White Paper

Enhancing patient-friendly packaging

Introducing TabTec® CR, a convenient solution for oral solid dosage products with integrated desiccant and child-resistant opening

More and more people rely on the use of prescription, over-the-counter (OTC), and nutritional supplement products to optimize health and well-being. Post-Covid there has been a notable uptick in self-care with the global market now estimated to be above 1.5 trillion USD and growing at a rate of 5 to 10%[1]. The pandemic made at-home testing routine, and underlined the importance of health, thereby helping to promote a greater emphasis on independent healthcare. Key areas of focus include stress management, sleep improvement, smoking cessation, and nutritional support with an ever-expanding range of innovative products serving these growing markets. Convenience is a defining factor in their adoption and ongoing use.

[1] S. Callaghan et al 'Feeling good: the future of the $1.5 trillion wellness market', McKinsey & Co, April 8, 2021

At the same time, the prevalence of chronic conditions such as diabetes, hypertension, and high cholesterol is growing. Almost 50% of the US population is now living with at least one chronic health condition with 40% of adults suffering from two or more[2]. Research indicates that health literacy and self-care have an important role to play in tackling chronic disease with better self-care leading to improved symptom recognition, enhanced disease management and a reduction in risk factors[3].

From vitamins, minerals and, in select regions, cannabidiol (CBD) to OTC products for the treatment of pain, nausea, heartburn, indigestion, coughs and colds, and allergies, to prescription drugs – oral solid dose (OSD) products have a vital role to play in meeting requirements for both self-care and chronic disease management. Key to their popularity is their safety, shelf life (stability), convenience, and cost. Presented in the right packaging, the safety and effectiveness of these products are ensured, and some can be carried easily by the patient, ready for use whenever and wherever required. But what is the right packaging? In truth there is no one size fits all solution. There is rather a range of options that vary with respect to factors such as patient appeal, useability, safety, protection from moisture, and recyclability.

Patient preference, industry innovation: the factors shaping OSD product packaging

Patient-centricity has become a watchword within the pharmaceutical industry from drug development through to packaging, and for good reasons, since user preference and accessibility have a defining impact on the success of a product. Tablet and capsule attributes such as texture, taste, swallowability, size, and color play a vital role when it comes to developing patient or user-centric products – and so does packaging[4]. Aside from its primary purposes of preservation and protection, packaging can define the handleability, ease of use, convenience and aesthetic appeal of the product. Research indicates that packaging interventions can help to improve patient adherence[5], while in a crowded OTC marketplace it can help to impart the crucial eye-catching appeal that makes a product stand out and promotes brand loyalty.

[2] R. Numerof ‘Our Nation’s Chronic Disease Epidemic is Getting Worse So Who’s Responsible?’, Forbes, November 22, 2022
[3] C. E. Magi et al ‘Health Literacy and Self-Care in Patients with Chronic Illness: A Systematic Reviews and Meta-Analysis Protocol’, Healthcare (Basel), March 31, 2024; 12(7):762
[4] B. Hauber et al ‘Patient Acceptability and Preferences for Solid Oral Dosage Form Drug Product Attributes: A Scoping Review. Patient Prefer Adherence’, June 21, 2024; 18:1281-1297
[5] V. S. Conn ‘Packaging interventions to increase medication adherence: systematic review and meta-analysis’, Curr Med Res Opin, November 4, 2014; 31(1):145-160

Improving patient compliance is especially important and a major goal for the pharmaceutical industry and healthcare providers alike. In the US, for example, it is estimated that non-compliance results in approx. 300 billion USD in avoidable healthcare costs each year and leads to 125,000 early deaths[6]. Adherence is particularly important for the chronic conditions that increasing numbers of people now live with from a relatively early age such as hypertension and diabetes where non-compliance can lead to adverse outcomes and escalating health issues.

The development of patient-centric packaging calls for a robust understanding of how products are prescribed, purchased, and used every day by different groups. For instance, more and more people now purchase OSD products online, increasing the need to consider e-commerce supply chain requirements[7]. This route imposes extra demands on the packaging due to the additional transport and handling and the associated risk of squashing, denting, or breakage. At the same time, it increases the need for visually appealing packaging to attract the browsing customer and help to convey quality and robustness.

[6] American Heart Association 'Medication Adherence: Taking Your Meds as Directed', January 18, 2024
[7] Meussling, T. 'Packaging for the Modern Patient: Key Considerations for e-Commerce', Packaging Technology Today, July 9, 2019

There is also an increasing trend for OSD product use ‘on the go’, especially when it comes to managing long-term chronic conditions and for OTC products. Rather than remaining at home, tablets and capsules are routinely kept in pockets, handbags, or left in the car. This again provides opportunities and challenges for the packaging manufacturer with respect to portability, ease of use, and protection over a wide range of environmental conditions.

Packaging solutions for tablets and capsules are progressively evolving in line with such requirements, shaped by additional industry drivers such as the need to improve sustainability and reduce carbon footprint, a trend that intensifies the need for appropriate material selection. Additional challenges include the need for packaging that is childproof while still being convenient to use, and that ensures product stability and acceptable shelf-life for every product, for instance through the optimized use of desiccants.

For pharmaceutical products, regulatory authorities such as the FDA provide clear guidance for the design, content, and labelling of packaging[8], covering requirements relating to tamper resistance, childproofing, and protection from external factors such as moisture. Innovations in pharmaceutical packaging necessarily take such requirements into account and though there is greater flexibility in packaging for non-pharmaceuticals, many of the same factors are equally important for safeguarding the consistent product quality on which brand reputations are built.

Assessing the options for OSD product packaging

This understanding of evolving patient and industry need provides a useful backdrop for assessing the advantages and disadvantages of established OSD packaging solutions. Blister packs are one of the most common. Easily manufactured at high throughput from thermoformed mono- or multi-layer transparent plastic, they are lightweight and made in various sizes from a few tablets to up to 20 doses. They offer an individual dose that users can easily check they have taken and are relatively difficult to tamper with.

These factors make blister packs convenient to use, though sharp corners and tougher child resistant backings can be problematic for some users. Furthermore, some product formulations that are extremely sensitive to moisture and/or light require the use of opaque

[8] FDA Guidance for Industry. ‘Container Closure Systems for Packaging Human Drugs and Biologics. Chemistry, Manufacturing and Controls Documentation’, May 1999

barrier materials, such as aluminum or other commercially available high barrier multi-layer films. All products provided in thermoformed blisters require the use of a secondary packaging carton to ensure product integrity during transport and handling, inclusion of the product use leaflet as a medium for printed regulatory information, security/tracking, and product identification/branding. Desiccants, where needed, may be added as a thermoplastic layer inside the thermoforming film. This, however, can increase unit price significantly and further complicate efforts towards recyclability. In general blister packs are not easily recycled.

Bottles are also a popular packaging choice, particularly in the US. Available in a variety of sizes, these are usually made of plastics such at HDPE, PET, or polypropylene, and typically accommodate 10 to 30 tablets for products destined for use ‘on the go’. Bottles are generally fitted with a standard push and turn child-resistant closure which is effective but may pose difficulties for other patient populations such as the elderly. Tamper proofing is usually achieved through a shrink sleeve, foil laminated heat seal with an additional seal on any secondary packaging. Desiccants can either be incorporated into the bottle itself, usually within the cap, or simply dropped in – a far less expensive option but one that can hinder product dosing. Bottles score moderately well on recyclability, though caps can be problematic if not mono material, but most are far from optimal with respect to discreet storage in a pocket.

Less common but still widespread packaging options include convenience vials and pouches, both of which are a discrete, pocketable choice for the on-the-go market. Convenience vials are typically the size and geometry of a lipstick container and usually contain just 8 to 12 tablets. They have the same push and turn closure as a bottle, though they lack a foil laminate induction seal, similar tamper proof solutions and comparable recyclability. However, desiccant incorporation is a major limitation; commercial options for vials with built-in desiccants are minimal, as are drop-in solutions, and potentially unviable based on cost.

Pouches are thin multi-layer plastic, paper and/or foil packets usually used for just one or two doses since once they are opened by tearing, the packaging loses its integrity. Pouches provide minimal resistance to crushing but offer good protection from moisture, typically due to the presence of an aluminum layer in the film. As with blister packs, the weight of material

used is relatively small, but the composite nature of the product makes recycling difficult. Furthermore, making a pouch that is child resistant requires the use of more complex opening mechanisms that can significantly increase per unit cost and impact user satisfaction.

In summary, there is no ideal format for primary OSD packaging. However, there is a wide range of existing solutions that serve various applications variously well, and identifiable opportunities for innovation to fill the gaps.

Introducing TabTec® CR: an innovative choice for OSD products

TabTec® CR is a new packaging platform from Sanner that extends the choice for OSD products such as tablets, caplets, soft gels, and capsules when product convenience is key. With a patented and certified child resistant push/flip opening, TabTec® CR has a slim, sleek, and appealing profile that makes it easy to slide into a pocket discreetly. When combined with custom colors specific to products brand, TabTec® CR stands out on the shelf, appealing to consumers both visually and in use.

TabTec® CR overcomes the most critical issues with respect to current convenience packaging options by providing a container suitable for a wide range of OSD formats, flexibility in product count, and most critically, an integrated desiccant solution to ensure product stability in a way that does not interfere with product dosing.

Extensive in-house studies have been conducted to evaluate TabTec® CR's dosing flexibility across the range of OSD formats and sizes currently available. Excluding the impact of product count, dosage formats that are smaller, denser, and uniform in shape provide the ideal dosing experience. As most OSD products do not meet an ideal design, these dosing studies provide product count guidance for all commonly used OSD formats and sizes, to ensure TabTec® CR provides a reliable dosing experience when used with a specific product.

The integrated desiccant chamber in its base sets TabTec® CR apart from many alternative solutions while providing a high degree of flexibility. Available with different desiccants – silica gel, activated carbon, molecular sieve, and blends – or without desiccant (if not required), different base configurations can be ordered and used with the same primary container providing great flexibility while minimizing inventory requirements.

TabTec® CR has been designed to be compatible with existing bottle filling and packaging lines and increases overall line efficiency with its integrated desiccant (elimination of desiccant insertion). TabTec® CR's shape provides various options for labelling, including pressure-sensitive (two panel or wrap around) and shrink sleeves. Tamper evidence features can be incorporated into the labels or be provided by secondary packaging such as cartons or hanging face-seal blisters for point-of-sale positioning.

This flexibility comes at a unit price that is directly comparable to that of a convenience vial or traditional bottle/CRC closure with drop in desiccant, making TabTec® CR an attractive option for a large and diverse portfolio of drug products and nutraceuticals that require robust moisture control to meet shelf-life requirements. The thoughtful combination of features makes TabTec® CR a compelling addition to the OSD packaging market that is particularly well-aligned with requirements for product shelf life and stability in combination with the convenience and ease-of-use required for on-the-go administration.

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About Sanner

Sanner was founded in 1894. Headquartered in Germany with best-in-class manufacturing facilities across Germany, France, Hungary, China, and the U.S. Sanner has successively developed from a global market leader for desiccant closures and effervescent tablet packaging into a sought-after provider of customized solutions in the areas of medical devices and diagnostics, pharmaceuticals, and consumer healthcare. Today, Sanner supplies its products to more than 150 countries globally and has more than 820 employees. In November 2021, GHO Capital, Europe's leading specialist investor in healthcare, acquired a majority stake in Sanner to partner with the fourth generation of the Sanner family to continue to support the growth of the company with a specific focus on transforming Sanner into a global MedTech CDMO.