



Concept, Prospects and Challenges of Internet Pharmacy to Practice of Pharmaceutical Care: A Review

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Authors' contributions

The work was carried out in collaboration among the authors. Author SOA conceived the idea and wrote the first draft. Authors JIA and FN performed the literature search. Author MIA proofread and edited the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Internet pharmacy has been the focus of heightened interest over the past 10 years. The unfolding and increasing trend and availability of online health information and drug sourcing are becoming of palpable concerns as the internet is known to be characteristically porous in terms of legislature and regulatory control. This prevalence and pattern of use of the internet in this regard alongside knowledge and attitude of users are examined. The readiness of regulatory bodies and operational legislations in some countries to checkmate illegal and uncontrolled ethical drug sourcing is similarly highlighted. The advantages of online drug sourcing that may increasingly fuel the internet market are considered. Finally, necessary upgrade of existing physical drug outlets to tackle possible spurious and illegal virtual pharmacies and strategies to practice of pharmaceutical care based on online ideologies are also reviewed.

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1. INTRODUCTION

In the past two decades, products and services have been extensively sourced online [1-3]. The internet has grown to be known as a medium used for health purposes by the public across the globe [4,5]. It has developed into a first-line information source about all aspects of information including healthcare. The number of internet users has also been observed to increase considerably in the last couple of years [6]. This trend has revolutionized lives in many ways. As access to the internet increased, so also did the applications to which this all important resources have been exploited. Research revealed that approximately 4.5% of all internet searches in the world are linked to health-related enquiries [7]. Population-based surveys revealed that 72% and 71% of internet users in the United States and Europe respectively, actually searched for health information at least once in a year [8,9,10].

In the present time, consumers access the internet not only for retrieving health information but with deep interest to self-diagnose and possibly procure various health services or product [10,11,12]. The supply of pharmaceuticals has developed in various manners and in conformity with different models in each region of the world. This has recourse to the perception, diverse regulatory stands and economic alongside the cultural environments [11]. As it is now, internet pharmacies are available and can be accessed globally. However, the spontaneous development of the procurement of medicines outside of the regular supply chain has its economic and regulatory concerns which are the subject of this review.

1.1 Awareness of Online Drug Sources

Fung and co-workers defined an online pharmacy as an internet-based vendor (legal or illegal) that sells medicine whether as an independent internet-only site or an online branch of a physically existing drug outlet [12]. These agents basically hold out opportunities for delivery, distribution or dispensing of medications directly to consumers by placing orders via the internet [13]. Since there are no strict restriction to drug information and drug-sale platforms on the internet, surfers have consistently navigated to sites where drugs can be ordered and subsequently delivered to them, just like any

other commodities. The public is therefore getting increasingly aware of the ease, comfort and affordability of medications right from their respective corners [14,15].

1.2 Attitude and Frequency of Online Drug Purchase

In a study conducted by Fittler et al, where majority of the respondents (872/1055, 82.65%) were aware of online sourcing of drugs, only (44/1055, 4.17%) had used the internet for previous medication purchases [1]. The reason for the low turnout was that most of the respondents in the study area believed that the physical retail pharmacy unit was the appropriate source of medications. It is however noted that with the frequent use of the internet, there is a possible increase in the frequency of online medication purchase. In the same vein, youth who are more disposed to internet use and of course, literacy factor will determine the medication purchase behavior and pattern for an individual in any environment.

Furthermore, the rampant use of personal computers and cell phones for communication between families, friends and peers especially among young persons and people with appreciable level of education alongside sustainable income have all influenced the propensity for online health services and product procurement [16]. The attitude of persons taking responsibility in self-managing their health have consequently increased over the years [17]. The study conducted by Takahashi and coworkers, on the extent of interactive internet use for health-related communications revealed that surfers actually chat with physicians or other health providers or persons with similar health concerns on their medical conditions. The outcome of such practices will undoubtedly increase the desire to source for drugs online, on the long run. In a Hungarian-based study of persons sourcing medications from the internet, nearly half (456/1055, 43.22%) of the respondents have chronic health conditions. Chronic use of drugs may foster the patient's deeper interest in gaining more information about their health and more so from the internet. Patients have been reported to confirm internet-sourced information from their physician or pharmacist [18]. As it stands today, an average client has a level of information on his perceived ailment before seeking medical or

pharmaceutical care before a physician or pharmacist, respectively.

1.3 Regulatory, Economic, Cultural and Environmental Influence on Online Drug Purchase

There are diverse regulatory environments within the different regions. In the United States, the internet pharmacy market is more of the prescription drugs. The model in Europe is more of nonprescription medications. The legislative style therefore contributes meaningfully to the success of an online order [19]. In developing countries, it appears the old laws have not recognized the modern development bothering on internet use and therefore poses no position on any style of operation for online drug procurement.

Online business transverses regional and jurisdictional boundaries and may generate some form of regulatory confusion. National authorities cannot operate beyond their borders [20]. The economic considerations and outcome of online sourcing of drugs seems to be deeply satisfying. Different vendors can be consulted within the space of time and the best deals in terms of delivery and cost is rationalized and instantaneously contracted. This becomes more important where there are no price control features in the environment, such as obtains in the internet space. A number of merchants may take advantage of the non-licensing or taxation requirements for business in drug and other pharmaceuticals while floating an internet-based drug business. The presence of many illegitimate websites with no defined location and professional qualification may operate without regulatory control. The main feature of this drugs-supply structure is the presentation of seemingly identical products in a chaotic and uncontrolled environment. Again, there is no restriction on the purchasers with respect to age and quantity of products requested [20-22].

1.4 What will Make More People Embrace Online Drug Purchases?

In a study conducted in Hungary, respondents believed that they could get more information online compared to the pharmacy. They also believe they could have a better deal. Products that are ordinarily and frequently unavailable in the conventional pharmacy can appropriately be

purchased online. The limitations of regimented hours of operation also do not apply to the virtual pharmacies. According to several surveys, the factors that predispose persons to embrace online purchases vary as revealed by the published data but summarily depends on the product type, the sample population studied, their educational status, income levels and substance abuse status [20,21].

2. PERCEIVED DISADVANTAGES OF ONLINE SOURCING OF DRUGS

Several publications seeking consumers perceived opinion on online sourcing of drugs revealed, a number of demerits. One of such disadvantage is that surfers are more likely to abuse drug preparations [23]. The fact that there is no control makes buyers procure drugs that they really do not need and consequently abuse them and worsen the medical condition, since there are various sources to drug-related information that are not censored, buyers may get confused from conflicting information leading to drug use problems. The source of the drug may be spurious and the reliability of the drug becomes worrisome. The quality and efficacy of the product on transit from an online sourcing may be temporarily compromised as the courier service company may have challenges with proper handling of products. Typologies of online pharmacy and dynamism of operations include buyers sending a scanned or fax copy of a prescription to the online agent and the prescription getting filled and sent by a courier agent to the buyer. Online consultation also happens with the registration and other protocols done online via completing an online generated questionnaire. Prescription is subsequently generated and online supply follows. Provision of care has been achieved by personalized chats, messages and email or generalized and hosted on static pages or frequently asked questions (FAQ). Online pharmacy employs different forms of technology to enhance the functionality of their site including video streaming on health topics and the dynamisms of use of mobile apps.

3. TYPES OF DRUGS PURCHASED ONLINE

Quite an endless list of drugs can be purchased online. It appears that some sites specialize in adverts to increase purchases. A common example of drug is the 5-phosphodiesterase inhibitors. Adverts on this class of drug have been reported to be seen as pop-ups during

surfing. Many illegal drugs have been purchased through a combination of anonymity technology and a sophisticated user-feedback system. These digital black markets are located all over the world with majority traceable to the United States and Canada. Sellers feel comfortable openly selling hard-core drugs because the identities of the dealers are utterly obscured, even with computer forensics. Most of the dealers do not accept credit cards, Paypal or any form of payments that can be traced or blocked. Bitcoins or Cryptocurrency are peer-to-peer currency not used by banks or government and are purportedly untraceable, which serves as the means of exchange.

It appears with upgrade of technology (e.g. 4G to 5G), transactions via the net will be easier and faster, one wonders, with time, if persons will need to go to physical pharmacy or drug stores to refill any kind of prescription or procure any drug at that! A study on online pharmacies revealed availability of different drugs classes for online request. The classes of drugs are well spelt out on the website and sorted by default with prices [13]. The drugs available for immediate order range from pain-relief, antibiotics, antidiabetics, infusions, fitness and supplement, oral hygiene, cough, cold and asthma drugs etc. The arrangement of the web pages will exactly portray the shelf arrangement in a well laid out physical drug store. Examples of available websites are my-medicines.com, Konga online shopping, Healthplus.com.ng, Asset pharmacy- online etc.

4. A LIST OF ONLINE PHARMACIES BY COUNTRY

Table 1 presents some online pharmacies by their countries. The names and business organizations are well known and there are no doubts as to the quality of the products that are distributed. However, the peculiarities of remote distribution of drugs and most importantly of products requiring medical supervision/ pharmaceutical care are usually evident with their attendant consequences.

5. CHALLENGES OF ONLINE DRUG SOURCING AND PHARMACEUTICAL CARE

Since the internet has become an acceptable way to source for medications due to perceived advantages of convenience and privacy, the

aspects of getting prescriptions before purchase of virtually every drug may be non-practical. Pharmacists and pharmaceutical care hinges on safe and efficacious use of medicines. This position means that the actualization of pharmaceutical care goals and objectives therefore requires concerted efforts to strategically step up interventions vis-à-vis the realities of online drug sourcing. Recent reports revealed that the use of internet pharmacies and the number of people using this avenue to procure drugs are increasing [24]. Pharmaceutical care service providers may have to step up from the remote hospital and community centres to the internet/online platform. Electronic pharmaceutical care (ePharmcare) concept will help curtail spurious use of information on drugs and drug supplies made possible by unqualified and illegal online vendors.

It is a reality that counterfeit and substandard drugs flood the physical market [25]. So also are wrong prescriptions requiring pharmaceutical interventions to save patients/users of drugs from adverse drug events [26]. Banning or fighting online drug chain supply may require more energy than proactive establishment of epharm care centres to curtail and halt the menace of faceless and harmful vendors, increasing by the day from online covers.

Interventions by the pharmacist have always been noted as a valuable input by the health care community in the patient care process. The diversified role of the pharmacist from dispensing of medications to patient care may be subtly eroded by the faceless route of drug access. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has recommended that all prescriptions be reviewed by pharmacists before dispensing and the outcome documented as a result of direct patient care [27,28]. The shunt provided by online purchase may precipitate the ill effects of online drug purchases as the required intervention may be absent. A study conducted in the United States in 2001 revealed that about 76% of prescriptions capable of causing morbidity or mortality did not reach the patients. An amount totaling 22% were duplicate orders, 19% were wrong doses, 19% were wrong frequencies [28]. It is possible to procure online drugs that will elude the assessment by a qualified clinical pharmacist. Taking such drugs may have its attendant repercussions.

Table 1. A list of some online drug business and their country of origin

Country	Names of online pharmacies (drug store)
Austria	Priceline Pharmacies, Terry White Chemmart
Canada	Brunet, Gestco, DRUGstore, Familiprix, Jean Coutu
China	China Nepstar, Super-Pharm Watson
Denmark	Association of Danish Pharmacies
Germany	Celesio
Hong Kong	Manings, Watsons
India	Medplus, Medlife
Ireland	Lloyds Pharmaes
Israel	Super-Pharm
Malaysia	Watsons, Guardian Pharm
Mexico	Famacias Benavides Famacias Guadalajara
Netherlands	Alliance Healthcare
Norway	Alliance Buds, DittApotek
UK	Busts Pharmacy, AsdaPharmacy, Well Pharmacy, Pharamcyzu Mede Xpress
United States	Family Pharmacy, Walmart, Healthmart

Clinical intervention has been proven to increase adherence to clinical practice guidelines and optimizing pharmacy benefits to the patients with extreme of ages (i.e., infants and elderly). Online drug purchase will minimize all the gains of pharmaceutical care.

6. THE WAY FORWARD FOR ONLINE PHARMACEUTICAL CARE PROVISION

As there is rising prevalence of chronic diseases and population with the attendant challenge on health systems in different countries, the evolution of reforms with inter-professional collaboration to cope with the pressure is inevitable. From the patient's end, online sourcing for health information and procurement of drugs has been documented alongside the disadvantages of the uncensored and uncontrolled modalities. From the health system, the strengthening of the concept of primary healthcare and other multidisciplinary models have been suggested to match the online drug distribution menace and challenge, stemming up with new roles for the healthcare professional (i.e., pharmacists, nurses etc) (WHO, 2010). Implementing healthcare services based on information systems and technologies (e.g., eHealth) has similarly been proposed to put sanity to online drug procurement with respect to safety and optimized benefit [29]. According to Lapao et al [30], the focus of the multidisciplinary models of care and consequent primary healthcare reforms are redirecting the thinking of community pharmacists' role. The new paradigm of community pharmacy orientation towards patient-centered practice alongside the worry on

uncontrolled drug distribution network on the internet requires developing a system supported by the clinical role of community pharmacists and an active role by the patients in their own disease management [30,31].

Pharmaceutical care being a patient-centered, outcome oriented pharmacy practice, the entire activity can be modeled and software developed to create a platform for the pharmacist to work in concert with the patient and the patients' other healthcare providers [32-34]. The design of the interactions on the platform will be directed to promote health, prevent disease, assess, monitor and, finally initiate and modify medication use. The present online procurement of drug information and consequently drugs does not guarantee safety and efficacy. Personalized drug use is also not ensured in the internet-based drug sales.

Computer software designers can work with pharmacists to design the platform where pharmacist and patients' interaction can occur based on caring, trust, open communication, cooperation and mutual decision. The series of entries on the platform will make it completely transparent that the pharmacist holds the welfare of the patient paramount and maintains an attitude of caring in exchange for the patients' agreement to supply all objective and subjective information and preferences alongside participating in the therapeutic plan. S the goal of the activities is to optimize the patients' health-related quality of life and achieving positive clinical outcomes within realistic economic expenditures, it is believed that an

agreement can easily be reached between the parties [35,36].

Online pharmaceutical care is therefore a patient centered, outcome oriented pharmacy practice where online pharmacists work with patient and other patients healthcare providers (physicians, laboratory scientists, dieticians, nurses, physiotherapists etc) to promote patients health. The common online drug procurement system is crude and it is certain that the information enquirers get are not patient-specific. Furthermore, there is no consideration of patient subjective and objective medical information. Though this means of procuring drugs may appear highly patronized, its crudity is emphasized by the fact that patients' information were not collected, organized, recorded or maintained for present or future use.

6.1 Software for Online Pharmacy Drug Shopping with Pharmaceutical Care Concept

There is a number of ecommerce software for building an online store which can be adapted to drug shopping. Examples of this include Shopify, BigCommerce and Volusion. These platform help to customize the business storefront sell on

multiple channels and accept secure payments. All of these platforms are quite easily accessible and anyone interested in online commerce can build a website by creating one using a WixEditor. With the right eCommerce platform, any business owner can make his business visible, handle shipping and deliveries, receive payments and present other added values including pharmaceutical care protocols-without leaving the physical office. Table 2 presents some platforms that are adaptable to pharmaceutical care as a value added service.

The platforms have a way to integrate with other services such as pharmaceutical care service as is the focus in this paper. Businesses rarely run everything using a single software suite, some apps are integrated to allow extra services like pharmaceutical care be available and all its benefits within the reach of online buyers [37-39]. Some software available for online use are listed in Table 3.

As community pharmacists are placed in the patient care chain being an extended frontline in within primary healthcare networks across the globe, this crucial responsibility will require appropriate training to ensure safe and effective medication use. In this modern day world,

Table 2. eCommerce platforms for online business adaptable to pharmaceutical care

Platform	Advantage
Shopify	For smooth and quick transaction
Squarespace	For simple and personalized online business
Ecwid	Aids in free start programme and provision for growth
BigCommerce	For wholesale business
WooCommerce	Aids in adding a shopping cart to WordPress site and free
Wix	Useful in building a complete site
Zyro	A simplistic eCommerce platform
Magento Open source	Handles small businesses
Prestashop	Offers a mobile-optimized platform
OpenCart	Easy to use, open-source platform

Table 3. Software for pharmaceutical Care

Software	Advantages
Pioneer Rx	Helps manage patient information and other data
WinRx	Help prescription monitoring and other data
Pharmaserv	Manages pharmacy operations and patient clinical services
SoftClinic	Gives electronic health records and hospital information system module
PharmActa	Personalized pharmaceutical care eHealth platform for patients and pharmacists

technology wise, eHealth being committed to an effective, network, patient-centered and accessible healthcare will prove a real-asset in reducing the menace of irrational and illegal drug use from online sourcing and promote therapy adherence and outcome.

7. CONCLUSION

Drug distribution pattern at the internet level has been presented with the merits and demerits alongside possible challenges this poses to efficient discharge of pharmaceutical care services. As online access to drugs may have come to stay, a formidable strategy for pharmaceutical care provision has to evolve and has been rationally reviewed accordingly to ensure safe and efficacious use of medicines.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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