Utilization and Perception of Information and Communication Technologies Among Pharmacists and Development of Pharmacy Informatics in Bosnia and Herzegovina

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ABSTRACT
Background: Information and communication technologies (ICT) are widely used in a health care as a result of pharmaceutical informatics and technology developments. There is a huge potential for pharmaceutical practice of technologies utilization in a different practice settings especial community pharmacy and patient counseling. Objective: To evaluate Bosnia and Herzegovina (BH) pharmacists’ knowledge and attitudes towards informational and communication technologies and extent of its utilization. Methods: Online survey conducted among pharmacists from different practice settings. Results: Pharmacists in BH are familiar and well known regarding importance of informational technologies. 93% are using special pharmaceutical information systems, and majority use technologies and software for prescription processing (47%), calculations (24%) communication (22%) and 9% for Internet search. 90% of pharmacists have profiles on social media mainly Facebook, followed by Instagram and LinkedIn mainly used for networking and communication with peers but less with patients. They have positive attitude regarding potential benefits of using social media for communication with patients and treatment outcomes improvement. Conclusion: Pharmacists in Bosnia and Herzegovina have satisfactory level of information and communication technologies understanding and knowledge. It is of high importance that education of future pharmacist in this field is in line with nature of pharmaceutical informatics in light of its clinical application rather than technical so future pharmacists can contribute to improvements in social media medicines-related information, learn from consumers’ online activities, and design new ways of delivering care to communities and individuals.

Keywords: pharmacy informatics, social media and pharmacy, patient counseling, information systems.

1. INTRODUCTION
Pharmacist have been among the first healthcare professionals who introduce new technologies in medicine in different fields including telemedicine related to medication counseling, drug design and clinical decisions (i). In the 1990s, the first research relating to pharmacy informatics was published (2), and it is defined by American Society of Health-System Pharmacists as „the use and integration of data, information, knowledge, technology, and automation in the medication-use process for the purpose of improving health outcomes“(3).

Pharmacy informatics focuses on the use of technology to optimize prescription fulfillment and use, help improve safety and efficiency. Pharmacy informatics are pharmacists with a solid background in clinical pharmacy practice, knowledge of pharmacotherapy, and extensive working knowledge of clinical information systems and drug distribution systems. Use of different pharmaceutical IT systems related to drug dispensing, e-prescription, clinical management (4), while recent trends show extensive use of social media (SoMe) and other interactive platforms (5). Globally, social media platforms are useful tools for healthcare professionals, and they can be used for different purposes such as ed-
ucation; professional development; job search; health promotion; personal promotion; communication with patients, colleagues, and students; dissemination of information about health; discussion of public health policies; and analysis of various issues related to general health topics. In Bosnia and Herzegovina (BH) medical informatics have been introduced into curricula almost 30 years ago (6) while specific branch of it, pharmacy informatics has been established 15 years ago and there is available specialization in this field (7).

Information and communication technologies (ICTs) are transforming health services throughout the world. Health information and technologies (HITs) involve application of information processing using computer for storage, retrieval, sharing and use of information and knowledge for communication by a pharmacist. Similarly electronic prescription (EP) services have made the dispensing and reimbursement processes more efficient. In BH e-prescriptions have been introduced in Canton Sarajevo in 2015, and today almost in entire country similar systems are available (8). Maintenance of patient record becomes easy by using ICTs. Barcode identification of medicines can be used to reduce medicine administration errors and to improve the medication history of patients, while today serialization as a part of drug distribution taking place (9). 100% of pharmacies in Europe are computerized, 100% have an Internet connection (of which 95.8% is broadband) and many utilize electronic dispensing software programs (10). Telemedicine using digital communications technology provides healthcare consultations and other health care services to rural, old and handicap patients easily and improves their access to healthcare by reducing their hospital attendance. This form of counseling and providing healthcare has been specially populated during COVID-19 pandemic due to restricted access to medical services (11).

2. AIM

The aim of our research was to evaluate extent in which pharmacists in Bosnia and Herzegovina use information technologies including social media platforms in their professional settings.

3. MATERIAL AND METHODS

We have developed survey which has been sent online on MS Forms platform to pharmacist all over Bosnia and Herzegovina. Survey has been sent through pharmaceutical associations – Pharmaceutical Society of Republic of Srpska (RS) and Pharmaceutical Chamber of Federation of Bosnia and Herzegovina (FBiH) in period December 2019-February 2020 in two waves including initial invitation and reminder.

Collected data have been analyzed by descriptive statistics.

4. RESULTS

E-mail survey has been sent to 400 addresses and complete survey has been conducted by 152 pharmacists from different professional settings. Equal distribution of pharmacists who responded from RS and FBiH has been noticed and majority is younger than 50 years old with experience of less than 10 years (59%). 76% of respondents are employed in community pharmacies owned by state or private, 7% works in hospital pharmacy, 6% are in distribution segment and the rest in pharmaceutical industry and administration as shown in Table 1.

Table 1. Characteristics of responding pharmacists

| Gender     | N   | %  |
|------------|-----|----|
| Male       | 21  | 14%|
| Female     | 131 | 86%|

| Age (years) | N   | %  |
|-------------|-----|----|
| <30         | 35  | 23%|
| 30-39       | 64  | 42%|
| 40-49       | 27  | 18%|
| 50-59       | 24  | 16%|
| >60         | 2   | 1% |

| Experience (years) | N   | %  |
|--------------------|-----|----|
| <5                 | 52  | 34%|
| 6-10               | 37  | 24%|
| 10-20              | 32  | 21%|
| >20                | 31  | 20%|

| Working environment | N   | %  |
|---------------------|-----|----|
| Private pharmacy owner | 12  | 8% |
| Private pharmacy chain owner | 4   | 3% |
| Private pharmacy employee | 31  | 20%|
| Private pharmacy chain employee | 40  | 26%|
| State owned pharmacy employee | 16  | 11%|
| State owned pharmacy chain employee | 13  | 9% |
| Hospital pharmacy | 10  | 7% |
| Distributor | 9   | 6% |
| Manufacturer | 4   | 3% |
| Representative office | 5   | 3% |
| Other (Agencies, ministries etc.) | 8   | 5% |

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Table 2. Online activities and e-mail communication patterns

| On-line activities | First Choice | E-mail communication | First choice |
|-------------------|--------------|----------------------|--------------|
| e-mail communication | 65%          | Suppliers            | 52%          |
| Surfing           | 22%          | Other Pharmacists    | 19%          |
| Education         | 11%          | Private              | 22%          |
| Private searches  | 2%           | Authorities          | 4%           |
|                   |              | Physicians           | 2%           |
|                   |              | Patients             | 1%           |

when web page is updated and most of them are employees in individual or pharmaceutical chains. Web sites content is mainly related to contact details and company presentation (29%), educational articles for patients and general population (24%), product advertising (22%) and online shopping (6%).

When it comes to social media, all of the respondents understand what are social media and 90% of them have profiles and accounts. Most of respondents have Facebook profile, followed by Instagram and LinkedIn, and non-have own blog (Figure 1). When it comes to perceptions and attitudes about social media utilization and benefits, they are presented in Table 3 in details, but in general, pharmacists have positive attitudes of benefits regarding improvement of communication with patients and other healthcare professionals, as well as treatment outcomes, while high disagreement is related to the statement that social media platforms could be useful to verify pharmacists’ competences. We have also evaluated how pharmacists feel about specific applications content and functionality that could be useful in their practice. 46% consider that such applications should provide pharmacological characteristics of the available treatments, 24.3% prefer to have application for adverse event reporting, 19% chose application for drug interactions, and minority find useful application that would provide drug prices, communication platform, food supplements data and contact details about pharmacies.

5. DISCUSSION

Recent lockdown and movement restrictions as part of measures to combat COVID-19 pandemics have shown that online services and platforms are in many cases the only possible communication channel for patients with chronic diseases or minor health conditions. Many healthcare services, including pharmacy counseling have been shifted to online platforms and extensive use of available informational technologies (12). Developments of health informatics and pharmaceutical informatics are rapidly growing in many segments including drug dispensing and prescription management, drug design, administration of pharmaceutical information system to every day communication with patients and peers. Even PGEU statement on e-Health published in 2015 confirmed that 100% of pharmacies in Europe are computerized, 100% have an Internet connection (of which 95.8% is broadband) and many utilize electronic dispensing software programs, study from Italy found that pharmacists have limited computer skills and computers are primarily used in pharmacies for pharmacy management (13). It has been also identified that pharmacist education should obligatory include knowledge on information management and technology to deal with record keeping obligations and medicines and medical devices’ verification systems (10).

Pharmaceutical informatics has been introduced into pharmaceutical faculties’ curricula during wartime in Bosnia and Herzegovina (B&H) together with other biomedical faculties at University of Sarajevo, led by pioneer of Medical informatics Professor Izet Masic, who established the first Cathedra for Medical informatics in B&H in 1992 (14-28). Within over 15 years it was of huge importance to clearly distinguish pharmaceutical informatics and pharmacy IT (24, 27).

Pharmacist needs to have a strong understanding of pharmacy practice and informatics to effectively improve patient outcomes and increase safety and efficiency but don’t perform the manual tasks of building these solutions in an electronic application. Unfortunately, such misunderstanding is present even on faculties’ representatives what could be misleading and such approach could be misleading. Pharmacy informatics refers to the relationship between pharmacy and medical computer applications that manage medication information and knowledge to enhance the services being provided.

As community pharmacists are oriented to patient counseling and handling different information on therapeutics and patient data it is very important to compile clinical knowledge with technical support. Our results suggest that pharmacist have incorporate information technologies in their everyday practice, mainly for e-mail communication and prescription management. Study on integration of information and communication technologies (ICT) from Barcelona suggest that the integration of ICT within community practices cannot be adequately understood and appreciated without examining how community pharmacists are making use of ICT within their own practice, their organizational context and the nature of the pharmacists-client relationship (29).

Broad use of social media platforms provides different possibilities for pharmacists and is becoming more and more popular. In our study it has been identified that pharmacists in Bosnia and Herzegovina extensively use social media and in most cases have more platforms in parallel having a general positive attitude regarding possibilities to improve communication and treatment outcomes and future developments, but are rarely used currently for this purpose. Researchers have studied the rate and usage of social media in different health care populations. For instance, pharmacists’ excessive use of social media is for the purpose of expanding their network and keeping in touch with old friends rather than for the purpose of education or professional development (30). Study conducted in Saudi Arabia observe that the participants employed social media mostly for networking (27%), education and professional development
(24%), and health promotion (13%) (31). Pharmacists occasionally provided advice and general health information on social media to friends and followers, and more commonly corrected misleading health information spread on Facebook. Short YouTube videos were used to support patient counseling in community pharmacy as reported in a study conducted in nine countries (32). Conclusion of patient counseling in community pharmacy as reported on Facebook. Short YouTube videos were used to support commonly corrected misleading health information spread on social media to friends and followers, and more commonly provided advice and general health information.

6. CONCLUSION

There is a satisfactory level of informational and communicational technologies understanding and knowledge among pharmacists in Bosnia and Herzegovina. Findings of our study are in line with current trend and similar researches. It is of crucial importance that education of future pharmacist in this field is in line with nature of pharmaceutical informatics and to assure its understanding. Pharmacists as medicine experts can contribute to improvements in social media medicines-related information, learn from consumers’ online activities, and design new ways of delivering care to communities and individuals.

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