

Innovative packaging of medicines

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Abstract

Packaging is both art and science of enclosing or protecting the products. The main role of pharmacist in a pharmaceutical packaging is to maintain quality of pharmaceutical products during storage, transportation, delivery, sale and use. Pharmaceutical packaging is a multiphase broad process which is classified into primary, secondary and tertiary level. These products should be designed in such a way that it gives a soothing impact to the users; also the medicine itself has healing effect, so its packaging should complement its features as well. Presently, numerous advancements and changes are taken into consideration for product safety, stability and patient's compliances. Therefore in the present review gives various aspects of conventional pharmaceutical packaging and recent advancement have been delineated.

Keywords: Pharmaceutical packaging, Compliance, Recent advancement etc.

Introduction

Packaging is defined as a technique which allows containment of pharmaceutical product from the time of production in a unit till its use. Role of pharmaceutical packaging is to provide life saving drugs, surgical devices, blood and blood products, nutraceuticals, powders, poultices, liquid and dosage forms, solid and semisolid dosage forms. Packaging of pharmaceuticals essentially provides containment, drug safety, identity, convenience of handling and delivery. Pharmaceutical packaging has to balance lots of complex considerations. Leaving behind relatively simple issues such as developing good designs and communicating with customers, pharmaceutical packagers are concerned to more pressing concerns which include fighting with counterfeiting, encouraging patient compliance, ensuring drug integrity and balancing child-resistance and accessibility for the elderly. Issue of environment safety is also key concern for both developed and developing countries packaging industry.

The drug development cycle which involves various aspects such as compliance and easy to use techniques helps to determine ways to success earlier. The industry adopted a more patient close attention to the drug development preferred by patients intended by their doctors. Dosing regimens, methods of delivery

and product packaging are now considered much earlier in development of drugs cycle.

New ideas of dynamic packaging, intelligent packaging and nanotechnology offers arrangements which play a vital part to improve or observing food quality and security and amplifying time span of usability.

Types of pharmaceutical packaging

Pharmaceutical packaging is classified into three different types: they are

1. Primary packaging system
2. Secondary packaging system
3. Tertiary packaging system

The primary packaging system contains the product and holds it that those package components actually come in contact with the product or those components that may have direct effect on the product shelf life.

Example: Ampoules, IV containers etc.

Secondary packaging system is outside the primary packaging which stores pharmaceutical packaging in it for their grouping.

Example: cartons box etc.

Tertiary packaging system is used for bulk handling shifting of pharmaceutical packages from one place to another.

Example: containers, barrels etc.²

Objectives of pharmaceutical packaging

Containment

The containment of the product is the most fundamental function of packaging for medicinal products. The design of high-quality packaging must take into account both the needs of the product and of the manufacturing and distribution system. This requires the packaging: not to leak, nor allow diffusion and permeation of the product, to be strong enough to hold the contents when subjected to normal handling and not to be altered by the ingredients of the formulation in its final dosage form.

Protection

The packaging must protect the product against all adverse external influences that may affect its quality or potency, such as light, moisture, oxygen, biological contamination, mechanical damage and counterfeiting/adulteration.

Information transmission

Labels and packages help to provide adequate information related to the drugs and communicate how to use, transport, dispose and recycle of the product. For pharmaceuticals, medical, chemical and food products, some types of information are required by governments.

Identification

The printed packs or its ancillary printed components serve the functions of providing both identity and information.

Convenience

The convenience is associated with product use or administration e.g. a unit dose eye drop which both eliminates the need for preservative and reduces risks associated with cross infection, by administering only a single dose.³

Innovations in Pharmaceutical packaging

Innovations in pharmaceutical packaging have experienced so little reinvention or change over the last few decades especially the prescription drugs. While other packaging categories have enjoyed progressive modifications, there is little variation in

the packs of pharmaceutical products from 1950s and 60s and the packs of today. However, the key role packaging plays in acquainting consumers about the contents & the risks involved in taking any prescription or over the counter drugs, there is an opportunity for modern pharmaceutical packaging to be depicted by smart info graphics. While on one hand there is a challenge of making packaging easy to open for people aged over 55, who reflects for about three quarters of all medicine users, the industry also has to create packs that are child-resistant. The external image of package must not only compliment product confidence, but provide clear & concise product identification & other feature.⁽⁴⁾

Cypak's advanced medication monitoring and report card systems

This is an advanced packaging technology can enable patients to communicate with healthcare professionals through printed technology. This record the time and data that a pill was taken based on when it is removed from its blister pack. This allows the patients to log their feedback on side-effects and treatment efficacy and upload it.

This technology holds significant potential for new levels of patient-doctor interface to workout best treatment plan. Sensor-based packaging concepts are best applied in clinical trials. This helps in drug development to establish whether a drug is ineffective or simply not being taken properly.

Cypak's advanced medication technology is used in targeting clinical trials market, as poor date resulting from non-compliance can be financially devastating in this context.⁵



Fig. 1: Cypak's Advanced Medication Monitoring and Report Card Systems

Burgopak's sliding CR blister pack

Burgopak healthcare and technology won the award for the "Most Innovative Child Resistant Packaging Design" at the Pharmapack Paris exhibition. The Burgopak's sliding CR blister pack can only be opened by applying force at two different points on the packaging. The blister pack & leaflets are coordinated with the outer box, which insures the product is never packaging.



Fig. 2: Burgopak's sliding CR Blister Pack

Ecoslide-RX sustainable compliance packaging

The pack is made from 100% recycled material using unbleached paperboard and clay coated surface designed to house blister packaging with a low of unsustainable film and foil. The slide package is very useful and it meets modern expectations for child-resistance and accessibility for seniors. It doesn't require heat sealing in the manufacturing process that reduces both cost and energy usage.



Fig. 3: Ecoslide -RX Sustainable Compliance Packaging.

Pharma small hands resistant (SHR): A re-closable and tear resistant carton

A reclosable and tear-resistant carton is ideal for highly toxic drugs. Stora Enso and Bosch launched Pharma small hands resistant (SHR). Stora Enso

Pharma SHR is a child resistant reclosable carton. It is ideal for highly toxic drugs and it is easy to use for senior adults. It is an innovative paperboard package system it only requires simple squeeze and pull manoeuvre.⁶



Fig. 4: Stora Enso Pharma SHR

Syreen prefilled syringe design

Environmental awareness is even starting to extend to the syringe market. It replaces glass with cyclic olefin polymer (COP). This material has allowed secondary packaging altogether as the COP design forms its own outer shell. The ability of packed syringes to clip into place eliminates the need for packing materials like cardboard.⁷



Fig. 5: Syreen Prefilled Syringes

The Talking Packaging: "Self Talk"

There are two developments in talking packaging:

1. The "Talk Pack" can be invisibly integrated into packaging material which needs a special scanning pen.
2. VVT Technical Research centre using tags with NFC based technology enables mobile phones to download audio, text, web page and product information. By using a special pen shaped reader information can be retrieved and store and it can replay as audio files, music, etc. To obtain the information on the manufacturer, shelf life, brand.



Fig. 6: Talk Pack

Dispensing caps

Dispensing caps store liquid and dry supplements separately from the water released by the consumer they form an energy or sometimes a medical drink. Everything from nutraceuticals to pharmaceuticals can be packed and properly dosed by a dispensed cap.



Fig. 7: Dispensing caps

Packaging against counterfeiting:

As per FDA – counterfeit drugs account for 10% of all medication in the US. Latest developments are fluorescent labels, packaging with laser surface authentication that can be recognized by a linear code. In India for instance, drug companies have been sending their medicines to overseas markets including an obligatory sport barcode on their outermost packaging, this was started in October 2011.

These are different aspects to deciphering and de-complexifying the counterfeit pharmaceutical supply chain. These technologies include bar codes, Tamper-evident packaging and the more recent RFID. The problem with these security devices is that packaging components provide no assurance as to authenticity of the contents, which may have been adulterated. Security devices alone do not reduce counterfeits but are designed to make them easier to detect.⁸



Fig. 8: Packaging against counterfeiting

Conclusion

Advancement in research of pharmaceuticals development had always being dependent on the development in packaging technology. To maintain integrity of pharmaceuticals during storage, shipment, and delivery, quality of packaging provides assurance for all these. So, development in field of packaging is correlated with development of NDA Pharmaceuticals in market.

Presently, very few pharmaceutical industries spend time and money on R and D in packaging. The conventional packages available do not serve the purpose of providing protection against counterfeiting and quality, and the industry seems to be sluggish in adopting the technical advances in the packaging, probably on account of the prohibitive cost factor.

Innovative packages which would be created by the industries will not only contribute to consumer's acceptability but also imparts patients as well as consumer's adherence to the product.

There is always scope for advancement and improvement of the pharmaceutical packaging. Therefore, new techniques like Cypak advance medication, Syreen prefilled syringe design, etc.

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Conflict of Interest

None.

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