	0.055	0.414
Other information sources	0.177	0.804	−0.109	0.048	0.692
National information sources	0.06	0.65	0.395	−0.056	0.585
National academic journals	0.397	0.545	0.065	0.309	0.554
Pharmacists Professional Association information	0.012	0.067	0.725	0.159	0.556
Conference. Seminars. Professional education	0.206	0.025	0.646	−0.007	0.460
Workplace information	0.18	0.057	−0.06	0.827	0.723
Pharmaceutical industry information	−0.032	0.048	0.406	0.64	0.578
Auto values	3.356	1.314	1.009	0.934	
% Variance explained	30.508	11.950	9.169	8.493	

(b) ICT and Internet utilization: varimax rotated factor matrix

	1. Emphasis on Internet for information	2. Emphasis on the Internet for communication and dissemination	3. Emphasis on the Internet for corporate activities	Commonalities
Searching for international academic journals	0.822	0.175	−0.009	0.706
Searching for international public institutions	0.742	0.291	0.027	0.636
Searching for national academic journals	0.734	0.132	0.159	0.582
Searching for national public institutions	0.658	0.212	0.324	0.583
Searching for pharmaceutical practice databases and web pages	0.532	0.09	0.414	0.462
Email with healthcare professionals within Spain	0.134	0.713	0.331	0.636
Interaction with clients	0.044	0.676	0.355	0.584
Email with healthcare professionals internationally	0.354	0.666	−0.116	0.583
Publishing information	0.263	0.594	−0.118	0.435
Interaction with Pharmacists Professional Association	0.108	−0.034	0.727	0.542
Searching for prices and invoices	0.117	0.17	0.669	0.49
Auto values	3.921	1.210	1.107	
% Variance explained	35.644	10.997	10.068	

(a) Rotated components matrix; sampling method: factor analysis by main components; rotation method: varimax with Kaiser-Meyer-Olkin 0.824; Bartlett's test of sphericity, $p = 0.000$; convergence in six itenerations; a minimum eigenvalue of 0.9. (b) Rotated components matrix; sampling method: factor analysis by main components; rotation method: varimax with Kaiser-Meyer-Olkin 0.854; Bartlett's test of sphericity, $p = 0.000$; convergence in six itenerations; a minimum eigenvalue of 1.

Table 3: Profiles of ICT integration of CPs in Barcelona ($n = 648$)

	Cluster		ANOVA
	1. Integrated CP, 40.75% ($n = 264$)	2. Non-integrated CP, 59.25% ($n = 384$)	
Emphasis on international information sources	0.85 951	−0.59 091	668.815*
Emphasis on national information sources	0.1809	−0.12 437	14.892*
Emphasis on professional education and Association information sources	0.10 476	−0.07 202	4.918*
Emphasis on workplace and Pharmaceutical Industry information	0.11 603	−0.07 977	6.044*
Emphasis on Internet for information	0.67 764	−0.46 588	298.705
Emphasis on the Internet for communication and dissemination	0.53 406	−0.36 716	157.872*
Emphasis on the Internet for corporate activities	0.11 623	−0.07 991	6.065*

Results of K-means: quick cluster analysis. Method of analysis: non-hierarchical cluster. Final cluster centroids.
*$p < 0.001$, $p < 0.05$.

emphasized ICT use for activities such as information searches, communication and the dissemination of information in addition to organization activities. The group is thus referred to as representing 'integrated CPs'. The label is used descriptively in order to capture the sense that for this group ICTs are a mundane and valued resource. Cluster 2 is characterized by notably different features. The second profile represents those CPs who placed less emphasis on ICT and are consequently labelled as 'non-integrated CPs'.

Significance statistical analysis (chi-square test) of the relationship between these profiles (Table 4) revealed that integrated CPs are more likely to start using Internet at an earlier stage, to consider it very useful, to use it on a daily basis, to have a blog and to consider Internet health information very relevant. No significance association related to age, gender or pharmacy ownership was found.

Further analysis of the relationship between the two profiles and the pharmacist–client relationship revealed that integrated CPs were more likely than non-integrated CPs to recommend that clients use the Internet to find health information and to have clients that discuss such information with them. Continuing this positive stance on ICT, integrated CPs are more likely to believe that patients gain in the quality of life and autonomy in a way which contributes to an improved pharmacist–client relationship. Finally, integrated CPs are more likely to contribute to online professional forums.

Determinants of the integrated CP

With the aim of estimating the overall effect of individual variables and factors on the integration of ICT within CPs practice, a binomial logit model was developed, considering cluster 1, integrated CPs, as a dichotomous-dependent variable (Table 5).

From the estimation of the model, it was found that all the variables included have a very significant explanatory power regarding the integration of ICT within pharmaceutical practice. The relationships of influence found have a plus sign in all cases. It was observed that factors related to 'intensive use of Internet' (every day), 'emphasis on Internet for communication and dissemination' as well as information needs from the Pharmacists Professional Association play a positive and significant role in the probability of being an integrated CP. Recommending clients going on-line for health information and discussing or sharing information found by customers also have a positive and significant role.

DISCUSSION

This study has sought to explore the CPs perception and the use of ICT. The analysis reported here indicates that there are two significant forms of ICT use amongst CPs. For over 40% of CPs, ICT were an integral part of their work and this is reflected in the role they

Table 4: Characteristics of 'integrated CP' in Barcelona (contingency analysis, significance) ($n = 648$)

	1. Integrated CP, 40.75% ($n = 264$)	2. Non-integrated CP, 59.25% ($n = 384$)	*p*
Begin to use the Internet (experience)			0.001
Since 2002	39.1% (99)	53.1% (181)	
Between 1997 and 2001	49.8% (126)	41.1% (140)	
Since 1996	11.1% (28)	5.9% (20)	
How do you consider the Internet in your work			0.001
Very useful	79.2% (205)	56.1% (211)	
Useful	20.5% (53)	39.9% (150)	
A little useful	4% (1)	4.0% (15)	
Frequency of the Internet use in workplace			0.001
Every day	71.4% (187)	45.0% (171)	
Three or four times per week	15.3% (40)	19.7% (75)	
One or two times per week	8.0% (21)	21.8% (83)	
Less than one or two times per week	4% (1)	1.6% (6)	
Never or hardly ever	5.0% (13)	11.8% (45)	
Presence on the Internet			0.001
Blog	8.2% (14)	2.4% (6)	
The use of ICT and the Internet in your daily work . . .			0.001
Improve communication with other healthcare professionals	45.6% (103)	29.5% (91)	
Improve efficiency and productivity of your work	65.9% (162)	57.6% (196)	
Barriers			0.001
Lack of computers connected to the Internet	11.9% (260)	17.6% (67)	
Lack of time	65.4% (170)	75.1% (286)	
Concerns about security and confidentiality	29.2% (76)	21.3% (81)	
Lack of training	11.5% (30)	19.9% (76)	
Do not experience any difficulties	22.3% (58)	15.2% (58)	
How do you consider health information available on the Internet?			0.001
Very relevant	14.7% (38)	6.0% (21)	
Relevant	72.6% (188)	73.3% (258)	
A little relevant	12.4% (32)	20.2% (71)	
Non relevant	4% (1)	6% (2)	
Do you recommend your clients to go online for health information?			0.001
Yes, usually	1.9% (5)	0% (0)	
Yes, often	5.3% (14)	2.1% (8)	
Yes, sometimes	49.6% (130)	32.4% (122)	
No, never	43.1% (113)	65.4% (246)	
Do your clients discuss or share with you their Internet health information findings?			0.001
Most of the clients	10.2% (97)	4.0% (14)	
Some of the clients	52.9% (139)	44.0% (165)	
A few of the clients	27.0% (139)	29.3% (110)	
Clients do not	9.9% (26)	22.7% (85)	
Do you think that individuals who go online for health information . . .			0.005
Improve their autonomy and quality of life a lot	6.7% (16)	5.1% (18)	
Improve their autonomy and quality of life	49.2% (118)	40.2% (142)	
Improve their autonomy and quality of life a little	25.8% (62)	36.5% (129)	
Do not improve their autonomy and quality of life	12.1% (29)	13.6% (48)	
Make their autonomy and quality of life worse	6.3% (15)	4.5% (16)	
Do you think that individuals who go online for health information . . .			0.001
Improve health professional/patient relationship a lot	4.5% (11)	2.3% (8)	
Improve health professional/patient relationship	29.4% (72)	18.0% (63)	
Improve health professional/patient relationship a little	53.1% (130)	54.0% (189)	
Do not improve health professional/patient relationship	13.1% (32)	25.7% (90)	
Do you think that patients who go online for health information . . .			0.001
Improve pharmacist/clients relationship a lot	4.8% (12)	1.4% (5)	
Improve pharmacist/clients relationship	32.5% (81)	20.6% (73)	
Improve pharmacist/clients relationship a little	50.2% (125)	50.8% (180)	
Do not improve pharmacist/clients relationship	12.4% (31)	27.1% (96)	

Continued

Table 4: *Continued*

	1. Integrated CP, 40.75% ($n = 264$)	2. Non-integrated CP, 59.25% ($n = 384$)	p
Do you participate on the Internet . . .			0.001
Clarifying questions about diagnosis, treatment or other pharmaceutical issues on professional forums	8.2% (10)	2.1% (4)	
Searching for advice on professional forums	26.4% (68)	17.1% (64)	
Providing advice on patient support groups websites	9.2% (24)	4.6% (17)	

Table 5: Determinants of the integrated CP in Barcelona

Variables		Estimated coefficient	Standard error	Wald	Significance	Exp (B)
Intensive use of the Internet (every day)		0.279	0.086	10.473	0.001	1.322
Recommend clients going on line for health information		0.682	0.170	16.124	0.000	1.978
Clients discuss or share their Internet health information findings with you		0.387	0.118	10.686	0.001	1.473
Emphasis on the Internet for communication and dissemination		1.004	0.113	79.637	0.000	2.729
Pharmacists Professional Association information		0.601	0.199	9.076	0.003	1.824
Constant		−2.554	0.367	48.500	0.000	0.078
−2 Log-likelihood	648.274					
R2 Cox-Snell	0.267					
R2 Nagelkerke	0.359					
Test of Hosmer–Lemeshow	0.439					

Method of regression: binomial logit analysis; dependent variable: integrated CPs (value 1, YES; value 0, NO); from −2 Log-likelihood 840.219 to 648.274; standardized coefficients; $n = 619$; % predicted observed: from 58.5 to 79.2.

play in several dimensions of pharmaceutical practice. There is congruence here with Rogers' (Rogers, 1995) Diffusion of Innovations theory in that this group of CPs could be considered as the 'innovators' and 'early adopters' of ICT. Therefore, the integrated CPs are at the forefront of a paradigm shift, which is reflected in the years of Internet experience, the frequency they use ICT and the relevance of these technologies across their professional activities. These CPs view ICT and the Internet as tools to further their relationship with clients and, congruent with EU policy, to facilitate patients' self-care. As revealed here, this includes the discussion of material clients have found on the Internet. They have a positive attitude towards public use of Internet and believe that this will contribute positively to their treatment. This reflects the recognition of the role community pharmacy has in health promotion and disease prevention (Paluck *et al.*, 2003). Furthermore, integrated CPs believe ICT professionals improve their communication with other healthcare professionals and has a positive impact on their efficiency and productivity in general. Integrated CPs are comfortable with technology and are more likely to be aware of security and confidentiality issues. Thus, integrated CPs are more aware of what ICT can offer to their practice (Gandecha *et al.*, 2005) and how to respond to clients' needs for information and advice as a growing proportion of the public routinely use the Internet for health information (Detmer *et al.*, 2003; Wiedenmayer *et al.*, 2006; Weiss, 2007; Kummervold *et al.*, 2008). There is a synergy here with Holden and Karsh's (Holden and Karsh, 2010) review of TAM research which noted the significance of societal factors in addition to the traditional TAM elements. Perceptions about the pharmacist–client relationship are evidently significant amongst the integrated CPs.

The second profile that emerged from our data analysis represents those CPs (59.25%) for whom ICT-based resources are less important and are not integrated to the same degree

within their routine work. This group reflects the features of what Rogers (Rogers, 1995) has characterized as the 'early and late majority'.

Our analysis, in common with other recent research, does not identify one specific factor that encouraged or discouraged the use of ICT but rather reveals a set of interrelated practices, experiences and opportunities that enhance ICT integration (Gagnon *et al*., 2009). Factors that can enhance the integration of ICT within pharmaceutical practice may be separated into a push and pull factors. Pull factors include the demand from the public and policy-makers that pharmacists should be able to discuss and recommend Internet-based health information. This expectation will become more significant with increasing public access to the Internet and the general shift in health policy to encourage people to take a greater responsibility for their health. In this respect, integrated CPs identified here reinforce and confirm clients' expectations about the utility of Internet-based health information. Push factors include the introduction of technologies such as ePrescribing at a regional level, the shift from paper-based back office functions and greater use of the Internet to disseminate information to practitioners by the Pharmacists Professional Association and other professional and state agencies These factors reflect the importance of the social and organizational factors within health systems compared with that in the other industries where TAM has been applied. This suggests, there is a need for a contextualizes version of TAM that grounds concepts such as perceived ease of use, usefulness and behavioural control within the complexity of health systems and how ICT shape and influence health professionals (Holden and Karsh, 2010).

Pharmacy has traditionally been a relatively isolated profession. Under the Spanish Health Care System, CPs remain scattered across the country, largely in independent business with some working in small rural communities. For the public, this has considerable advantages in that, as note previously, it provides easy access to a health professional without any appointment or booking system. However, it is more difficult to implement universal practices and standards, deliver continued training and education and to ensure that all CPs are aware of changes in clinical practice and health policy. ICT provides a means to deliver such information and, more mundanely, to allow scattered CPs to take advantage of EPRs, billing systems and other technology that provide fast and reliable communication between different parts of the SNHS. Congruent with a patient-centred approach to health care and the evolving use of the Internet by the public, it will become increasingly difficult for non-integrated CPs to maintain their position. Pressure for clients wanting to share and discuss information from the Internet will not diminish and given the marketing of pharmaceutical products online to the public, it is in the commercial interest of CPs to be at least informed about the information being published there. Integrated CPs are in a better position to meet such expectations from both patients and the SNHS. In a sense they can act as role models for other CPs by demonstrating the advantages to be gained through the use of ICT and the way it is embedded in their practice.

Limitations

The email survey offers a valid alternative to the postal, telephone or face-to-face surveys, provided technical, methodological, ethical and legal considerations are taken into account (Strauss *et al*., 1997; Braithwaite *et al*., 2003; Lorenzi, 2004). When compared with the total membership of the Pharmacists Association of Barcelona, survey responses revealed a difference of 1.2% in gender and <5.5% in age. In common with other Internet-based survey, there may be an under representation of those who make little or no use of ICT. However, all the Association's members are provided with a personal email upon mandatory registration as a member. The data reported here is a snapshot and so we are not able to trace any changes to ICT use over time. Further research is needed to better understand the interaction between factors that play a significant role in the probability of being an integrated CP. A second survey and further analysis has been planned to identify changes in CPs' work over time and ICT use including additional questions on e-prescription.

SUPPLEMENTARY DATA

Supplementary data are available at *Health Promotion International* online.

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DISCLAIMER

The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

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