

**CURRENT AND FUTURE ASPECTS OF PHARMACEUTICAL PACKAGING****<sup>1</sup>D. K. Sanghi and \*Rakesh Tiwle**<sup>1</sup>Shri Laxmanrao Mankar Institute of Pharmacy Amgaon District Gondia.

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**ABSTRACT**

Packaging play an important role in the pharmaceutical products. Pharmaceuticals packaging provides a protection, establishment, quality of the product and display the needs of security. Now a day's F&D also focus on the packaging development of the pharmaceutical products. In that FDA has been made several guideline under the section 132 & 211. Packaging maintains the integrity of pharmaceuticals products during the time of storage, shipment and transportation. Pharmaceutical packaging is a multiphase broad process which is classified into primary, secondary and tertiary level. The purpose of this paper is to focus about the packaging technology of the pharmaceutical products.

**KEYWORDS:** Child-Resistant Packaging, Patient-friendly Packaging, Unit-Dose Packaging, Two-in-one prefilled vials, Prefilled Syringes.

**INTRODUCTION**

Packaging indicates the assessment of the pack products which encase the pharmaceutical products. It is basically outer shell which grabs the attention of consumers. A creativity of a packaging product or it is wrapped by double coated upper and inner surface of the products. Pharmaceutical product from the time of manufacturing stops to utilize. Encasing of drugs is important for life-preserving drugs, medical artifice, and medical treatments. Pharmaceutical packaging products a broad process and a various task. It provides life saving drugs, medicinal treatments and new products like medicinal nutritional in every dosage form. It provides the protection against the environmental condition physically or chemically. Packaging should include the proper information of the products like storage conditions how to use and if any indication for the children it should be printed in to the packaging products. It also include the batch no manufacturing date and license number also.

**SELECTION CRITERIA OF PACKAGING MATERIALS**

1. It protects against the environmental conditions like humidity, temperature.
2. In packaging the order taste not be alter.
3. It should be non toxic.
4. Packaging material should be the according FDA guideline.

**ADVANTAGES OF PACKAGING**

1. It enhance the integrity of dosage form.
2. Side effects should be minimized.

3. Adequate packaging enhances the shelf life of the products.

**Pharmaceutical packaging type.**

1. Primary packaging system is the material that first envelops the product and holds it.
2. Secondary packaging system is outside the primary packaging and used to group primary packages together e.g., cartons, boxes,
3. Tertiary packaging system is used for bulk handling and shipping e.g., barrel, container.

**Patient-friendly Packaging**

Parents feel the pressure when a young child needs certain medications, knowing that giving too much or too little could cause serious side effects.

**Figure. No. 1.****Child-Resistant Packaging**

C-R packaging is special packaging used to reduce the risk of children ingesting dangerous items. In some jurisdictions, unit packaging such as blister packs is also

regulated for child safety. In developed countries like UK, it has been made compulsory to pack drugs like Aspirin, Elemental iron, Contraceptives and many other drugs to be packed in CRP.



Figure. No. 2.

### Unit-Dose Packaging

A unit dose is the amount of a medication administered to a patient in a single dose. Unit-dose packaging is the packaging of a single dose in a non-reusable container. It is increasingly used in hospitals, nursing homes, etc., Medications in unit-dose packaging are easily identifiable and can be returned to the pharmacy if the medication is discontinued.



Figure. No. 3.

### Two-in-one prefilled vials

Two-in-one vial is a multi-chamber dispenser, which provides a closure solution for filling and separately packing the medication and water for injection, or for the compound injection packaging in a sterile vial.



Figure. No. 4.

### Prefilled Syringes

The benefits compared with vial-disposable syringe concepts are obviously convenience and ease of handling, as well as advantages in safety and a reduction of drug overfill. In the future, the pharmaceutical and biotech industries will ask for prefillable drug delivery systems for valuable potent drugs. Particularly, for biological the parenteral application will remain the most important route of application. The worldwide prefilled market is estimated to be one billion units.



Figure. No. 5.

### Tamper Evident Packaging Systems

Some packages are inherently tamper proof, like a tin can hermetically sealed, an aseptically packed multilayer carton or a vacuum or the retort pack.

#### a) Film wrappers

A transparent film with a distinctive design is wrapped securely around a product or product container. The film must be cut or torn to open the container and remove the product. Substrates options include ultra-destructible films, voidable films that provides image when removed. e.g, solvent sensitive papers.



Figure. No. 6.

#### b) Shrink seals and bands

Bands or wrappers with a distinctive design are shrunk by heat or drying to seal the cap and container union. The seal must be cut or torn to remove the product.



Figure. No. 7.

#### c) Breakable caps

Such caps break when an attempt is made to open it. These caps provide external tamper evidence and can also be combined with the internal seals thereby providing double security.

#### d) Sealed tubes

The mouth of the tube is sealed, and the seal must be punctured to obtain the product.

#### Future of Packaging Technology

Pharmaceutical industry research and manufacturing technologies have driven significant developments in packaging and delivery systems. An increase in the number of large-molecule, biopharmaceutical drugs in development pipelines has led to an increase in the need for injectable packaging and administration systems. The old glass and elastomer closure systems may not provide the effective barrier properties needed for high-value, lifesaving therapies. Component manufacturers have responded with new materials and technologies that ensure extended drug-product shelf-life. Many new biotechnology-derived drug therapies are unstable in liquid form and therefore are introduced as lyophilized or dry powder dosage forms. Lyophilized drugs need special stoppers for optimal performance in lyophilization chambers. The stoppers must solve the problem of the stopper sticking to the lyophilization shelf after the cycle is completed. In addition, lyophilized drugs typically are reconstituted at the point of care, thus requiring patient-friendly administration systems.

Packaging and delivery systems as a differentiator for drug products will continue to become more important, especially in crowded therapeutic areas and for solving industry-wide problems such as drug-product counterfeiting. The market today is receptive to packaging systems that can provide track-and-trace capabilities and product authentication throughout the supply chain. Pharmaceutical seals are an ideal platform for these technologies. The wider use of technologies such as RFID tags embedded in the plastic button affixed to the seal, or ultraviolet inks applied to the seal, providing item-level security may be seen. The drive for cleanliness and purity will no doubt continue into the foreseeable future.

Although predicting the future is problematic, but one prediction with confidence can be made: as pharmaceutical research continues to develop advanced, life-saving therapies, the systems used to package and administer those therapies will keep pace through advances in material science and innovative design.

#### CONCLUSION

In the era of globalization, it would be a challenge for the packaging industry, as the years ahead would witness the opening of the global channels, and to match the international standards and quality, it is necessary that packaging industry upgrades more in research to have a holistic approach to packaging that would go beyond functional aspect of packaging. 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. As packaging industry is directly or indirectly involved in the drug manufacturing process, it becomes ethically mandatory to understand and incorporate scientific methods in packaging. The pharmaceutical packaging trends are on the verge of innovative rapid growth provided the needs of the product, its security, cost and patient convenience is taken into consideration to build brand identity.

Ideas have been plentiful from packaging designers, as well as in the frameworks. Often it is heard that once a

#### PACKAGING MANAGEMENT

Packaging management play a vital role in the pack primarily serves as a means of selling and protection of the product. The functions within a company which are either directly or indirectly associated with packaging. Where as in a small company one person may cover every activity and probably not realize that one is involved in packaging, many specific jobs can be identified with larger companies. marketing and sales.



Figure. No. 8

- Packaging supplies buying, packaging buyer or package purchasing ,supplies, warehouse, warehouse supplies, warehouse manager, finished stock manager
- Package development, packaging technology, pack or package research or engineering production, product manufacture and packaging
- production engineering, machinery purchasing, spare-part supplies and maintenance analytical method development for product and 'pack'
- pack design, packaging design-graphical and functional; design purchasing
- legal aspects of packaging; legal department

#### ➤ **Child-Resistant Packaging**

Child-resistant packaging (CRP) or C-R packaging is special packaging used to reduce the risk of children



**Figure. No. 9.**

- **Unit-Dose Packaging**
- A unit dose is the amount of a medication administered to a patient in a single dose. Unit-dose packaging is the packaging of a single dose in a non-reusable container. It is increasingly used in hospitals, nursing homes, because it is easy and convenient in handling.



**Figure. No. 10.**

- **Prefilled Syringes**
- The use of prefilled syringes is a modern way to apply parenteral drugs. With the achievements in science and technology in the past twenty years an

increasing number of injectable apply prefilled syringes.

#### ➤ **Tamper Evident Packaging Systems**

##### ➤ **Film wrappers**

- A transparent film with a distinctive design is wrapped securely around a product or product container.

##### ➤ **Breakable caps**

##### ➤ **Sealed tubes**

##### ➤ **Shrink seals and bands**

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#### **REFERENCE**