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Evolution of drug delivery system for better patient safety

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Drug delivery systems have rapidly evolved with new technologies that support home use and can aid in patient compliance, adherence and safety. Two areas of recent innovation, in particular, are helping pharmaceutical companies meet new market demands for self-care at home: patient-controlled delivery systems and wearable injectors. Alagu Subramaniam, Managing Director, India, West Pharmaceutical Packaging India Private Limited shares his views on evolution of drug delivery system for better patient safety



Chronic conditions such as diabetes, multiple sclerosis and rheumatoid arthritis are on the rise and often require daily self-administration of injectable therapies. While it may be convenient for patients to self-administer medication at home, it can also be quite difficult. Patients need to manage dosage, store medications and supplies and may be at risk for needlestick injuries.

Fortunately, drug delivery systems have evolved to incorporate new technology and novel materials to aid in patient compliance and safety. New developments in self-administration technology – such as ergonomically designed, patient-

controlled injection systems and wearable injectors – are helping to provide safe, reliable and convenient methods for home-based drug administration.

Advances in Self-administration

Drug delivery systems have rapidly evolved with new technologies that support home use and can aid in patient compliance, adherence and safety. Two areas of recent innovation, in particular, are helping pharmaceutical companies meet new market demands for self-care at home: patient-controlled delivery systems and wearable injectors.

Patient-controlled self-injection systems represent an important advancement in injectable drug administration. Patients with chronic conditions sometimes have dexterity challenges that can make it difficult to reliably self-administer doses of injectable medicines. New, ergonomically designed patient-controlled injectors can help optimize self-care by making it easy for patients to hold the system and administer the dose at the touch of a button. A simple, two-step operation where the patient removes the cap and presses the system against the skin to deliver a subcutaneous injection may be an ideal solution for those with dexterity challenges. Audible, visual and tactile end-of-dose indicators, as well as a passive safety system that covers the needle after injection can also help make the drug delivery process more intuitive.

Self-injection systems that enable patients to control the rate of the dose may help to minimize pain compared to spring-based auto-injectors. Patient-activated and controlled systems may also assist with compliance since the systems are not indicative of a syringe injection, which may be less frightening for the patient. Thus compliance may be easier and the therapy adherence could be more successful for those with needle phobias. In addition, patient-activated and controlled systems do not rely on complicated mechanics, which can help to shorten the development time needed to pair the device with a drug.

New developments in wearable drug delivery technology are also helping to provide a safe, reliable and effective method for home-based drug administration. Some patients either do not want to inject themselves with medications, or their conditions make it difficult for them to do so. Additionally, for some injectable medicines with higher-volume doses, it can be hard to administer the drug consistently via a prefilled syringe. Furthermore, some drugs – including many new biologics – require large volumes of viscous solutions, making a single-dose option difficult or impossible.

Wearable injectors – which typically adhere to a patient's abdomen – are quickly becoming popular choices for delivering many therapies for chronic conditions. They are convenient and easy to use and can be pre-programmed to deliver high volumes of viscous or sensitive drug products, eliminating the need for patients to measure dosages and helping prevent the risk of needlestick injuries.

Designing with the User Experience in Mind

While patient-controlled self-injections systems and wearable injectors both offer tremendous opportunity for advancing at-home administration, developing these new systems can pose a significant challenge for pharmaceutical manufacturers: how to design a wearable injector that patients not only *can* use, but also *want* to use. To meet this challenge the makers of injectable medicines must fully understand and incorporate the needs of end users when bringing a self-injected therapy to market. This requires giving careful thought to how a medication will be administered by patients in order to ensure optimal patient outcomes. As such, the design of an injectable medicine's delivery system is fast becoming an essential aspect of the manufacturer's go-to-market strategy for a drug.