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The Use of the World Wide Web and Internet in Pharmacy Practice: An Exploratory Study*

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Abstract: The purpose of this exploratory study is to investigate the degree of internet use by pharmacists and how internet usage impacts pharmacists' practice using 862 samples of pharmacists from the St. Louis Metropolitan Area. Barriers to use internet tools are also explored. The results of this study indicate that more than 77% of pharmacists are using the internet. However, those who utilize it in their business and marketing practices remain relatively minor. Surprisingly, only 11% of the respondents have their own practice websites and almost 84% of pharmacists who currently do not have a website stated that they have no intention to develop one. Almost half of our respondents believe that the Web use can improve customer counseling which is followed by time management (44%). Forty-three percent of the respondents claimed they would increase capital investment on IT substantially over the next 12 months. This study also reveals that a lack of understanding of the Web potentials plays an important impediment in using information technology in their practice.

Key words: Internet use, world wide web, pharmacy practice, healthcare market, p-value

Introduction

The use of the internet by physicians has dramatically increased from 20% in 1997 to over 78% in 2002 (Kwon and Xie, 2004) and it has been even estimated that physicians' internet usage will eventually change the requirements for pharmacy practice in the future (Carrns, 2001). According to a study by Gruen (1999), internet companies have their eyes on the estimated $250 billion internet-based health care market. However, there are few studies, if any, on a use of internet in the pharmacy fields. Accordingly, it would be interesting to exam how pharmacists use the Web tool in their business practice.

The global internet population is growing at a rapid rate. According to the Computer Industry Almanac (www.c-i-a.com), the worldwide internet population today is almost 945 million and is expected to reach 1.5 billion in 2007. In addition, UNCTAD estimates that the value of global e-commerce would have totaled $3.9 billion dollars in 2003 and around 18% of all firm and individual purchases will be carried out via the internet by 2006. According to Forrester Research, net shoppers in Europe will spend an average Euro$ 223 online, bringing Europe's online retail market to Euro$ 40 billion in 2004 and online retail will take 8% of total retail sales in Europe by 2009. More

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importantly, this phenomenon does not just limit to Europe. A survey of shoppers in 124 countries also has found that two thirds of online consumers have no concerns about purchasing from international websites (www.nua.com). Although global e-commerce provides marketers an exceptional channel to reach their potential customers worldwide, many companies are realizing that building an e-commerce website to suit an international audience is more complex than they expected (Sheldon and Strader, 2002).

A number of studies on the impact of the internet usage on healthcare have been published. For example, Sanchez (2000) claimed that although hospitals have begun to achieve parity in their use of website marketing with other industries, the full potentials of the internet use with its unique characteristics in the health care field have yet to be realized. Lin *et al*. (2001) surveyed a large number of healthcare organizations in the US and found that 48% of the respondents developed and maintained their websites and most respondents believed that their websites could be used most efficiently to solicit customer opinion and feedback.

Kwon and Xie's (2004) study on physician's use of internet revealed that the internet has not been used widely in medical-patient related fields as one would have expected. Among the top five areas that physicians listed their using internet, the bottom three areas are not medical-patient related fields. Important areas that the internet can be useful, such as drug information, continuing medical education, medical records, etc. were not even included, according to their study.

As patients have become more informed of the power and utility of internet especially as it is related to patient care management, they are demanding their physicians and pharmacists go online. This has led to a clear trend that an increasing number of physicians are online (Kuraitis, 1999). In fact, each day, over six million Americans seek medical and drug information on the Websites and over one hundred and ten million (110 million) people searched online for medical and drug information in 2002 and the trend continues. In addition, over 90% of all physicians report that patients have presented them with medical and drug information that has been garnered from the internet (Martin *et al*., 2002).

Physicians have responded to patients' demand by increasing their usage of online resources. In 1997, only 20% of physicians were said to be online (Bennett *et al*., 2004) and today that number has risen to over 78% of all physicians (Kwon and Xie, 2004). This dramatic increase in the number of physicians online has resulted in a subsequent increase in the amount of medical and drug information available online as well as sites catering to physicians and pharmacists, which also contributed to an improvement of the patient-physician-pharmacist relationship (Murray *et al*., 2003). As a result, physicians are beginning to see that not only they are able to communicate with their patients more easily but also they discovered several ways to use the internet to better serve their patients and improve general business practices (Bodenheimer and Grumbach, 2003).

In spite of a surge of internet use by primarily physicians and health care personnel especially among drug distributors, there have been no noticeable studies on internet use and its impact on pharmacists' practice behaviors. As more physicians get involved in internet use in their patient management, it is a matter of time that pharmacists have to respond to make their management more efficient, effective and responsive.

The purpose of this study is to exam the degree of internet use by pharmacists and whether internet use has any impact on their practice behaviors. Barriers to use internet tools will be also explored. This study used a survey method to collect relevant data. A simple descriptive statistics and cross-tab methods were used to extract information from the collected data.

Materials and Methods

A survey with twenty-five questions on pharmacists' use of the World Wide Web and four questions on demographic information was carefully designed with the help of internet specialists and pharmacy practitioners to ensure the relevance of the topics. In order to avoid response bias, survey questions were randomly arranged.

A total of 1,692 questionnaires were distributed to pharmacists in the St. Louis, Missouri, metropolitan area. Eight hundred sixty-two valid responses were received representing a 50.9% response rate. Approximately 10% of the late returns were used to exam whether the contents of these late returns were significantly (statistically) different from those returns from the rest. The later is considered as the representative of non-respondents (Amstrong and Overton, 1997; Lambert and Harrington, 1990; Kannan and Tan, 2002). The t-test results of means of descriptive variables and the chi-square test of frequency of nominal and/or categorical attributes for two groups of returns do not show any statistically significant differences.

Results

Demographics Information

Of the total 862 respondents, 41.3% are female. More male pharmacists are working in the independent settings (16.1%) vs. more female pharmacists working in the chain pharmacy (30.4%) (p = 0.004) (Table 1).

It appears that the younger pharmacists (younger than 40 years) tend to work more for hospital-based practice (33.3%) and chain pharmacy (33%). As expected, more older pharmacists (>60 or older) worked in the independent settings (30.8%) (p = 0.000) (Table 2).

Table 1: Practice types by gender

Type of practice	Female (%)	Male (%)	Total
Independent	8.0	16.1	12.8% (n = 108)
Long-term	4.0	3.0	3.4% (n = 29)
Hospital-based	29.2	30.0	29.7% (n = 251)
Educational	3.4	1.2	2.1% (n = 18)
Managed care	3.7	2.4	3.0% (n = 25)
Chain pharmacy	30.4	24.9	27.2% (n = 230)
Others	21.2	22.3	21.9% (n = 185)
Total	100.0 %(n = 349)	100.0%(n = 497)	100.0% (N = 849)

Chi-Square = 19.424, p-value = 0.004

Table 2: Practice types by age

Type of practice	<40 (%)	41~49 (%)	50~59 (%)	60 + (%)	Total
Independent	3.6	15.5	14.8	30.8	12.6% (n = 106)
Long-term	3.0	4.0	4.7	1.9	3.5% (n = 29)
Hospital-based	33.3	30.7	30.2	15.0	29.6% (n = 249)
Educational	3.6	0.8	1.3	1.9	2.1% (n = 18)
Managed care	4.5	3.2	1.3	0.0	3.0% (n = 25)
Chain pharmacy	33.0	19.9	27.5	27.1	27.4% (n = 230)
Others	18.9	25.9	20.1	23.4	21.8% (n = 183)
Total	100.0% (n = 333)	100.0% (n = 251)	100.0% (n = 149)	100.0% (n = 107)	100.0% (N = 840)

Chi-Square = 88.710, p-value = 0.000

Table 3: Extent of the world wide web, internet, or intranet use in pharmacy practice

Extent of usage	Frequency	(%)
Use Daily	408	65.5
1 ~ 3 times a Week	144	23.1
1 ~ 3 time per month	71	11.4
Total	623	100

Table 4: Extent of the world wide web, internet, or intranet use in pharmacy practice by gender and age group

	Users (%)	Non-users (%)	Total
By Gender (Chi-square = 0.399, p-value = 0528)			
Female	78.4	21.6	100% (n = 333)
Male	76.5	23.5	1000% (n = 485)
Total	77.3% (n = 632)	22.7% (n = 186)	100% (N = 818)
By Age Group (Chi-square = 88.724, p-value = 0.000)			
<40	87.6	12.4	100% (n = 323)
40 ~ 49	79.0	21.0	100% (n = 248)
50 ~ 59	74.5	25.5	100% (n = 149)
60+	41.3	58.7	100% (n = 92)
Total	77.3% (n = 628)	22.7% (n = 184)	100% (N = 812)

Table 5: Extent of the world wide web, internet, or intranet use in pharmacy practice by types of practice

Type of practice	Yes (%)	No (%)	Total
Independent	40.6	59.4	100% (n = 106)
Long-term	86.2	13.8	100% (n = 29)
Hospital-based	98.4	1.6	100% (n = 245)
Educational	100	0	100% (n = 18)
Managed care	96.0	4.0	100% (n = 25)
Chain pharmacy	59.5	40.5	100% (n = 222)
Others	85.8	14.2	100% (n = 169)
Total	77.1% (n = 628)	22.9 (n = 186)	100% (N = 814)

Chi-Square = 201.340, p-value = .000

According to the Telcordia's (2001) study, it is estimated that nearly 500 million people throughout the world use the internet. The American Medical Association study indicates that the use of the internet by physicians has dramatically increased in 2000 (Carrns, 2001). Do pharmacists, one of the important players in the healthcare system, take advantage of the internet in their practices as frequently and extensively as physicians?

Almost 66% of the pharmacists use internet in their business at a daily basis as shown in Table 3. According to our survey, over 77% of the respondents use the World Wide Web, internet, or Intranet (information exchange device within the same organization) in their practices. The use of these communication tools is common for male as well as female pharmacists (p = 0.528) (Table 4).

As expected, the younger pharmacists tend to use the IT tools much more than their counterparts (87.6% for less than 40 years old vs. 41.3% for 60 or older population) (p = 0.000) (Table 4). In addition, it is revealed, according to Table 5, that pharmacists working as independent setting and for the chain pharmacy tend to use the internet far less than their counterparts (40.6% for independent and 59.5% for chain pharmacy vs. over 85% for other practice types) (p = 0.00).

Place of Learning Communication Technologies

In order to take advantage of the full potentials of Web and internet technologies, the knowledge acquisition process is critical and one has to learn the tools through proper channels. Otherwise, the users may not gain the full benefits of the technologies and probably waste their investment in the technology area.

Table 6: Places of learning web and internet tools

Places	Frequency	(%)*
Self-taught	520	83.9
From peers	208	33.5
From family	94	15.2
Attending formal training	51	8.2
Learned from professional meeting	17	2.7
Others	19	3.1
Total	909	

* The total percentage exceeds 100% as this issue addresses multiple selections

Table 7: Ownership of practice website

Ownership	Frequency	(%)
Owned website	69	11.0
Do not own website	558	89.0
Total	627	100

Table 8: Planned time to develop own websites

Time frame	Frequency	(%)
Next month	8	1.7
Next 3 months	6	1.3
Next 6 months	6	1.3
Next 12 months	55	11.6
Never	398	84.1
Total	473	100

According to our study, almost 84% of the respondents claimed that they learned the technology through self-taught process and almost 34% learned through their peers; only a little more than 10% learned it either through attending formal IT classes or at professional meetings (Table 6), which may have caused a great deal of internet anxiety as addressed later in this paper. A cross-sectional study (not shown here but provided upon request) based on age, gender and practice types yield no statistically significant differences as to where and how they acquired the technologies.

Degree of World Wide Web and Internet Use in Pharmacy Practice

The University of Iowa Hospital's website receives approximately 250,000 requests for information each week via the internet. Prospective patients can find easily detailed descriptions of common medical procedures and a host of other information relevant to their treatments from this website; however, this is just one example of many avenues that healthcare professionals can use internet tools in their marketing, business and other areas to benefit their operations. According to Shepherd and Fell (1996), Web page is the most frequently used tool, which is followed by external e-mail, research, bulletin boards, online commercial services, news groups and discussion groups. In addition, about 37% of their study's respondents believe that the internet will be an important tool in marketing their healthcare organizations over the next five years.

Although a Web page is the most frequent mode of communication that healthcare organizations are depending on in their business and marketing practices, surprisingly, only 11% of our respondents actually own practice websites (Table 7). More surprisingly to some extent, more than 84% of them do not have any plan to develop their own practice websites (Table 8). Neither age, nor gender seems to matter in this case. More pharmacists in long-term health care institutions and chain pharmacy expressed their intention not to develop their own websites ($p = 0.00$) (not shown, but provided upon request). Perhaps pharmacists in the chain pharmacy working environment may not need to own their own business Website as the organizations at the main office usually develop and provide one for the entire stores. For long-term care institutions, pharmacists may not find Website as useful as the level of market characteristics.

Table 9: Top 10 most useful information of world wide web used by pharmacists

Areas	(%)
Medical information sources	61.9
Drug information	61.9
Continuing education	54.5
News and information	52.0
General communications	51.3
Non-patient e-mail	50.9
Travel information	45.8
Purchasing goods	41.0
Shopping	33.5
Professional association communication	32.5

The total percentage exceeds 100% as this issue addresses multiple selections

Useful Information for Web Users

Table 9 list top ten most useful information on Websites visited by pharmacists. According to our survey, "medical information" and "drug information" sources are the most frequently used areas (61.9% each) of Web by pharmacists, which is followed by "continuing education" (54.5%), "news and information" (52%) and "general communication" (51.3%) for the top five list. The next five list includes non-patient related information ranging from non-patient related email (50.9%) to sports and recreation (26%). It should be noticed, however, that such seemingly pertinent information to patient care and management as communication with patients, patient profiles and patient prescriptions are not even included in the top 10 list. Present study seems to support Sanchez's (2000) claim that the full potentials of the internet benefits have yet to be realized.

Popular Websites Visited by Pharmacists

A study by Gruen (1999) classified internet companies, which are seeking to penetrate into the internet-based medical services market in four separate categories. First, "content providers," such as Medscape, whose mission is to provide clinical information and educational tools that are the most objective, credible and relevant to its members, their patients and their practices. Second, "connectivity providers," such as Healtheon.com, which develops and manages virtual healthcare networks that enable seamless information exchange and mission-critical transaction processing among key participants in the healthcare industry. Third, "care providers," such as Americasdoctor.com, which provides pharmaceutical and biotech companies and contract research organizations, an exclusive source for conducting Phase II-IV clinical research. Finally, "community providers," such as WebMD Health, provide chat rooms for discussions of unique healthcare concerns or conditions. This study sought to determine if pharmacists preferred a particular site (or sites) compared to other sites.

Present study reveals that Medline, which belongs to "care providers" category, has the largest number of visitors (41.5%) and is followed by the Center for Disease Control website (35.7%) and Medscape (28.8%) as shown in Table 10. To our surprise, the pharmacy related sites, such as American Society of Health-System Pharmacists (24.5%), American Pharmaceutical Association (10.3%) and American Society of Consultant Pharmacists (8.2%) are not even listed in the top 3 rank.

Web and Practice Efficiency

It was estimated that more than 70,000 websites carry health information, while more than 50 million people seek health information online (Cline and Haynes, 2001). Medical information is one of the most researched topics online and many health education researchers and practitioners already have embraced the internet as an area of inquiry and application (Bernhardt and Hubley, 2001).

Table 10: Top 10 most popular websites among pharmacists

Areas	(%)
Medline	41.5
Center for Disease Control	35.7
Medscape	28.8
American Society of Health-system Pharmacists	24.8
National Institute of Health	23.8
New England Journal of Medicine	22.3
PubMed	20.2
American Pharmaceutical Association	10.3
American Society of Consultant Pharmacists	8.2
Others	26.2

The total percentage exceeds 100% as this issue addresses multiple selections

Table 11: Web use helps pharmacists' efficiency

Areas	(%)
Staffing	8
Scheduling	10
Others	21
Client satisfaction	28
Business practice	33
Time management	44
Counseling	47

Note: Multiple-choices are possible. Percentage in total may not sum up to 1

Accordingly, it seems to be a logical assessment that consumers in the healthcare market today should be much better informed on healthcare access and other pertinent information including drug management. However, Wilkins and Navarro (2001) cautioned that the experts might be overstating the latest wave of consumerism supposedly sweeping the healthcare industry.

According to our survey, 47% of pharmacists believe that the Web can help their practices more efficient in "counseling" and 44% of them also believe that Web use improves "time management." Other seemingly pertinent areas such as business practice, customer satisfaction etc. do not score highly accordingly to our survey as shown in Table 11. According to the American Medical Association's 2000 study (Carrns, 2001), these three areas (client satisfaction, scheduling improvement and staffing enhancement) would benefit most from the Web use. Our study seems to have a different list of impact on efficiency issues than those reported in medical management.

Barriers to Use Web Tools

In spite of the growing awareness of internet use in the health care field, a variety of factors have to some extent impeded widespread internet use (Kerwin, 2002). In late 1995, Shepherd and Fell conducted a study to measure the degree to which the internet has been incorporated into healthcare marketing efforts and some of the barriers to using the internet in their practice. Their study reveals that "lack of knowledge" appears to be a greatest constraint, which is followed by no understanding of advantages of net, cost of technology and lack of trained personnel.

Potential users are often concerned with transmitting personal health information over the internet. A study by California Health Care Foundation and the Internet Healthcare Coalition (Dash, 2000) found that 75% of consumers seeking health information are concerned about the sites in which they have registered sharing their personal health information with others without their permission.

When pharmacists list information on Websites, there are always some concerns as to privacy and liability issues. A heavy investment requirement in information technologies may be another reason that some pharmacists may be reluctant to have their own Websites. Three areas of concern will be explored.

Table 12: Will web use increase liability?

Areas	(%)
Substantially	3
Moderately	8
Minimum	26
Not at all	39
Don't know	24

Table 13: Confidentiality and privacy issues

Issues	Frequency	(%)
Adequately protected	165	26.1
Not protected	218	34.4
Do not know	250	39.5
Total	633	100.0

Table 14: Confidentiality and privacy issues by age

Issues	<40 (%)	40~49 (%)	50 ~ 59 (%)	60 + (%)	Total
Adequately protected	31.1	23.5	23.4	10.5	26.1%(n=163)
Not protected	28.6	41.8	39.6	28.9	34.7%(n=217)
Do not know	40.4	34.7	36.9	60.5	39.2%(n=245)
Total	100.0% (n = 280)	100.0% (n = 196)	100.0% (n = 111)	100.0% (n = 38)	100.0%(N=625)

Chi-square = 19.724, p-value = 0.003

Table 15: Confidentiality and privacy issues by types of practices

	Issues (%)			
Practice types	Adequately protected	Not protected	Do not know	Total
Independent	11.4	38.6	50.0	100% (n = 44)
Long-term	8.0	16.0	76.0	100% (n = 25)
Hospital-ased	29.7	33.5	36.8	100% (n = 239)
Educational	22.2	22.2	55.6	100% (n = 18)
Managed care	50	16.7	33.3	100% (n = 24)
Chain pharmacy	25.6	37.6	36.8	100% (n = 133)
Others	23.4	40.7	35.9	100% (n = 145)
Total	25.8% (n = 162)	34.7%(n = 218)	39.5(n = 248)	100% (N = 628)

Chi-square = 33.812, p-value = 0.001

Liability Issue

Our study indicates that " a fear of increased liability" in using Web related tools is not a major issue. For example, only 3% of respondents believe that the use of Web tools increases liability and the majority of respondents (39%) expressed the view that the use of the Web does not increase their liability at all (Table 12). However, it should be pointed out that almost one-fourths of the respondents stated that they simply do not have a clear understanding about the liability issue which appears to confirm Kerwin's (2002) study. However, this study clearly demonstrates that although most experts claim that the use of internet will change the pharmacy practice in the future (Carrns, 2001), our study seems to dispute such claim.

Confidentiality Issues

Present study reveals some disturbing results on confidentiality and privacy issue. According to our study, almost 40% of the respondents simply do not have any knowledge on this important issue and over 34% of the respondents do not believe that this issue adequately addressed at this time (Table 13). When this information is cross-checked with the age variable, the middle age pharmacists (41 years old ~ 59 years old) are more likely concerned with this issue and as expected, the older respondents appear not having a clear information whether this issue is adequately addressed (p-value = 0.003) (Table 14). Pharmacists in independent operations, long-term care and surprisingly to some extent in educational institution settings are more likely need some help on this issue (p = 0.001) (Table 15).

Table 16: Barriers to using internet in practice

Areas	(%)
Don't believe web	1
No resource	10
Lost productivity	9
Privacy issue	10
Other reasons	15
Technical difficulty	17
No time	38

Note: Multiple-choices are possible. Percentage in total may not sum up to 1

Table 17: Actual and expected capital investment on information technologies

	2000 (%)	Next 12 Months (%)
None	51.4	19.3
<$1,000	20.3	13.1
$1,000~2,999	0	9.8
$3,000~5,999	2.7	6.7
$6,000~10,000	2.7	8.2
>$10,000	23.0	42.8
Total	100% (N = 788)	100% (N = 388)

Other Barriers

According to our survey, "lack of time to learn how to use the internet in their practices" poses the greatest barrier (38%). This study also found that 17% of the respondents reported that they "do not have technical competence in using the Web in their practices". (Table 16). Present study also reveals that gender, age and practice types do not add any additional information on this issue.

The Future Outlook

Although some portions of the findings in our study are disappointing, we are still optimistic about the future of the use of the Web and internet in pharmacy practice. According to our study, more than 51% of our respondents did not invest in 2000 any capital on Web marketing. However, according to Table 17, almost 43% of the respondents claimed they would spend more than $10,000 on improving information technology in their practices in the next 12 months, which is a substantial commitment to information technology area. Also, significant differences are shown that younger, male and hospital-based pharmacists are more likely to invest more resources on information technology in their practices ($p = 0.001$, 0.011 and 0.000, respectively. Not shown, but provided upon request).

Discussion and Conclusions

This study investigated a sample of pharmacists from the St. Louis, Missouri metropolitan area. Although this study does not include all potential factors impacting pharmacy practice across the profession, it provides us a relatively detailed insight into the impact of Web use among pharmacists.

According to the survey by the American Medical Association conducted in 2000 and a study by Kwon and Xie in 2004, although more doctors use the internet for research and personal communications, the use of this tool in interacting with patients and administering medical records remain in the minority. Only 17% of doctors said they use the Web for obtaining or transferring medical records and only 8% use it for health-insurance claims processing. Surprisingly, among physicians who do not have a website, 70% said they will "never" intend to develop one (Carrns, 2001).

Interestingly, present study provides similar results: While more pharmacists are using the internet in their practices (77.3%), pharmacists who utilize it in their business (23.4%) and marketing (2.7%) practices remain a minority which seems to support the Sanchez's study (2000). If age, gender and practice types are used as controlled variables, pharmacists in hospital-based operations use Web tools more (40%) than chain pharmacy (21%) and independent pharmacy practices (7%). Although no significant difference is found for a gender factor, younger and male respondents tend to use more Web tools in their practices than their counterparts. Surprisingly, only 11% of our respondents have their own practice websites and almost 84% of pharmacists who do not currently have a Web page mentioned that they have no plan to develop one. However, younger, female and hospital-based/chain pharmacy practices are more likely to develop their own websites in the next 12 months. Among the top ten sites that pharmacists often visit, Medline (41.5%) is the most popular website and American Society of Consultant Pharmacists (8.2%) seems to be the least attractive one. Experts claim that the use of internet will change the requirements for pharmacy practice in the future, but our study seems to dispute such claim. Although pharmacists believe that the Web can help their practices to become more efficient in counseling (29%) and time management (27%), few believe using the Web actually improves client satisfaction (17%) or increases liability (39%). In spite of the growing awareness of the internet use in pharmacist's professional practice, a variety of factors have to some extent impeded the widespread internet use. A lack of time to learn Web use is the greatest barrier for pharmacists in our study. Privacy and confidentiality issues, lack of resources and lost productivity are also mentioned as important barriers. The above finding appears to confirm the study by Dash (2000) in California Medical market.

Although most results of our survey are disappointing, we are still optimistic at the future Web use in the pharmacy practice, because almost 43% of our respondents claimed that they would spend more than $10,000 dollars on improving information technology in their practices in the next 12 months, which is a sizeable increase compared to almost no spending in year 2000.

The internet has the potentials for becoming more common in pharmacy as well as other facets of the health care area. Pharmacists will face both opportunities and challenges in their practices. As the information technology advances, it is imperative for the pharmacists to keep up with the change and utilize a practical application of information technology in their pharmacy practices.

This exploratory study provides a framework for further investigation, which should include the in-depth research to provide more breadth in related topics and should enrich the literature in this evolving area of pharmacy practice.

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