The rise of electronic commerce in healthcare: The need to ensure consumer safety

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Article History:
Received on: 05 Sep 2020
Revised on: 25 Sep 2020
Accepted on: 06 Oct 2020

Keywords:
Health Product, e-commerce, internet, illegal sales, counterfeiting, patient safety

ABSTRACT
The growth of e-commerce is revolutionizing access to health products, and offers of these products on the Internet are often attractive from the customer’s point of view. However, it contributes significantly to the expansion of international trade in falsified medicines. The objective is to take stock of the significant growth in the online sale of health products with the health challenges encountered. We conducted a survey on the purchase of the most popular online health products in Morocco, and then examined the type of health products offered, the price of the most common drugs compared to conventional prices. 49 websites and social network forums were identified, 37% of which had a specific address and 63% of which had a virtual interface. The sales strategies identified are numerous, the main ones being the availability of medical specialties not available in the country, the order to pay less and save time. The most common purchases concern so-called "comfort" medicines.

INTRODUCTION
The growth of e-commerce in the world is unstoppable. With double and even triple-digit growth since its introduction in the 1990s, it has become easy to find everything online that the customer wants to buy immediately Levaggi et al. (2009). The growth of the internet and e-commerce has also taken on significant importance in the field of health, from the simple dissemination of information to a real opportunity to acquire health products directly (Orizio et al., 2009).

Many websites, blogs, and forums are emerging on the web to highlight the benefits of e-Health
services, or to promote exchanges between Internet users to find the “best” addresses or to compare prices. Besides, the behaviour of many Internet users has evolved towards the sale of various pharmaceutical products over the internet, which are often considered suspicious, most often associated with counterfeits (Lavorgna, 2015; Liang and MacKey, 2009).

Many pharmaceutical products have gradually been offered, and their online purchase can offer significant benefits that are often attractive from the customer’s point of view, including, as recognized by the Us Food and Drug Administration (FDA), a “private and convenient way to obtain the necessary drugs, sometimes at affordable prices”. However, risks to consumers are significantly increased when obtaining medical products from unlicensed and unregulated sources (Fittler et al., 2013).

The World Health Organization (WHO) is facing this problem in the context of counterfeit medicines, defined as “a global public health crisis”, stating that medicines purchased over the internet from sites hiding their physical address are counterfeit in more than 50% of cases (of the World Health Organization, 2010). The WHO, for its part, has announced some alarming figures: Globally, one out of every two medicines sold on the internet is, in fact, a counterfeit, causing more than 700,000 deaths each year. A criminal but extremely lucrative business, with a turnover estimated at more than 75 MM dollars (Organization, 2017).

Although the drug supply chain is highly regulated in most countries of the world, Morocco is not immune to this global phenomenon of illicit drug sales. Article 30 of the Law No. 17-04 on the code of the drug and pharmacy, certainly establishes the obligation to sell medicines in pharmacies, but the non-conventional circuit remains important and presents serious dangers for the health of citizens (of Morocco, 2006).

Today, there is a remarkably wide range of websites on the web that distribute, almost always illegally, different families of medicines and health products. Many people continue to buy medicines informally, unaware that these medicines can be dangerous because their composition is not subject to any marketing authorization, quality control, expiry date, or controls on transport and storage conditions.

Illegal sales of health products encompass several aspects, including the sale of real medicines by unauthorized actors, the sale of counterfeit products, the sale on the market of products whose storage and transport do not comply with regulations, prohibited or MA-free medicines (Jena et al., 2011).

From these elements, other issues such as expired and relabelled drugs, contraband drugs, over-the-counter drugs purchased outside pharmacies…

Africa is probably the continent that pays the highest price for the trafficking of counterfeit medicines, The scourge of counterfeiting mainly affects some regions of Africa, Asia, and Latin America, where access to medicines is limited (Organization, 2006). Distribution channels are much less controlled, allowing illegal networks to enter the out in two phases: the first phase consisted of collecting and analyzing the existing market more efficiently.

Thus, the objective of the study was to take stock of the significant growth in the online sale of health products with the health challenges encountered and to propose actions and perspectives adapted to public health challenges.

MATERIALS AND METHODS

The analysis of this study was carried publicly accessible data, from a selection of the most frequently cited websites, forums, blogs in Morocco and collecting messages on social networks that offer different health services and offers, focusing in particular on the characteristics of promoters and their promotional strategies, asking whether they declared their detailed physical locations with an apparent geographical reference or only had a virtual interface.

Data collection included all websites specific to the sale of pharmaceutical and medical products, the set of websites allowing the publication of ads of different categories of service: sale, rental, employment (example: Avito, Jumi), and some Social networks: Facebook, Twitter, and Instagram.

The search was conducted using some pre-selected keywords that were a combination of medical products and terms that mentioned the marketing and presumed sale of drugs and health products.

In a second step, we examined the type of health products proposed, the price of the most frequently present drugs compared to conventional prices and the origin of the products proposed.

The data collected allowed us to identify the problem and study the courses of action to be considered to secure the purchase of drugs.

RESULTS AND DISCUSSION

According to the report of the Moroccan anti-poison and Pharmacovigilance Center, drugs are the leading cause of intoxication in Morocco. Nearly 4108 drug poisonings, which resulted in 4 deaths, were
recorded in 2017, 65% of these poisonings are accidental (31% are due to fake drugs), compared to 35% of suicide attempts. The people most affected were adults (47.7%, compared to 52.19% overall) and baby walkers (22.9%), according to the report of the Moroccan anti-poison and Pharmacovigilance Center.

**Characteristics of promoters and contact details**

We identified 49 websites, forums, and blogs on social networks that meet the inclusion criteria, including 37% with a specific address and 63% with a virtual interface. Only 39% of the promoters provided full details of their physical location, with 63% reporting that they were in Morocco, 31% in Europe, and 6% in Turkey.

56% of promoters declaring their physical location offer home deliveries to the applicant regardless of their country or city of residence. In other forums, such as FACEBOOK, advertisers offer their products by asking interested parties to contact them either by the phone number they post or to contact them privately for more details.

**Marketing strategies**

The analysis of sales promotion strategies revealed that the most common ones were the safe use of personal data and secure payment, confidentiality, high product quality with affordable prices, short delivery times and delivery facilities, which offers comfort to the customer, as well as a suggestion for a bulk purchasing to pay less for some advertisers. The strategies identified are shown in Table 1.

We have also noticed that these offers are accompanied by a large number of responses in different forms: testimonial opinions or comments from various sources.

It is also noted that sales promotion strategies differ between a virtual interface and a physical pharmacy and that the strategy of buying cheaper remains the most common point for both promoters regardless of its location. This is represented in Table 2.

**Products offered Online**

The most common purchases concern in particular so-called “comfort” medicines indeed, products intended to treat sexual problems (23%), in particular, erectile dysfunction (Sildenafil), female hormones (5%), slimming products for weight loss (11%), food supplements or vitamins (8%), products for the relief of joint and muscle pain (4%) and cosmetic products (35%) are the products most concerned. The classification of products offered online is represented in Table 3.

Generic drugs (3%) are not spared from this problem, as are medical devices (4%) (insulin needles, insulin pumps, breast implants, etc.).

Among the drugs that circulate on social networks are specific high-risk drugs such as Insulins, Tacrolimus monohydrate, Enoxaparin, Norditropin, Minoxidil, Cyproheptadine with vitamins, Posalfilin The drugs found are given in Table 4.

These drugs are found on social networks where the majority sold only one or two drugs at most. These are drugs sold through virtual interfaces without the required medical prescriptions.

These announcements do not include any information on the quality and compliance with the storage conditions of these sensitive products.

**Prices**

The price of specific drugs offered for some Internet users was lower than the price of the legal circuit, with a price difference ranging from 5 to 400 Moroccan Dirhams (MAD) (Table 5), which attracts the customer more towards buying these products via the internet. For others, prices have not been specified, and ask interested parties to contact them for more details.

**Origin of the products offered**

The majority of imported health products come from producing countries (85%) India, China, Turkey, and Russia and then resell them at a lower cost in other countries. One example of promotion found: “Our website provides quality generic medicines shipped directly from India. Each of the products available on our website is manufactured with the best raw materials and with the greatest care in world-class pharmaceutical manufacturing plants in India”.

**Discussion**

Counterfeit medicines claim many victims in Morocco, as drug poisoning is second only to food poisoning. However, the Antipoison and pharmacovigilance centre considers that the figures recorded remain below reality insofar as the adverse events and deaths that occur at home escape the centre’s reporting system, this under-reporting of the patient to his doctor or pharmacist can be considered in a context of shame linked to this unauthorized purchase.

These drug poisonings are related mainly to the consumption of counterfeit drugs, counterfeit products, products of poor quality whose manufacture, storage, and transport do not comply with standards or products that have expired and been relabelled.
Table 1: Strategies to promote online sales of products

| Promotion strategies                          | Percentage (%) |
|----------------------------------------------|----------------|
| Secure payment method                        | 34             |
| Confidentiality                              | 42             |
| Cheaper price                                | 82             |
| Good quality of drug                         | 11             |
| Short delivery time                          | 75             |
| Availability of foreign drugs                | 89             |
| Easy delivery (home delivery)                | 56             |
| Free sample offer after purchase             | 4              |
| Verification of online availability          | 4              |

Table 2: Strategies to promote online sales of products according to the nature of the promoter

|                        | Virtual interface | Physical Pharmacy |
|------------------------|-------------------|-------------------|
| Secure payment method  | +                 | ++                |
| Confidentiality        | +                 | ++                |
| Cheaper price          | ++                | ++                |
| Good quality of drug   | -                 | ++                |
| Short delivery time    | ++                | +                 |
| Availability of foreign drugs | +        | ++                |
| Easy delivery (home delivery) | -          | ++                |
| Free sample offer after purchase | -        | +                 |
| Verification of online availability | -        | ++                |

- No information available  + : Information available in less than 50% of ads  ++ : Information available in more than 50% of ads

Table 3: Classification of Products offered Online

| Products offered Online                                      | Percentage (%) | Ranking |
|-------------------------------------------------------------|----------------|---------|
| Cosmetic products                                           | 35             | 1       |
| Erectile dysfunction medication                              | 23             | 2       |
| Products against obesity                                    | 11             | 3       |
| Vitamins                                                    | 8              | 4       |
| Devices and preparations for breast and buttock enlargement| 6              | 5       |
| Female hormones                                             | 5              | 6       |
| Medical devices                                             | 4              | 7       |
| Product against pain                                        | 4              | 8       |
| Generic drugs                                               | 3              | 9       |
| Anticancerous                                               | 1              | 10      |

It is therefore not surprising that the internet has become one of the primary means of marketing these counterfeit medicines. Indeed, one out of every two drugs sold on a website that does not declare its physical address is a fake (Desai, 2016). However, the declaration of geographical location is an essential feature concerning transparency. Orizio (Orizio et al., 2009) found that online pharmacies requesting a prescription were significantly more likely to report their geographic location than online sales sites that did not, which were most often just virtual interfaces. These results are consistent with the results found in our study, where most of the promoters who did not report their location were mostly virtual interfaces.

The first reason for buying medicines online is the accessibility of medical specialties not available in the country. Then there is the concern to pay less...
Table 4: Specific drugs sold over the internet

| Medication                        | Number of offers |
|----------------------------------|------------------|
| Insulins                         | 7                |
| Tacrolimus monohydrate           | 1                |
| Enoxaparin                       | 1                |
| Norditropin                      | 1                |
| Minoxidil                        | 3                |
| Cyproheptadine                   | 4                |
| Posalfilin                       | 1                |
| Fluconazole                      | 2                |
| Doxycycline                      | 1                |
| Doxorubicin                      | 1                |

and save time or to be able to buy in complete discretion. The literature review also shows that different sales strategies are adopted by Internet users, depending on the products.

Levaggi and Orizio disclosed the promotional strategies used more frequently by online sales sites to sell their products. Identified arguments regarding privacy, quality of services and drugs, price offers assurance that buying drugs online is legal, and the suggestion that customers can get a drug while avoiding a visit to the doctor (Levaggi et al., 2009; Orizio et al., 2009). In particular, privacy concerns related to the use of personal data and discreet packaging; quality of service statements related to short delivery times, online tracking of order status and, indirectly, the posting of testimonials from people who have already purchased online; and price offers mentioned as an incentive to buy in bulk. Armstrong (Armstrong et al., 1999) reported that one-third of their sample highlighted the benefits of online ordering, including confidentiality, ease of ordering, and cost reduction.

Other findings reveal contradictions. Products were offered at more advantageous prices if the customer had a prescription, while for other products, it was the absence of a prescription that was synonymous with a reduction. These different strategies seem to be designed to promote profits rather than compliance with legislation.

It seems today that online sales have become more and more complex as they offer almost every type of product. In contrast, a few years ago, they tended to sell mainly lifestyle products, such as sildenafil and food supplements.

According to the literature, studies have reported several offers of specific drugs: the erectile dysfunction drug «sildenafil» (Fittler et al., 2013; Koenraadt and van de Ven, 2018; Gallagher and Chapman, 2010), benzodiazepines (Peterson, 2001), analgesics (Littlejohn et al., 2005), antibiotics (Orizio et al., 2010), insulin, female hormones (Peterson et al., 2003), antidepressants (Orizio et al., 2009; Littlejohn et al., 2005), alopecia drugs (Armstrong et al., 1999; Littlejohn et al., 2005), obesity drugs (Bate and Hess, 2010; Littlejohn et al., 2005) and more specifically ciprofloxacin (Tsai et al., 2002), contraceptives (Memmel et al., 2006) and psoriasis treatments (Bate and Hess, 2010).

GAO (Gao, 2004) found that some drugs were more widely available and easier to obtain than others, which came from fewer sources or were more difficult to purchase. In another study by Littlejohn and Makinen counter herbal, personal hygiene and cosmetic products; “lifestyle pharmacies” provided erectile dysfunction and alopecia drugs; and “over-the-counter pharmacies” provided virtually everything, including opioids and unapproved pharmaceutical products (Littlejohn et al., 2005; Makinen et al., 2005).

We are therefore witnessing a diversification between the offer of medical products by the different Internet users—this with prices significantly lower than those charged in traditional pharmacies. The packaging is deceiving from the outside and inspires confidence in uninformed consumers. The message accompanying the proposed offer and the price are undoubtedly irresistible.

Besides, shipping and handling fees and online consultation fees can reduce total savings for consumers (Müller et al., 2009) who complain about the high prices of these products in pharmacies, the unavailability of the product, and the requirement to submit a prescription. This market for health products is flourishing and is attracting more and more young people precisely.

It should be noted that, to date, the sale of medicines
### Table 5: Comparison of drug prices between the price in the conventional Moroccan circuit or abroad and the price proposed by internet

| Medication                          | Name of ingredient                  | Prices in the conventional circuit (MAD) | Price proposed on the internet (MAD) | Difference (%) |
|-------------------------------------|-------------------------------------|----------------------------------------|-------------------------------------|----------------|
| Lantus solostar 100 IU, 1 pre-filled pen | Insulin Glargine                    | 152.50                                 | 80.00                               | 48             |
| Novorapid Flex-pen100IU, 1 pre-filled pen | Insulin Aspart                      | 129.40                                 | 60.00                               | 54             |
| Apidra Solostar 100 IU, 1 pre-filled pen | Insulin glulisine                    | 98.40                                  | 60.00                               | 39             |
| Humalog mix50 100IU, cartridges / 5 | Insulin lispro                       | 111.00                                 | 70.00                               | 37             |
| Minoxidil 2%, 1 vial               | Minoxidil                           | 247.00                                 | 83.00                               | 66             |
| Minoxidil 5%, box of 3 vials       | Minoxidil                           | 292.30                                 | 400.00                              | 37             |
| Apetamin, syrup200mL              | Cyproheptadine lysine and vitamins   | 217.08                                 | 280.00                              | 29             |
| Apetimax, syrup                   | Vitamins Lysine Royal Jelly          | 133.07                                 | 139.00                              | 4              |
| Protopic 0.1, ointment30g          | Tacrolimus                           | 369.00                                 | 350.00                              | 5              |
| Nifluril 250mg, a box of 30 capsules | Niflumic acid                      | 34.10                                  | 18.00                               | 47             |
| Aldara 5%, cream box of 12 packets | imiquimod                           | 1700.00                                | 1300.00                             | 24             |
| Imunocare 50mg/g, cream box of 24 packets | imiquimod                     | 819.53                                 | 800.00                              | 2              |
| Verufill, topical solution, vial of 15mL | Salicilic acid/lactic acid              | 56.83                                  | 200.00                              | 71             |
| Biobio active carbon               | Charbon active vitamins              | 410.00                                 | 200.00                              | 51             |
| Alvityl, a box of 40 tablets        | Paracetamol, pseudoephedrine         | 110.00                                 | 77.00                               | 30             |
| Humax, 20mg box of 12 tablets       | hydrochloride, chlorphenamine        | 34.00                                  | 20.00                               | 41             |
|                                    | maleate                             |                                        |                                     |                |

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on the internet is not possible in Morocco under the legal framework governing the sale and distribution of medicines. Article 30 of the Law No. 17-04 on the code of the drug and pharmacy, establishes the obligation to sell medicines in pharmacies (of Morocco, 2006) and prohibits any sale outside conventional channels, which remains essential and presents severe dangers to the health of citizens.

Medicines purchased on the internet even when offered under a known name already marketed are not always those for which a marketing authorization has been granted. Distribution channels used for the sale of medicines on the internet are not, as a general rule, part of the pharmaceutical chain regularly controlled by the health authorities.

According to a WCO survey, in 2011, there are 106 producer countries from all the continents, including Brazil, Argentina, Indonesia, Russia, Ukraine, Egypt or the Philippines, and 146 destination countries. However, according to recent research, Asia, China, and India in particular, are the principal manufacturers of counterfeit drugs (50% to 70%, according to estimates) (Organization, 2017). Both countries developed an important pharmaceutical industry at the time of the legal recognition of generic drugs in the 1970s. For example, India now has more than 20,000 drug producers, most of them small and specialized in generics, and about 800,000 distributors (Swaminath, 2008). In such a large sector, attempts at regulation and control are not very effective against the parallel industry.

Several recent reports of the use of medicinal products outside their marketing authorization and serious adverse reactions related to the use of falsified medicinal products purchased via the internet have been recorded.

Since 2013, WHO has received more than 1500 reports of substandard or falsified products, most of these reports (42%) come from the WHO Africa region. Falsified or fake medicines may contain insufficient quantities of active ingredients to be effective. In other cases, they do not contain any active ingredients, or even impurities or toxic substances. While inactive drugs do not affect the diseases they are supposed to treat, those containing active ingredients are still too often harmful and not only to patients (Organization, 2017).

A literature review by Gorizia (Orizio et al., 2011) revealed a dozen articles published with about sixty cases concerning the purchase of drugs on the internet, including about twenty related to the consumption of products to lose weight. Neuberg et al. (Neuberg et al., 2009) reported one case of life-threatening thyroid hormone abuse in a 56-year-old female patient encouraged and facilitated by unconventional health advice. Also, in the United Kingdom, an acute coronary syndrome was diagnosed in a 41 years old male who had taken Viagra for erectile dysfunction (Solomon et al., 2002).

Pharmacovigilance, in this case, cannot be exercised a priori on these health products since their marketing is not reported to the health authorities. Therefore, risks are often only identified as a posteriori in the context of market surveillance or when an alert has been transmitted to the health authorities, and the link has been established with the product (Badrane et al., 2018).

The purchase of health products, particularly medicines on the internet, should be made more secure. Different actors are likely to intervene to combat the illicit sale of these products, each playing their role.

These findings highlight public health issues and prospects for better regulating the purchase of health products, particularly medicines on the internet.

On the one hand, it is important to avoid customers from going to illegal websites that offer all kinds of pharmaceutical products. On the other hand, it is necessary to create a simple regulatory framework to define better the rules governing the purchase of medicines via the internet to keep the medicine in a circuit authorized and delivered by a regulated professional.

For several months, the Ministry of Health has been working on a draft text on the legal sale of medicines and strengthening the fight against counterfeit medicines. A reinforced action plan with the various actors in the fight against counterfeit medicines is also underway.

Indeed, strict regulation of medicines and its enforcement by national drug regulatory authorities would contribute significantly to the prevention and detection of counterfeiting.

At the national level, some perspectives are possible

Development of operational cooperation between the drug industry, pharmacists, and the customs intelligence department, Gendarmerie, Judicial Police to combat the illegal sale of drugs.

Development of cooperation with the public authorities and the national drug control laboratory with technical data sheets to assist in the identification and control of the main suspect products;

Setting up an active monitoring unit on the internet and investigation service.

Carrying out campaigns to warn against the risks
Implementation of surveillance and sanction measures to identify and prohibit illegal sales and counterfeiting and other falsifications of medicines, in collaboration with the judiciary, police, gendarmerie, and customs services,

Reinforcement of the capacity to detect orders from the Internet and control postal parcels.

Besides, awareness-raising campaigns aimed at the general public by the Ministry of Health could be deployed in other regions. Websites, through an information page, can raise awareness among the general public about the risks associated with the purchase of medicines online by encouraging them to favour official distribution channels, to double their vigilance in the face of an abnormally low price, the presence of spelling or grammatical errors on the box and on the site, the quality of the packaging, or unusual packaging.

At the international level, it is essential to consider intensifying international collaboration through coordinated control operations, international cooperation, in particular with the WHO, which does not primarily aim to regulate the sale of medicines on the internet. But it can, however, provide direct assistance to countries and regions to strengthen drug regulation.

CONCLUSIONS

Health products purchased over the internet can cause consumer safety concerns. The health tragedies linked to falsified products show that counterfeiting of medical products is not to be taken lightly, as it continues to cause victims throughout the world. Indeed, the trafficking of counterfeit or falsified medicines is the work of a chain of actors who are independent of each other but structured among themselves and integrated into international networks. The link is thus made between foreign producers and consumer countries via complex procedures and routes that allow them to avoid customs and health controls on a massive scale. The challenge for health authorities is now to develop an appropriate regulatory approach to control the purchase of these products on the internet and to put in place measures to prevent and minimize the risks associated with this practice.

Acknowledgement

The authors wish to thank all the individuals and institutions that made this study possible, especially Team of anti-poison and pharmacovigilance centre.

Funding Support

The authors declare that they have no funding support for this study.

Conflict of interest statement

The authors declare that they have no conflict of interest for this study.

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