INSIGHTS INTO THE FUTURE OF

# Child Resistant Packaging

Adopting new technology to protect children from hazardous substances and products

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# Contents


Child-Resistant Packaging - Today's Landscape 3

Current EU Legislation and International Standards 5

Driving Forces of Change in Child-Resistant Packaging 6

Protecting Children from Non-medicine Poisoning 7

Innovation in Child-Resistant Packaging 8

Introducing Origin - Child-Resistant Packaging for The Future 9

Why Choose Origin? 10

# Child-Resistant Packaging
# Today's Landscape

Child-resistant packaging is a critical component of producing and selling hazardous substances such as pharmaceuticals and toxic materials.

An increase in legislation and regulation around the world, has led to the growth of the child-resistant packaging market.

The global market for child-resistant packaging is predicted to double over this decade, from approximately **$20 billion** to **$40 billion** by 2031.

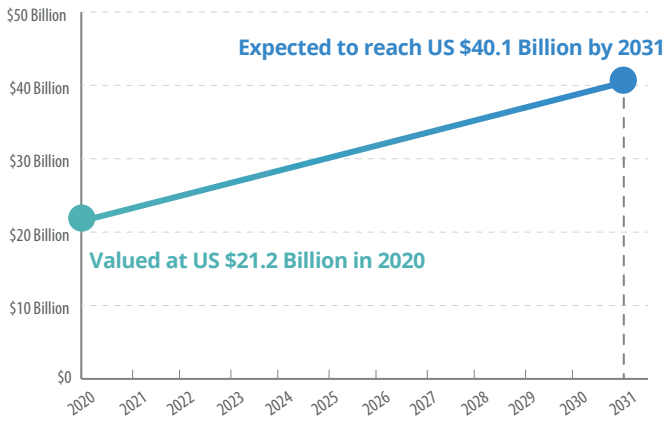



Figure 1 - Growth of child-resistant packaging market

## Acute Child Poisoning - A Global Challenge

In 2012, the European Union (EU) issued a report revealing the worrying extent of childhood poisoning, accounting for the deaths of more than 3,000 children aged between 0 and 14, each year. The study compared unintentional child deaths and found that acute poisoning was the fifth most common cause.

In the USA, 6,000 children under the age of five were admitted to hospital and a further 55,000 were given remedial treatment in emergency rooms (ERs) for poisoning caused by the ingestion of pharmaceuticals in 2012.

The problem of childhood poisoning still remains, with more recent statistics showing a relatively high amount of child poisoning. In 2019 there were 37.4 poison exposures per 1000 children aged below six years in the USA. 99.2% of these poison exposures were unintentional.

Although accidental poisoning occurs in the adult population too, children are disproportionately affected.

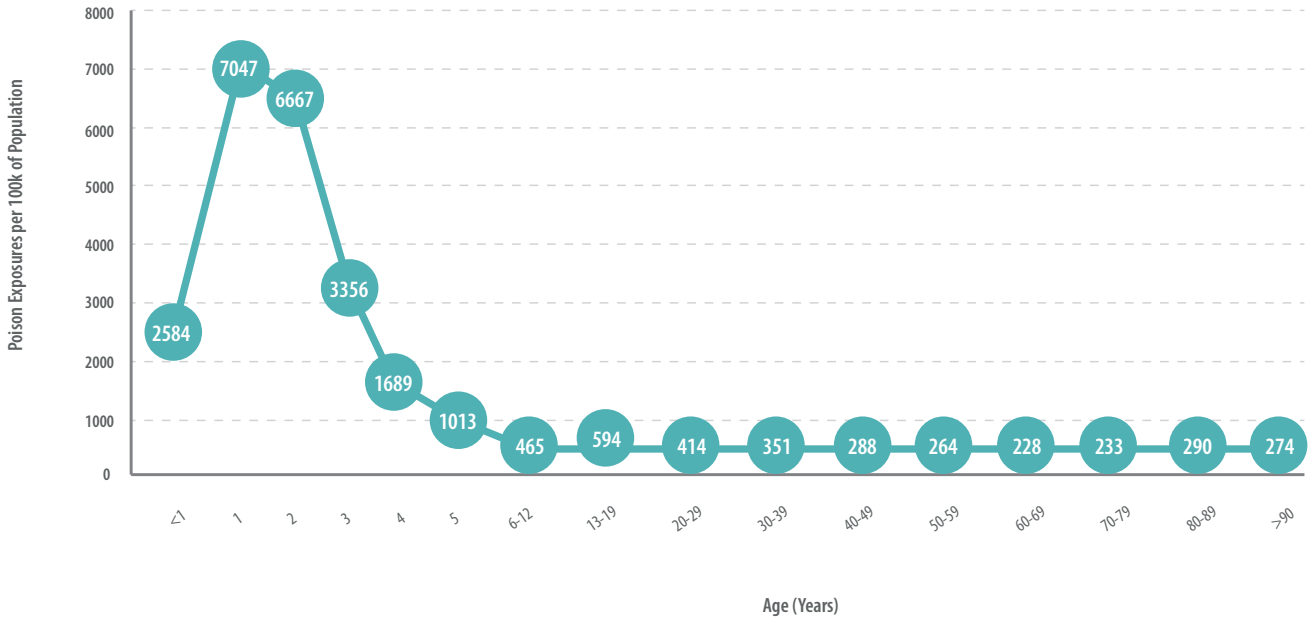



Figure 2 - Number of poison exposures per 100k of population by age (in the USA)

## Child Poisoning - The Most Common Substances

In order to protect children from the harm caused by unintentional poisoning, it is important to understand which substances are the most likely to be accidentally swallowed or imbibed.

The three main culprits are cosmetics and personal care products, cleaning fluids and substances, and painkiller medication (also known as analgesics). Combined, these three types of substance account for more than 30% of child (aged below six years) poisonings in the USA.

| | No. | % |
|---|---|---|
| Cosmetics & Personal Care Products | 109,465 | 11.4 |
| Cleaning Substances | 100,830 | 10.5 |
| Analgesics | 85,978 | 9.0 |
| Foreign Bodies/Joys/Miscellaneous | 68,707 | 7.2 |
| Dietary Supplements/Herbals/Homeopathic | 48,537 | 5.1 |
| Antihistamines | 43,944 | 4.6 |
| Topical Preparations | 42,746 | 4.5 |
| Vitamins | 39,122 | 4.1 |
| Pesticides | 34 ,356 | 3.6 |
| Plants | 26,417 | 3.6 |

Figure 3 - Main types of substance involved in child (under 6) poisonings (in the USA, 2019)

In older children and adults, unintentional poisonings rarely involve cosmetics and cleaning substances, and are instead more likely to be caused by pharmaceutical overdose.

Therefore, when we consider the need for child-resistant packaging, the most critical items to include are cosmetics, cleaning substances, and painkiller medication.

Also, the past decade has seen an increase in the amount of over-the-counter (OTC) medication used by adults, including medicinal cannabis, so special attention should be paid to this area. The global market for OTC medicinal products is expected to grow from $157 billion in 2021 to more than $230 billion by 2028, at an expected CAGR of 5.8%.

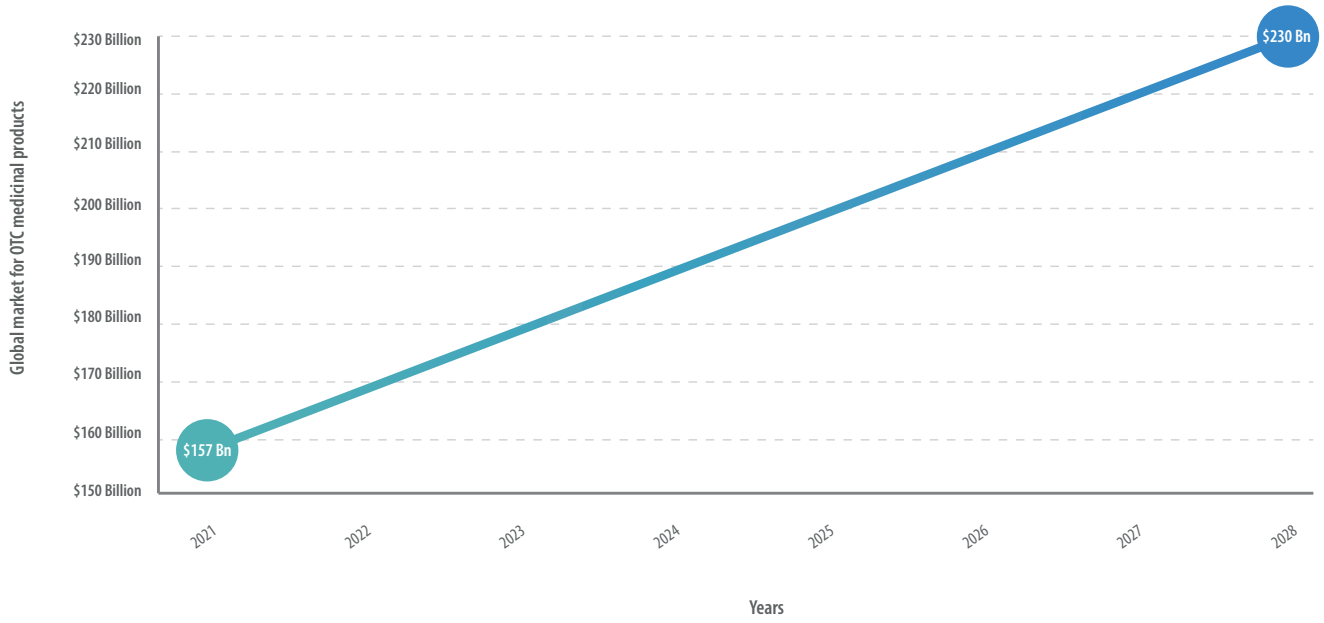



Figure 4 - Size of global over-the-counter medication market from 2017 to 2028 (USD Billion)

# Current EU Legislation and International Standards

## The European Union (EU) has robust legislation in place to help reduce and prevent occurrences of unintentional child poisoning.

In the EU, the Classification, Labelling and Packaging (CLP) Regulation ((EC) No 1272/2008) is regularly updated by the European Chemicals Agency (ECHA) to ensure that hazardous chemicals are safely contained, with child-resistant packaging where necessary. The legislation lists the criteria for substances that need to be fitted with child-resistant packaging, including toxicity, skin corrosion properties, and respiratory sensitisation.

In 2015, the EU undertook a large-scale project to enforce compliance with CLP packaging requirements. The project found that 29% of the products investigated turned out to be non-compliant with CLP and nearly 44% were non-compliant with CRF (child-resistant fastening) regulations. Reclosable CRF products should be compliant with ISO 83173 and non-reclosable CRFs should be compliant with EN 862. Compliance needs to be tested in a certified lab that complies with ISO/IEC 17025:2005.

## Global Initiatives to Reduce Childhood Poisoning

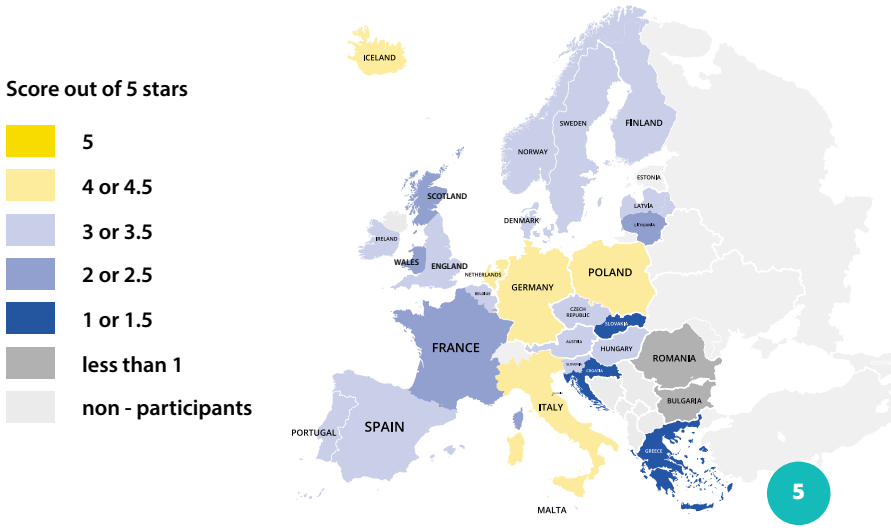
Several international organisations and governmental bodies around the world run campaigns and initiatives to reduce the occurence of unintentional child poisoning.

The World Health Organization (WHO) is involved in establishing poison centres in member states. In 2021, the WHO revealed that only 47% of member states have an active poison centre, with noticeable gaps in regions such as Africa, East Mediterranean, and Western Pacific.

The UK government body, Public Health England, began a campaign in 2018 to reduce unintentional injuries of children aged 5 and under. Accidental poisoning was identified as one of the top three causes of injury and death in this age bracket, after falling and collision with mechanical forces. The report revealed that 70% of accidental poisoning cases were caused by medication and 20% by household chemicals.

The European Child Safety Alliance released a report in 2012 as part of the Tools to Address Childhood Trauma, Injury, and Children's Safety (TACTICS) to influence national policy on unintentional injury, with a strong focus on accidental poisoning. Each European member state was rated out of five stars for the efficacy of their childhood poisoning prevention policies and measures. Based on this rating system, the ECSA set out to enforce policies to reduce poisoning, including adherence to robust child-resistant packaging of hazardous substances. Out of 27 member states, 21 were found to have good educational strategies in place, but only 12 had sufficiently well-enforced legislation on child-resistant packaging.

*Growing awareness of the scale and seriousness of unintentional childhood poisoning is driving change within the pharmaceutical and hazardous substances industry, especially in the way items are packaged.*



# Driving Forces of Change in Child-Resistant Packaging

The legislation and initiatives mentioned in the previous section have compelled pharmaceutical and chemical companies to make changes in the way they package hazardous substances.

At the moment, squeeze-and-turn or push-and-turn caps and press-to-release sliding seals or zippers are the most common child-resistant packaging options.

One big driving force of change has been a series of high profile lawsuits against pharmaceutical companies that have not adhered to legislation. In 2017, Dr Reddy's Laboratories was fined $5 million for failure to comply with the Consumer Product Safety Act (CPSA) and PPPA. The damage to their financial status, reputation, and investor confidence was significant.

Another driver behind innovation in the child-resistant packaging industry is sustainability. The UN Sustainable Development Goals have been almost universally accepted across the world and achieving environmental sustainability in pharmaceutical packaging is an important part of the initiative.

Manufacturers of hazardous substances are now under pressure to abide by tougher legislation and regulation, while keeping costs down and hitting sustainability targets. Therefore, the big pharmaceutical and chemical companies are channeling serious funding into research and development to innovate new child-resistant packaging solutions.

## Considering Senior-friendly Packaging

As well as the drive to protect children from the harm caused by accidental poisoning, it is important to also consider senior citizens and protect their ability to access important medication.

It is no secret that we live in a rapidly aging population, with many elderly people living alone or in care homes. It is important that child-resistant packaging is not so difficult to open that senior citizens cannot access their medicine. Also, the COVID-19 pandemic has exposed the problems faced by care homes in terms of understaffing which means that staff may not always be on hand to open packaging at the required times, especially for those deemed more able.

Due to concerns about child-resistant packaging within the elderly community, the Consumer Product Safety Commission (CPSC) in the USA performs tests on packaging that include both children and older adults. In the tests, 80% of the children must be unable to open the packaging during the trial period and a group of 100 adults aged between 50 and 70, who have no obvious mental or physical disabilities, must have a 90% success rate when opening the packaging.

The testing protocol applied by the CPSC should be considered a good gauge of the effectiveness of child-resistant packaging to both protect children and enable senior citizens to access vital medication.

# Protecting Children from Non-medicine Poisoning

Whenever child-resistant packaging is mentioned, most people automatically think of medicine containers. However, household chemicals such as cleaning products also pose a risk if they are not packaged correctly.

Soluble packaging, such as the soluble film that surrounds dishwasher tablets, have become popular with manufacturers and consumers as they improve convenience and they are cheaper to produce. However, they do not offer any protection for children who may be attracted by the bright colours and interesting shape of dishwasher tablets, for example.

Without the physical barrier of plastic wrapping, there is a greater chance for accidental poisoning. Worse still, there are no regulations covering these products at the moment.

## A Special Note on Medical Cannabis and CBD

As cannabis is being approved in more and more countries for medicinal use, especially CBD oil and edibles, the question of packaging regulation arises. At the moment, in most countries there are no regulations to cover the packaging of CBD oil for instance.

In many cases, the manufacturers of CBD oil products have taken it upon themselves to use push-and-twist caps, or something similar, but these are not necessarily tested and compliant with industry standards, due to the lack of regulation. However, it is possible that this will change as the use of cannabis-derived products becomes more widespread.

# Facing the Challenges of Diminished Responsibility

Diminished responsibility is a legal defence that exonerates people from prosecution or culpability by claiming that their mental faculties were diminished or impaired in some way. Diminished responsibility can apply to accidental child poisoning as a parent or guardian may claim it if they are ill, incapacitated, or intoxicated in some way.

In cases of diminished adult responsibility, the onus falls on the pharmaceutical and chemical companies to take preventative action, i.e. to stop children gaining access to hazardous substances. Effective, tried and tested child-resistant packaging is the solution to this problem and will protect businesses from individual lawsuits and class action.

For instance, if a company producing and supplying medicinal cannabis were to neglect their moral (not legal as yet) duty to package the product safely in a child-resistant container and a child were to eat enough of it to intoxicate themselves while the parent was asleep, in theory, a lawsuit could be brought against the company due to diminished responsibility of the adult.

# Innovation in Child-Resistant Packaging

Due to the mounting pressure on manufacturers of hazardous substances to improve the effectiveness of child-resistant packaging, recent years have seen an increase in novel concepts and technology.

In this section, we will look at the most promising and effective new technology and discuss how it can be used to reduce the likelihood of accidental poisoning, while also allowing adults (especially vulnerable adults) to still access the products.

## Multi-step Mechanisms and Alerts

Recent research into child-resistant packaging has revealed that multi-step mechanisms that require a series of special actions to open a container are highly effective in reducing the incidence of children accessing potentially dangerous substances.

For instance, a prototype cuboid-shaped package has been designed that requires people to open two flaps at a 180 degree angle, press a release button inside the opening, then apply pressure to both sides of the box to gain entry. Upon opening the box, an audio alert is emitted that can only be silenced by reclosing the box, thereby signaling if a child tries to open the box. The audio alert is designed to be an irritating, high-pitched buzzer that will deter the child as soon as it goes off. This prototype proved to be highly successful with only 6% of children successfully opening the package within 5 minutes, compared to 96% of adults.

## Oversized Packaging

The prototype mentioned above was also designed with outer packaging measuring greater than 8cm in width. Ergonomically, this is very difficult for children to handle as their palms are too small and they are unable to grip the box, while simultaneously applying pressure to both sides to open it effectively. The principle of ergonomically oversized packaging can be applied to other multi-step mechanisms, such as press-and-turn or squeeze-and-turn bottle caps.

## Smart Packaging

In today's digital age, it is not surprising that researchers are exploring the potential of 'smart' containers that use digital technology to only allow access to adults and prevent children from opening the container.

A 2018 study revealed that sensors can be applied that detect adults with 98.16% accuracy and detect children with 96.67% accuracy, making it a highly effective way to prevent unintentional poisoning of children. However, the costs are prohibitive at the moment, but as the technology becomes more affordable it may become a viable option in the not too distant future.

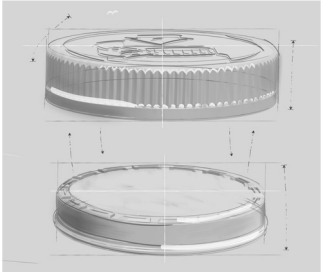
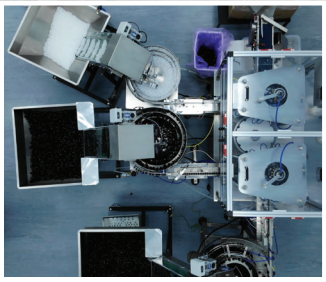
## Visual Distraction

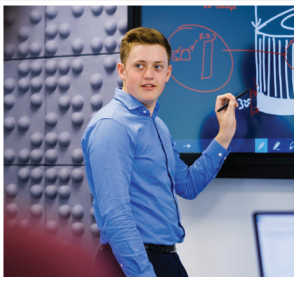
To prevent younger children (between the ages of 2 and 3.5 years) accessing hazardous substances, a visual distraction technique has been shown to be effective. A visual distractor is built into the design of the packaging that helps to stop children from opening the packaging.

A recent study used a lenticular 3D graphic to give the impression of changing colours and distort depth and movement perception in the children. However, the research acknowledged that a pretty visual may attract children to the packaging who would otherwise not have noticed it, which could present a potential additional risk factor. The study concluded that more research needs to be carried out to investigate this potential risk further.

## Sustainable Child-Resistant Packaging Solutions

As mentioned previously, businesses are obliged to reach sustainability targets set by governments and international bodies. Therefore, sustainable packaging is a necessity these days. In order to reach sustainability targets, product designers are developing child-resistant containers and cartons that are made from recyclable materials such as card or certain types of plastic, with multi-step mechanisms built in.



# Introducing Origin

## Child-Resistant Packaging for The Future

Here at Origin Ltd, we have worked hard to innovate and produce solutions that meet the needs and requirements of manufacturers, consumers, and regulatory bodies.

Our child-resistant packaging solutions use a variety of methods, including multi-step mechanisms and ergonomic oversizing, to make sure that hazardous substances are kept safely out of the reach of children, but remain accessible to adults.

### Safety & Compliance

All of our packaging solutions are designed to be safe, effective, and sustainable.

Our reclosable packaging solutions comply with standard BSEN ISO8317 and the US equivalent 16CFR 1700.20. All packaging is tested thoroughly, both the container and closing mechanism.

### Our Product Range

We produce 19 types of child-resistant packaging, including multi-step mechanism jars, bottles and plastic containers, as well as larger items such as clamshell containers and wide-necked cylindrical containers.

To see our complete range of child-resistant packaging, please visit this **webpage.**

## Child-Resistant Packaging for Medicinal Cannabis

Here at Origin Ltd, we have responded to the growth in demand for medicinal cannabis across the UK and Europe by producing specially manufactured packaging products.

Our industry-leading medicinal cannabis packaging products are fully compliant with medicinal packaging standard ISO 15378 and child-resistant packaging standard ISO 8317. We manufacture 125ml to 250ml child-resistant jars for packaging and storing dried flowers weighing between 1 gram to 10 grams. The plastic jars are ergonomically designed with a 70mm neck diameter to allow access to adults while making it difficult for children to grip and open.

All medicinal cannabis packaging products are manufactured in our dedicated cleanroom facility to ensure that pharmaceutical standards are met.

## Driving Innovation with Our Research and Development Team

Here at Origin Ltd, we take development and innovation seriously. For that reason, we have an expert development team, known as DiD - Design, Innovation & Development.

DiD combines innovative design and manufacturing techniques to keep packaging costs down for our customers without compromising on quality and safety.

DiD places a special focus on child-resistant packaging and applies rigorous child testing and senior-friendly testing on all products before they are approved for manufacture.

# Why Choose **Origin?**

Here at Origin Ltd, we have been making pharmaceutical packaging solutions for over 55 years.  In other words, we have wide-ranging expertise and knowledge in the field of child-resistant packaging.

We are always looking to develop our packaging products and we invest heavily in innovative technology.

To talk to one of our expert team members about any of the subjects raised in this whitepaper or to discuss your child-resistant packaging needs, book a consultation with us by clicking the link below.

**Book A Call**

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