Informatics in Primary Care 2009;17:241–8

Refereed paper

Physicians' attitudes towards eprescribing: a comparative web survey in Austria and Sweden

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ABSTRACT

Background The eHealth Action Plan required the member states of the European Union (EU) to provide online services such as eprescribing of pharmaceuticals by the end of 2008. So far, implementation activities and efforts of the member states have been uneven. While in Austria pilot projects and feasibility studies have been conducted, Sweden has always been one of the leading countries in the field of eprescribing.

Objective To identify potential success factors for the implementation of eprescribing in Sweden, by comparing the attitudes of Austrian and Swedish physicians.

Method In a web survey, we asked 1824 Austrian and 427 Swedish physicians within primary care and other disciplines to declare to what extent they agreed with ten statements regarding their attitudes towards eprescribing. We deployed the chi-square test for testing the relationship between the country of residence of physicians and their attitudes towards eprescribing.

Results We demonstrated a relationship between the country of residence of physicians and their attitudes towards eprescribing ($P<0.001$) for all the responses. Of the Swedish physicians, 92% regarded eprescribing as time-saving, 88.1% as being safer and 96.0% as providing a better service for patients. Although less strongly supportive, the attitudes of the Austrian physicians were mainly positive.

Conclusion We found that the major potential success factors for the implementation of eprescribing in Sweden were saving of time for the physician, improved safety and better service for patients. The mainly positive attitudes of the Austrian physicians may enable implementation of eprescribing in due course.

Keywords: Austria, confidentiality, drug information services, electronic prescribing, medical informatics, Sweden

Introduction

The written paper-based prescription has for centuries been the way to transfer information from the physician's medical practice to the pharmacy.[1] In most countries, these paper-based prescriptions for pharmaceuticals are still in use, but they are associated with prescribing and dispensing errors. At the moment, prescriptions are at the intermediate stage between paper and electronic transfer.[2] The use of eprescriptions has the potential to save time,[3–8] enhance patients' safety[3,4,6,8–10] and service to patients[3,6,8] and is expected

to reduce costs.[11,12] However, electronically sent prescriptions may cause new types of error[9] and access to electronic personal prescription data might be valuable for the pharmaceutical industry, insurance companies and employers. This access could be misused for marketing, medical underwriting and discrimination against applicants for jobs, and thus bears the risk of invading patients' privacy.[13] According to the eHealth Action Plan of the EU, the majority of European countries should have provided online services such as the eprescribing of pharmaceuticals by the end of 2008.[14] Thus far, implementation activities and efforts of member states to reach this target have been uneven.[15]

In 1983, the world's first eprescription was transferred in Sweden from the computer system in a physician's office to a nearby pharmacy.[16] Several pilot projects followed in the succeeding years, before a new strategy was decided on at the end of the 1990s in order to boost the quantity and quality of eprescribing. Subsequently, the amount of electronically transferred prescriptions has increased substantially.[1] In December 2007, eprescriptions accounted for 68% of all new prescriptions issued in Sweden.[17] In Austria, the emedication tool is one of the basic components of the planned implementation of the electronic health record.[18,19] However, by December 2007 the process of implementing eprescribing had only gone as far as the conducting of pre-studies, feasibility studies and pilot projects.

Austrian primary care physicians are regarded as being relatively reluctant to use information technology (IT) for the management of patient data,[18] whereas in Sweden early experience in eprescribing has been gained in primary health care. Furthermore, in Sweden, electronic health record systems have been used earlier and to a greater extent in primary health care than in hospitals.[1]

We chose to compare Austrian physicians with Swedish, since Austrian difficulties in implementing eprescribing caught the attention of the media in 2007, whereas Sweden has always been one of the world's leading countries in the implementation of eprescribing. The objective of this study was to identify potential success factors for the implementation of eprescribing by comparing the attitudes of Austrian and Swedish physicians.

Methods

We conducted a web-based survey among physicians in Austria and Sweden in order to analyse their attitudes towards eprescribing. All data analysed in the study were given by the survey respondents. The survey was conducted in English, including keywords in the respective country's language to improve understanding.

Survey design

Working with experts in the field in both countries, ten corresponding questions for the Austrian and Swedish physicians regarding attitudes towards eprescribing were agreed. Six questions captured information about the prescriber's demographics. The Swedish physicians were asked to answer an additional question regarding their frequency of sending eprescriptions and an additional open question regarding experience gained. The technical infrastructure for conducting the survey was provided by WebSurvey (Textalk AB; Mölndal, Sweden). The questionnaire was divided across four screens: the questions on demographics were displayed on one screen and the questions on attitudes on two further screens, followed by a final confirmation screen. By clicking a button, the physicians were able to review and change their answers. The Swedish physicians were able to skip the open question; all other questions in the survey were mandatory.

The attitudes section covered issues regarding advantages and disadvantages for patients and physicians of sending eprescriptions, costs and future predictions. The response format was a four-step scale ranging from 'strongly agree' to 'strongly disagree'. Additionally, the physicians could choose the alternative 'no opinion'. Only one alternative could be chosen and it was possible to add free-text comments to attitude questions.

The link to the web survey was sent along with an invitation email explaining the purpose of the study, and assuring participants that their responses would be treated anonymously and confidentially. The physicians were notified that the survey would take four to six minutes to answer. No incentives were offered apart from provision of the results. The invitation letter to the Austrian physicians included a definition of the term eprescribing. The survey was available for completion for 15 days (20 November to 4 December 2007). Two reminders were sent during this time frame. Owing to time and cost constraints, the samples for both countries were identified arbitrarily via convenience sampling.

Sample

In Austria, 1824 physicians who listed their email addresses in 'Herold Yellow Pages', an Austrian online telephone directory, were contacted (Table 1). The federal states of Lower Austria, Salzburg and Vienna were selected, in order to include a Western and an

Table 1 Number (*n*) and percentage (%) for selected characteristics of physicians included in the study

	AUT[a]		SWE[b]	
	n	%	*n*	%
Gender				
Male	54	70.1	83	65.9
Female	23	29.9	43	34.1
Age				
25–34	1	1.3	15	11.9
35–44	26	33.8	31	24.6
45–54	41	53.3	36	28.6
55–64	8	10.4	40	31.8
65–74	1	1.3	4	3.2
Place of work				
Hospital	20	26.0	86	68.3
Primary health care	57	74.0	40	31.7
Computer use at home				
Never	3	3.9	5	4.0
Sometimes	16	20.8	18	14.3
Regularly	58	75.3	103	81.7
Computer use at work				
No	9	11.7	1	0.8
Yes	68	88.3	125	99.2
Sending eprescriptions				
Regularly	–	–	119	94.4
Sometimes	–	–	5	4.0
Never	77	100.0	2	1.6

[a] Austria, $n = 77$
[b] Sweden, $n = 126$

Eastern federal state as well as the capital city. The physicians were selected independently of discipline. During the survey period, the web page for accessing the questionnaire was opened 161 times by Austrian physicians, giving a viewing rate of 8.8% (161/1824). Of the physicians, 77 submitted their answers, resulting in a completion rate of 47.8% (77/161) and a total response rate of 4.2% (77/1824). The physicians' median age was 47 years (range: 26–66 years, IQR: 9). The majority of the physicians, 70.1% (54/77), were male and 29.9% (23/77) were female. Most of the physicians, 74.0% (57/77), were working in primary health care and 26.0% (20/77) in hospitals. Compared with the Swedish physicians, the percentage of Austrian physicians who used the computer at home for dealing with personal sensitive information was slightly lower. Most of the Austrian physicians, 88.3% (68/77), stated that they used their computer for daily routine work, while 11.7% (9/77) did not. None of the Austrian physicians had experience in electronic prescribing.

In Sweden, we identified seven out of the 21 health care regions which included both urban as well as rural areas: Norrbotten, Stockholm, Kronoberg, Uppsala, Blekinge, Skåne and Västernorrland. The penetration of eprescriptions in the chosen regions varied between 57% and 85% in December 2007.[17] Via 24 clinical heads, email addresses of 427 physicians from four disciplines (primary care, internal medicine, orthopaedics and general surgery) were collected. The rationale for selecting these disciplines was to survey physicians prescribing a low as well as a high number of pharmaceuticals per day. We assumed that orthopaedic and general surgeons would issue a low, physicians from internal medicine a medium and primary care physicians a high number of prescriptions. During the survey period, the URL for accessing the questionnaire

was opened 145 times by Swedish physicians, giving a viewing rate of 34.0% (145/427). Of these physicians, 126 submitted their answers, resulting in a completion rate of 86.9% (126/145) and a total response rate of 29.5% (126/427). The physicians' median age was 51 years (range: 25–69 years, IQR: 17.75). Of the Swedish physicians, 65.9% (83/126) were male and 34.1% (43/126) were female. The majority of the physicians, 68.3% (86/126), were working in hospitals and 31.7% (40/126) were working in primary health care. Of the Swedish physicians, 99.2% (125/126) used their computer for their daily routine work. The vast majority of the physicians, 94.4% (119/126), were prescribing electronically on a regular basis, 4.0% (5/126) were doing so sometimes and 1.6% (2/126) never.

Statistics

The responses were captured automatically and analysed deploying Microsoft Office Excel (ver. 2003; Microsoft, Seattle, WA). The data was presented in absolute numbers and as a share of the physicians from the respective country. To examine the relationship between the country of residence of physicians and their attitude towards eprescribing, the chi-square test was deployed by grouping positive and negative attitudes, and excluding 'no opinion' answers. A value of $P<0.001$ was regarded as statistically significant. Free-text answers were categorised and reported as absolute and relative numbers; comments were reported where relevant.

Results

We demonstrated a relationship between the country of residence of physicians and their attitudes towards eprescribing ($P<0.001$) throughout all of the variables. Although less enthusiastic than their Swedish colleagues, the attitudes of the Austrian physicians were mainly positive (Table 2). Major potential success factors for the implementation of eprescribing in Sweden were identified: a saving of time for the physician, greater safety and a better service for patients.

General attitude: capability of sending eprescriptions

Among the Austrian physicians, 66.2% (51/77) had a positive attitude towards eprescribing, whereas 28.6% (22/77) had a negative attitude. Of the Swedish physicians, 99.2% (125/126) agreed or strongly agreed that having the capability to send eprescriptions was good.

Time-saving, safety and service compared to paper-based prescriptions

A narrow majority of the Austrian physicians, 50.6% (39/77), agreed or strongly agreed that sending eprescriptions would save time in comparison with issuing paper-based prescriptions. In the comments, 13.0% (10/77) of the Austrian physicians stressed how time consuming their experience had been since the implementation of the e-card system. 69.8% (88/126) of the Swedish physicians strongly agreed on the time-saving factor of sending eprescriptions.

Of the Austrian physicians, 40.3% (31/77) had a positive attitude towards eprescribing, considering it safer for patients, whereas 49.4% (38/77) had a negative attitude. In the comments, 13.0% (10/77) of the Austrian physicians wondered how eprescriptions could be safer. The Swedish physicians showed a more positive attitude: 88.1% (111/126) agreed or strongly agreed with the statement. However, 7.9% (10/126) added a negative comment, stressing that a wide range of errors still appeared.

Of the Austrian physicians, 55.9% (43/77) had a positive belief that this offered an improved service for patients, whereas 36.4% (28/77) disagreed or strongly disagreed that eprescribing constituted a better service. Of the Swedish physicians, 96.0% (121/126) agreed or strongly agreed with this statement, representing near unanimity.

Worry about being controlled and data abuse

Just under half of the Austrian physicians, 41.6% (32/77), stated that they were worried about being controlled when sending eprescriptions, whereas only 11.9% (15/126) of the Swedish physicians expressed the same concern.

Again, just under half of the Austrian physicians, 46.8% (36/77), disagreed or strongly disagreed with the statement about concerns there might be abuse of these data. Among the Swedish physicians, a much higher proportion, 83.3% (105/77), were not worried about data abuse when sending eprescriptions.

Patients' worries

The proportions of Austrian physicians concerned that their patients might be worried by eprescriptions were almost equal: 42.3% (33/77) were not and 45.5%

Table 2 Extent of agreement to survey statements by physicians included in the study

Survey statement[a]	Nation	1	2	3	4	No opinion	Completeness rate	χ^{2b}
Having the capability to send eprescriptions is good	AUT[c]	18	33	12	10	4	0.95	42.4
	SWE[d]	112	13	0	0	1	0.99	
Compared to paper prescriptions, eprescriptions are time-saving for the doctor	AUT	12	27	25	9	4	0.94	46.7
	SWE	88	29	6	1	2	0.98	
Compared to paper prescriptions, eprescriptions are safer for patients	AUT	10	21	25	13	8	0.90	55.2
	SWE	62	49	7	1	7	0.94	
Compared to paper prescriptions, eprescriptions mean better service for patients	AUT	10	33	23	5	6	0.92	52.4
	SWE	77	44	1	0	4	0.97	
I am worried that my work is being controlled when sending eprescriptions	AUT	18	14	29	5	11	0.86	26.0
	SWE	3	12	41	55	15	0.88	
I am worried about data abuse when sending eprescriptions	AUT	18	19	30	6	4	0.95	36.7
	SWE	2	11	55	50	8	0.94	
Patients will be (SWE – are) worried by eprescriptions	AUT	7	28	31	2	9	0.88	66.6
	SWE	0	2	56	59	9	0.93	
It is a problem that more and more personal healthcare information is stored and available in databases	AUT	20	27	22	6	2	0.97	28.3
	SWE	7	22	47	43	7	0.94	
Sending eprescriptions reduces costs for the health system	AUT	6	30	24	14	3	0.96	33.0
	SWE	34	45	7	2	38	0.70	
I believe that in five years it will be standard procedure for all doctors to send eprescriptions	AUT	9	33	19	9	7	0.91	58.4
	SWE	73	52	0	0	1	0.99	

[a] Physicians were asked to declare their extent of agreement on a four point scale: 1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree
[b] $P<0.001$ was calculated for all parameters, 1 degree of freedom
[c] Austria, $n = 77$
[d] Sweden, $n = 126$

(35/77) were. Only 1.6% (2/126) of the Swedish physicians expected eprescriptions to be of concern to their patients. Almost half of the Swedish physicians, 46.8% (59/126), strongly disagreed and 44.4% (56/126) disagreed that eprescribing might worry their patients.

Storage of personal healthcare information

Concerns about storing personal healthcare information and making it available via databases is not only an issue related to sending eprescriptions. Among the Austrian physicians, 61.0% (47/77) regarded storage of prescribing data on a database to be a problem. The

Swedish physicians had a more positive attitude: only 5.6% (7/126) strongly agreed and 17.5% (22/126) agreed that the storing of personal healthcare information was a problem.

ePrescribing and costs

Among the Austrian physicians, 49.4% (38/77) disagreed or strongly disagreed that sending eprescriptions saved costs for the health system. The majority of the Swedish physicians, 62.7% (79/126), believed that eprescribing was cost-saving.

Future use of eprescribing

Over the next five years, 54.6% (42/77) of the Austrian physicians believed that sending eprescriptions would become standard procedure. Of the Swedish physicians, 99.2% (125/126) agreed or strongly agreed with this statement. Comments were submitted by 5.6% (7/126), stressing that it already was standard procedure.

Experiences

Only 69.0% (87/126) of the Swedish physicians submitted answers to the open question, giving a total of 160 responses. Of these, 65.6% (105/160) were classified as positive and 34.4% (55/160) as negative (Table 3).

Among the reported positive experiences, 26.7% (28/105) described an advantage of eprescribing to be a saving of time, 16.2% (17/105) that it was an easier procedure and 10.5% (11/105) related to access to former prescriptions within the healthcare region. Most of the negative experiences, 30.9% (17/55), concerned system breakdowns and 18.2% (10/55) were related to problems associated with changing or cancelling prescriptions already sent.

Table 3 Number (*n*) and percentage (%) of the most frequently mentioned experiences by Swedish physicians included in the study

	n	%
Good experiences (*n* = 105)		
Time-saving procedure	28	26.7
Easier procedure	17	16.2
Visibility of formerly prescribed pharmaceuticals within the county	11	10.5
Bad experiences (*n* = 55)		
Troublesome when the system doesn't work	17	30.9
Impossible to cancel/change a prescription	10	18.2

Discussion

Principal findings

In times when many other industries in Europe are taking advantage of sophisticated communication technologies,[20,21] Austrian physicians are still relying on paper for prescribing pharmaceuticals. The study revealed major differences in attitudes between Austrian and Swedish physicians.

We found that the major advantages of eprescribing in Sweden are the saving of time for the physician, improved safety and a better service for patients. Additionally, the physicians' low levels of concern about data abuse, and the effective measures for its control may also have facilitated implementation. However, the Swedish physicians stressed how a wide range of errors still occurred; and system breakdowns had also been experienced.

Implications of the findings

Contrasting the attitudes of experienced users with those yet to comprehensively implement a technology may be a useful approach in a range of circumstances, drawing out the differences between experiential learning and the hypotheses of less experienced users.

The need for international exchange of experience as a method for enhancing the implementation of eprescribing has also been recognised within the EU.[22] Six months after our survey was conducted, European Patients Smart Open Services (epSOS), a European initiative for enhancing the implementation of e-health services across European healthcare systems, was launched.[23]

Comparison with literature

This is the first study comparing physicians in Austria and Sweden regarding their attitudes towards eprescribing. Other studies have found that eprescribing was not necessarily time-saving, but that this depends on the system implemented,[24] and that the time-saving is negated by additional computer tasks[25] and more clarification contact with the prescriber at the time of

dispensing.[26] This corresponds with the more sceptical attitudes of the Austrian physicians. Some studies have identified previous negative experiences with other IT initiatives[6,27] and concerns about confidentiality issues[7] as key barriers for the implementation of eprescribing. Previous research also suggests that Swedish patients appreciate having their medication record electronically accessible,[28] possibly reflecting a different level of readiness for information and communication technologies between different societies.[29]

Limitations of the method

It is likely that recruiting physicians via email addresses biased our study. Physicians answering a web survey might have a more positive attitude towards innovative technologies compared with the total population of physicians. Additionally, the low Austrian response rate might have biased the sample towards physicians who are strong opponents to or supporters of eprescribing. Differences in age group and previous use of eprescribing may also be sources of bias.

What this paper adds

- Potential success factors for the implementation of eprescribing: time-saving, more safety and better service for patients
- Our findings are consistent with previous findings of other studies and can be used to further improve existing eprescribing systems
- The implementation of eprescribing in Austria is likely to be seen as a welcome innovation by many Austrian physicians

Call for further research

The results of this survey could be tested with a more complete sample, or during implementation of eprescribing in a trial setting.

Conclusions

Notwithstanding the negative experiences, physicians in Sweden seemed to a large extent to be satisfied with sending eprescriptions and were more positive than Austrian physicians. This study highlights the difference in attitude to an established technology and identifies potential barriers to effective implementation hypothesised by non-users.

ACKNOWLEDGEMENTS

The study was funded by the eHealth Institute Kalmar, Sweden. Thomas Schröck (IMC University of Applied Sciences Krems, Austria) is acknowledged for assisting the project. We acknowledge the assistance of Sten-Erik Öhlund (Logica, Sweden) and Martin Hurch (ARGE ELGA, Austria) in developing the questionnaire.

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CONFLICTS OF INTEREST

None.

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Accepted January 2010