

Drug Dispensing Technologies

"Convenience & Safety"



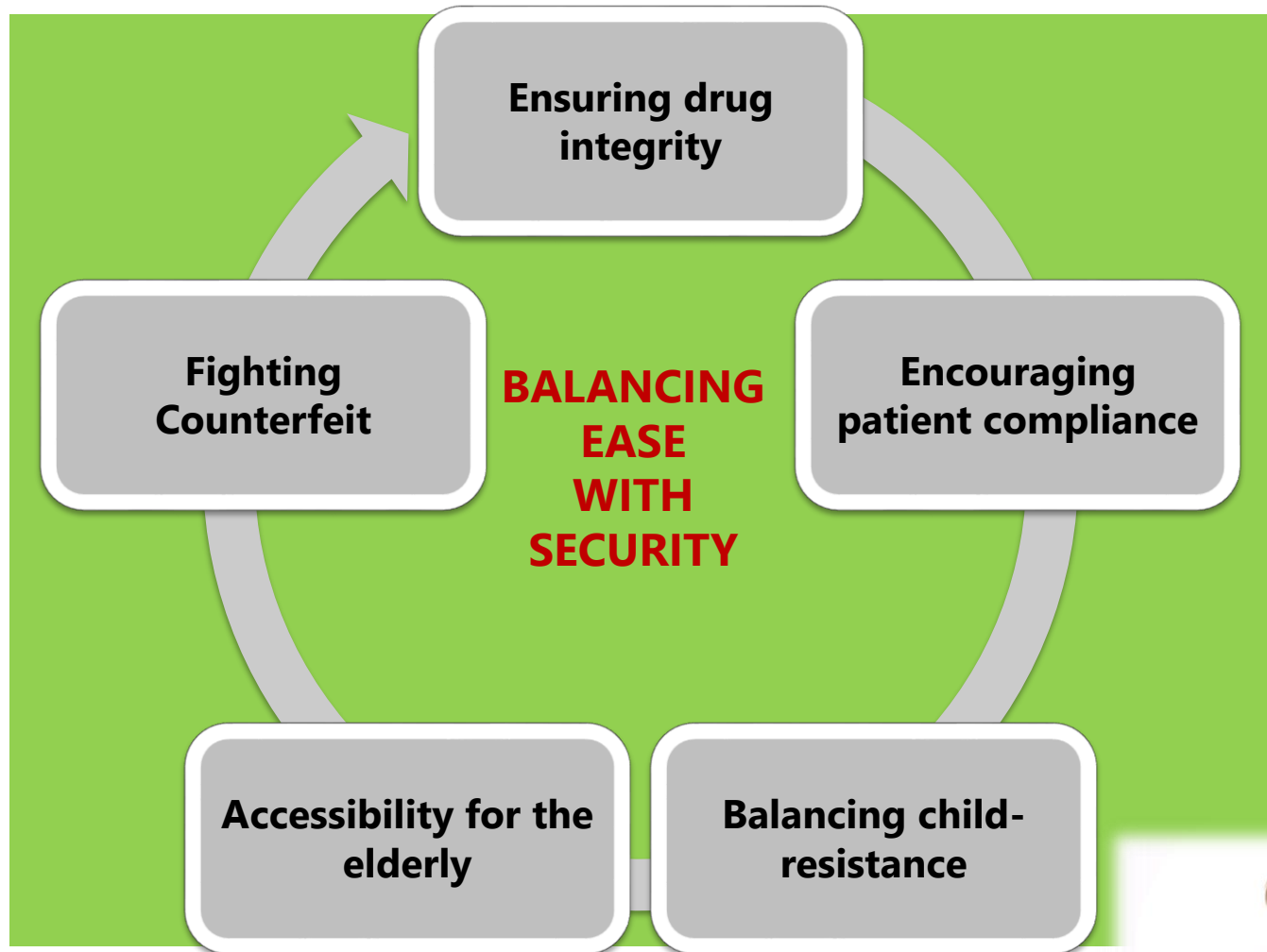
ABOUT SUN PHARMA

- Sun Pharmaceutical Industries Ltd. is the fifth largest speciality generic pharmaceutical company in the world with revenues of over \$4.5 billion.
- The company manufacturing presence covers five continents with a stronger presence in US, India, Asia, Europe, South Africa, CIS & Russia and Latin America

Sun Pharma in Numbers

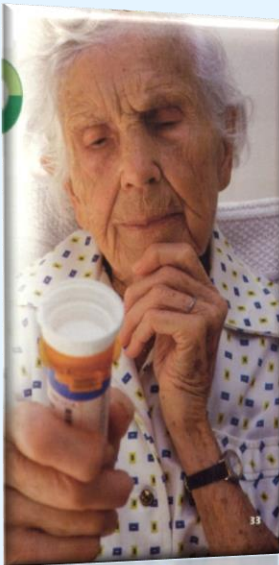


Beyond relatively simple issues such as developing good designs and communicating with customers, pharmaceutical packagers are governed by more pressing concerns



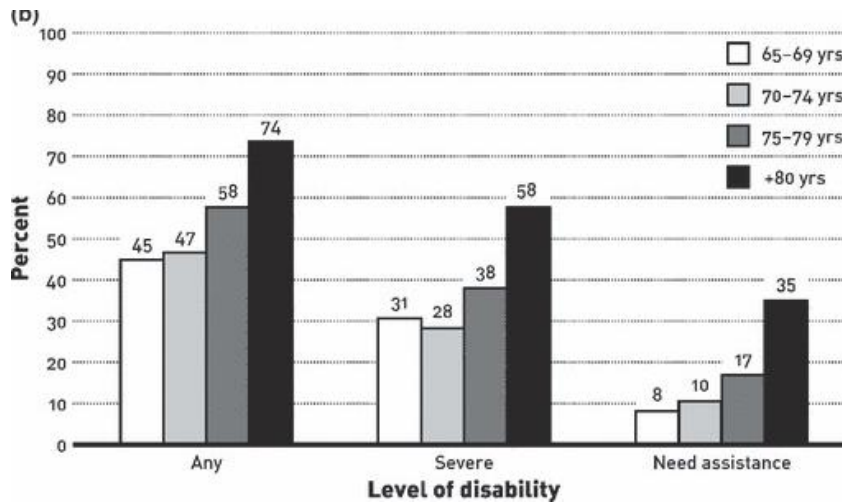
CURE > CARE

This continuous series of challenges means pharmaceutical packaging professionals are some of the industry's leading innovators



**For elderly people, medications can be a lifeline to good health...
or a disaster waiting to happen.**

Estimated level of disability by age.



Source: Agency on Aging³⁷ and US Census Bureau.³⁸



- Poor medication adherence takes the lives of 125,000 Americans annually, and costs the health care system nearly \$300 billion a year in additional doctor visits

Some common health problems among the elderly include;

Memory loss

- Dose skip
- Overdose

Impaired eyesight

- Wrong medication
- Wrong strength
- Wrong dosing

Arthritis & Osteoarthritis

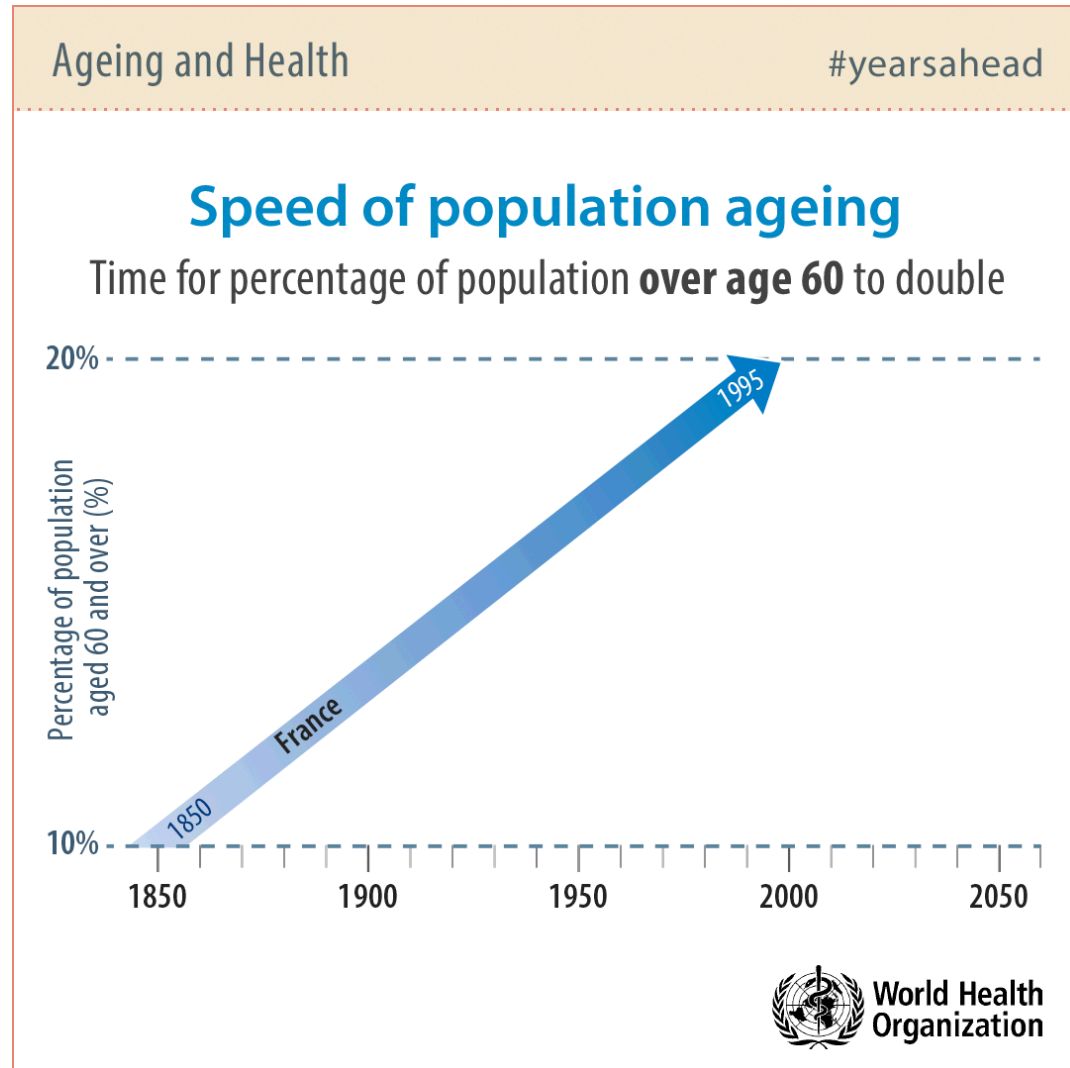
- Inappropriate dosage form
- Difficult to administer

Decreased muscle strength & flexibility

- Difficult to:
 - Open
 - Close
 - Dispense

Geriatric Population Growth

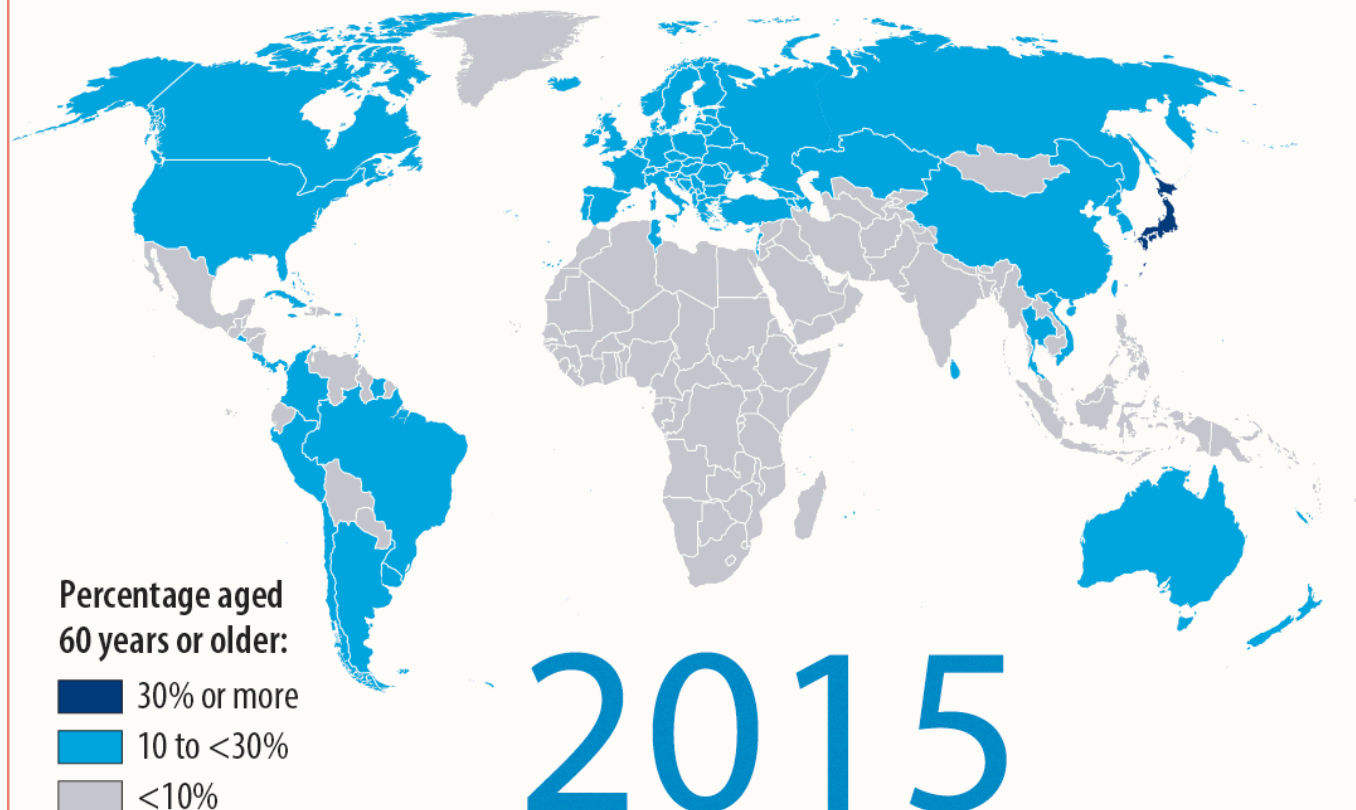
- **WHO:** Number of people over 60 years set to double by 2050
- More than 50% of consumers between the ages of 60 and 70, nearly 60% of those between 70 and 80 years old, and a whopping 66% of those over 80 report difficulties with current packaging



ISO 11156:2011, *Packaging - Accessible design - General requirements*, provides a framework for packaging design that takes into account the varying physical and sensory capabilities of users to ensure that it can be used not only by people with visual, hearing, motor or cognitive disabilities, but also by the elderly, the temporarily disabled and by those with no disability at all.

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Populations are getting older



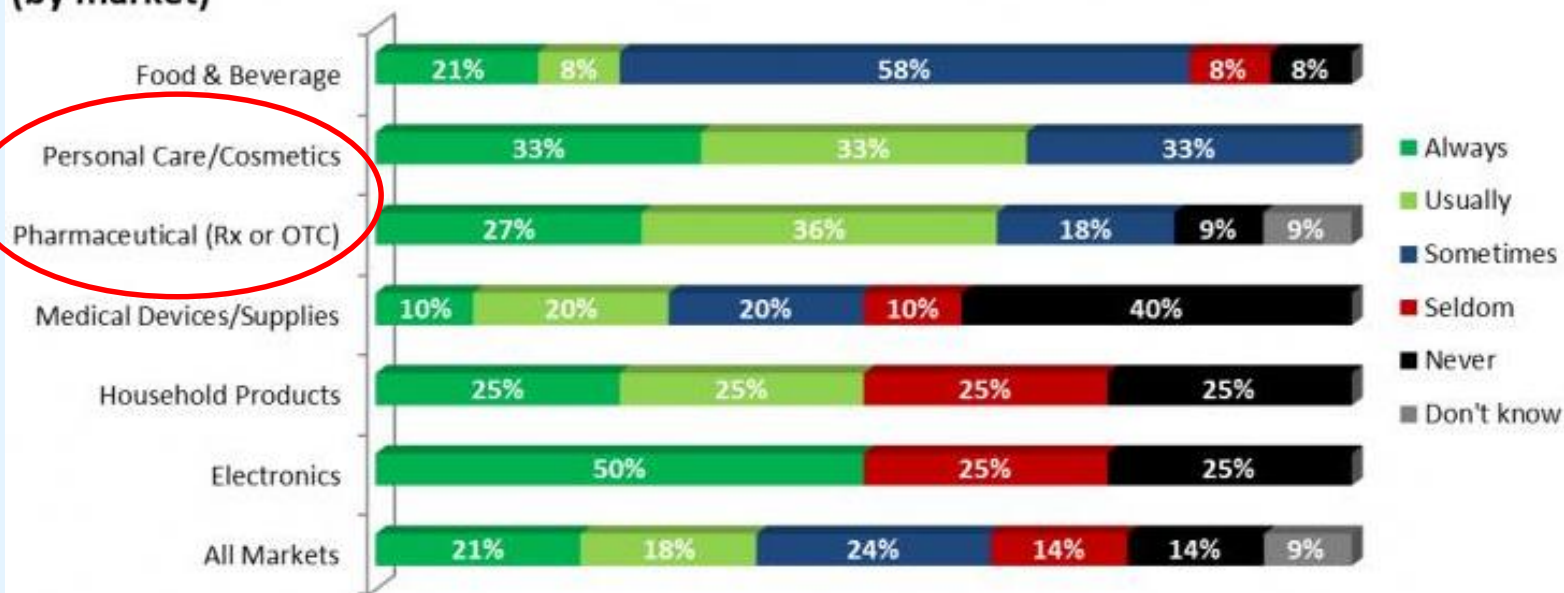
<http://www.who.int/ageing/events/world-report-2015-launch/populations-are-getting-older-full.gif?ua=1>



**World Health
Organization**

Are seniors top of mind when you design packaging?

In general, do you consider the needs of seniors when designing your packages?
(by market)

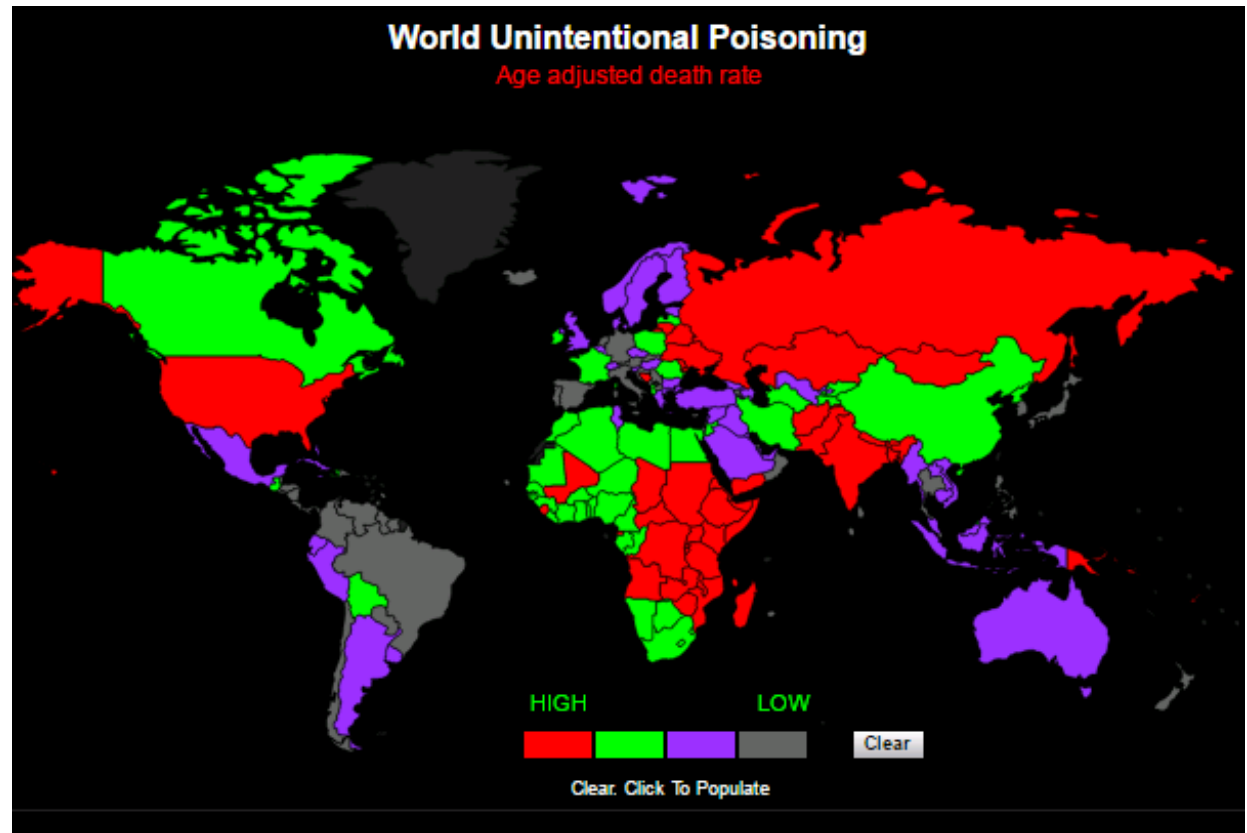


Source: 2015 Sept Packaging Digest online poll

World Unintentional Poisoning.

Worldwide unintentional Poisoning caused **193,000 deaths**. It is the leading cause of death in the US between ages 35-44...A growing percentage of these deaths are related to prescription drug overdose.

How does the cap know if it is a kid or an adult who wants to get the stuff out??

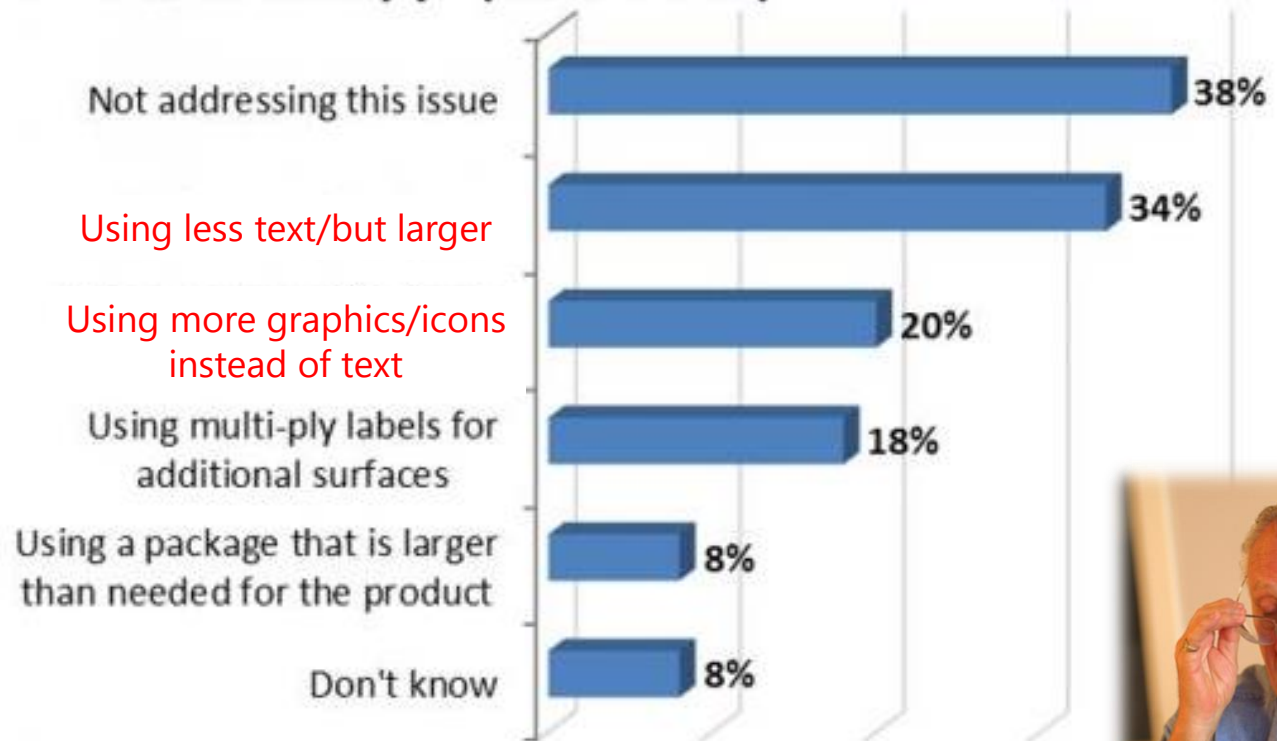


60,000 U.S. Kids Treated for Accidental Medicine Poisoning a Year
Toddlers account for 7 out of 10 cases, report says

Achieving **convenience** through Packaging

Achieving convenience through Packaging

For products sold to seniors, especially smaller or single-serve sizes, how are you addressing the need for readable copy? (all markets)



Source : 2015 Sept Packaging Digest Online Poll

- Develop Packaging that is easier to read and that bear instructions that are easier to understand.
- If seniors can't read a package, they often don't buy the product.
- Ensure the font size is right, the colouring is right
- Packaging should Correspond the size of their real content

Achieving convenience through Packaging

Some regulatory agencies are also emphasize upon the convenience and safety of the patients while developing packaging

Labeling

Regulatory agencies have made some labeling guidelines for convenience of the patients.

1. The full name of the medicine should appear on at least three non-opposing faces of the pack.
2. Design should incorporate the judicious use of colour.
3. Colour and font style/ size to provide maximum legibility.



Tallman Lettering

cefa**CLOR**
cef**ADRO**xil
cef**ALEX**in
cef**AZOL**in
ce**FIX**ime
cefo**TAX**ime

The MHRA and the National Patient Safety Agency have agreed a labelling design mechanism “use of Tallman lettering” which will help pharmacy staff more easily identify the correct medicine.

Achieving convenience through Packaging

At least 90% of adults must be able to open the packaging within 5 minutes in order for packaging to be considered senior friendly.

Source: HealthcarePackaging.com

Magnifier lid / Medicine bottle cap

The medicine bottle lid is transformed in a magnifying glass, which makes reading the particular instructions easier. Mainly because it is an integrated part of the bottle, it is easy to use and also convenient to carry



Talking labels – HD Barcode

Scan and listen



Labels with HD Barcode that embeds an audio file, scanning the code with your phone will play the media. It needs “No Internet connection” to play.

Offers an easy and friendly way for Senior population with compliance benefits



Achieving convenience through Packaging

By using on-pack badges and call-outs, rather than small-font text, companies can efficiently communicate the differentiating features of their products to elderly consumers.

Packaging : That glows in dark

Labels or stickers on packaging are printed with phosphorescent ink where there are instructions which customer needs to be able to see in the dark.



Phosphorescent ink is also known as “glow in the dark” ink. This ink glows in the dark after it has been exposed to a source of light. The phosphor particles in the ink are capable of absorbing light and then releasing it after a certain time.

Wiki Cell



First edible packaging. The pearl accommodates liquid preparation inside and can be administered directly without the chance of mess.

Researcher: Wikifoods
Present Status: Under Development for water packaging

Achieving convenience through Packaging

Easy Peel, Reseal packaging”



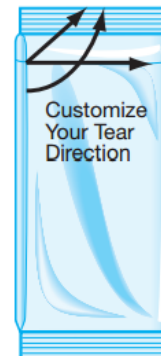
An air bubble is created in the seal of a flexible or semi-rigid package. Popping the bubble ruptures the seal, separating the layers, so users of any age and dexterity can then easily and quickly peel open the package.

Convenience Stick Packs

Single-serve stickpacks that open effortlessly, tear completely and dispense the ideal portion of anything from powdered beverages to condiments to creamer

1

IntegraDirect® Tear-Initiation Feature



The technology uses laser scoring to guide the opening tear without compromising the film's barrier.

➤ The Packaging Standards Council (PSC) found that elderly consumers appreciated tear tapes and clear instructions on how to open packaging.

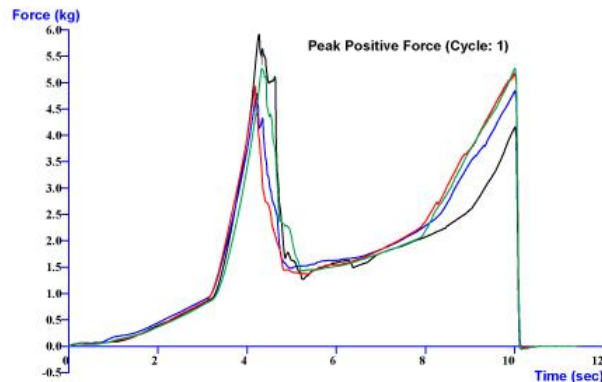
Achieving convenience through Packaging

High tempered blister foils

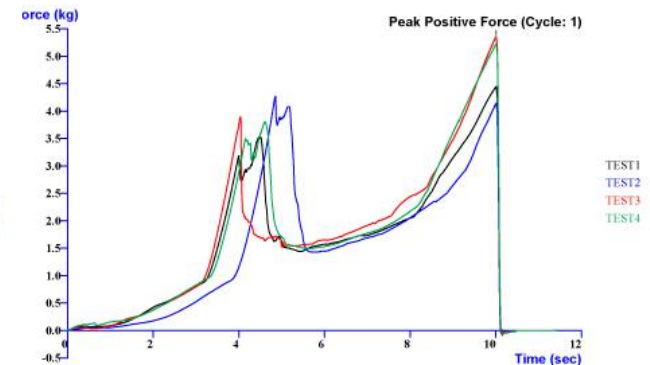
The innovation eases the tablet /capsule dispensing from blister pack i.e. by reducing the push through force.



- Force required to push tablet through 25 micron blister foil is ~ **4.6 to 5.6 Kgf (Avg 5.1 Kgf)**.
- Force required to push tablet through 20 micron high tempered blister foil is ~ **3.5 to 4.3 Kgf (Avg 3.9 Kgf)**.
- Comparative data indicated ~ **23% less force** required to dispense tablet with improved packaging.



Force required to push 25u foil



Force required to push 20u foil

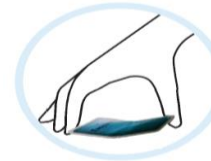
- Senior Friendly pack- This pack will provide convenience to senior patients who face problem while dispensing the medicine from unit dose blister due to extra force required.

Achieving convenience through Packaging

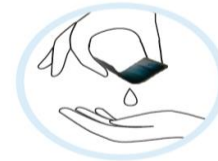


EASY SNAP

A revolutionary one hand opening packaging system. While the sachet is folded, a previously mechanically made center cut tends to break open progressively, which allows the product to flow out in a completely controlled manner.



BEND



SNAP



SQUEEZE

Dose Sipping Syringe

Pre set the adjustable stopper to the correct dosage



The convenience of a product can be a key differentiator

Achieving convenience through Packaging

Button Dosing

Pack with convenience of pressing button for adequate dose delivery. A flexible button designed to conveniently and accurately deliver liquid product.



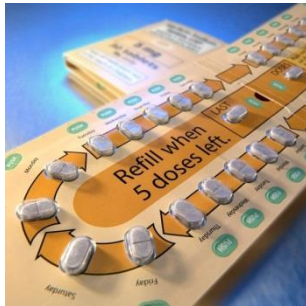
Cap with integrated metered dosing system

- Its two principal components are the dosing head and closure. At the closure opening point the precisely measured liquid reaches the dosing head for safe, effective dosing the 2k dosing system operates
- Works on principal of vacuum pressure delivery.



Achieving convenience through Packaging

Calendarized, Compliance-Prompting Packaging



Confusion and misunderstanding can be greatly reduced with calendarized pharmaceutical packaging to improve adherence

Reminder Cap

The Remind-A-Cap has a simple mechanical dial that is turned from the inside of the closure by the user after taking a dose. Doing so queues up the day and time the next dose is needed in a small window on the top of the cap, which acts as the reminder.



- Patients using unit-dose calendar packaging are more likely to comply with their regimens

- Reminds people whether they have taken their medications

Achieving convenience through Packaging

Non-Slip Packaging Material

Fine-grain sandpaper was selected for the label design.



Easy open and soft grip Arthritis Cap

Ergonomic design: A rubber-wrapped cap to improve gripping and a flip-top closure for Folgers coffee atop a shaped container for easy access compared to a screw-on closure.

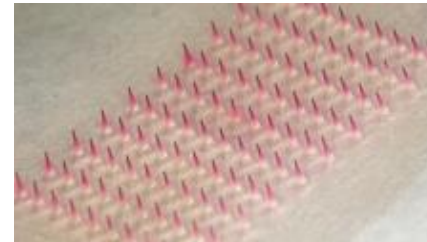
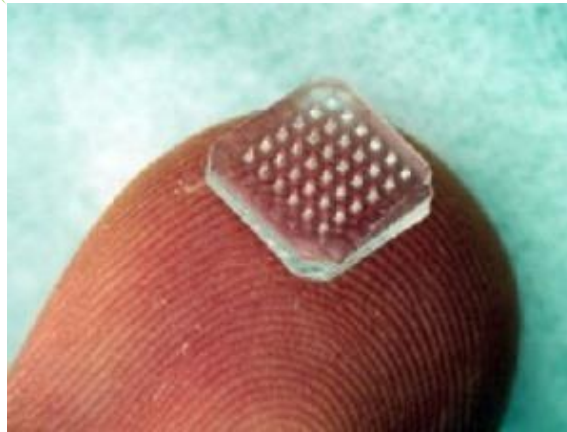
Aleve Easy Open Arthritis Cap and Soft Grip® Arthritis Cap



- Research showed that bottles easily slip from the hands of the elderly.
- The demographic again demands lightweight packaging
- Also, packaging should be designed with no sharp edges, which may harm while handling

Achieving convenience through Packaging

Micro Needle Vaccination Patch



Vaccination patch made with upto 100 microneedles in a single patch. Needles are fraction of millimeter long, Each patch contains a single dose of vaccines . The tiny needles painlessly puncture a patient's skin, where they dissolve. 20 minutes later, and you can throw the patch away, fully vaccinated.

- ✓ Researchers : CDC & Georgia Institute of Technology (Dr. Prasunitz)
- ✓ Present Status :Under Clinical Trial phase

Achieving convenience through Packaging

Researcher: Jelly Bean Candy
Present Status:
Available with candy packs

Pill Dispenser



Innovative type of Pill Dispenser—displayed a brand-new polypropylene container that makes convenience of taking medical pills.
Lift the top flap, raise the inner canister, and lower to dispense the pills one or two at a time.

Single Tablet Dispenser

Molded inserts that helps single tablet dispensing from bottles.

One at a time



*Inserts which allow
Single tablet dosing*



Achieving convenience through Packaging

Researcher: New
Packaging Concept
Present Status: Not
available in market

Pack with inbuilt applicator



Novel type of portion pack consisting of an applicator in form of lid. While using we just need to remove the lid and it comes out in the shape of spatula which can be used as an applicator to apply ointment on the affected area.

Reusable dispenser pouch



First reusable dispenser pouch. This dispenser design includes an outer shell, nozzle and a pipe. There are refill pouches that fit right under the dispenser's shell with just a simple screw into the nozzle and pipe. Each pump has Braille engraved onto it so you can tell the difference even with soap in your eyes.

Researcher: Eco Pump
Refill Dispenser
Present Status:
Available for some
handwash products

Achieving Safety & Compliance through Packaging

Achieving Safety through Packaging

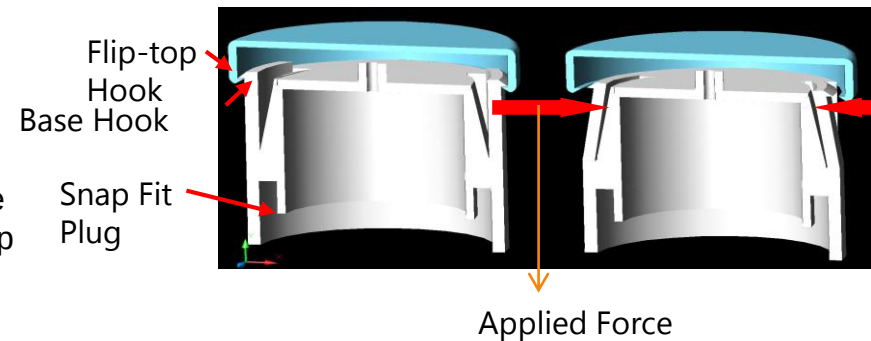
CR CLOSURE FOR SMALL CONTAINERS

To dispense the product the consumer aligns the indicia on the cap, pushes down, and then rotates the cap to a stop. The cap can then be removed and the product is ready to be dispensed. After use, the cap snaps back on in any position.



Flip Top cap with Hook Mechanism on Base of Dispenser

The Flip top closure provides convenience to consumer with limited dexterity, while providing child resistance through flip top hook, which needs to be pressed from both sides while opening closure



Achieving Safety through Packaging

Child-resistant tear open sachets



These sachets use a customised aluminium foil and feature an integrated special design within the foil surface and seal, a discrete tear notch. To increase the level of child resistance, the sachet can only be opened by folding over the corner and with the tear notch aligned – no easy task for a child.

Manufacturer: Mespac

New blister-packaging concept : Pouches to provide product protection and child-resistance

The centerpiece of the packaging design is a pouch that provides both child-resistance (CR) and barrier protection for prescription and over-the-counter drugs. In addition, the design also offers merchandising flexibility for retailers and pharmacies.



The flexible pouch is child-resistant on the initial opening and subsequent re-openings using the Press-To-Engage (PTE) resealable slider.

Fingerprint Scanner for Delivery Devices

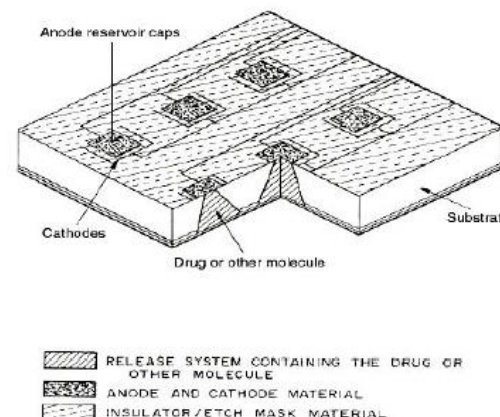
This concept is a new overdose-proof medication dispenser. For delivery of the correct pre-determined dosage at the right time, the patient needs to use the packs built-in fingerprint scanner. The pack can't be opened even with the significant intervention.



Microchip Drug Delivery

Microchip drug delivery system is the most wonderful system of delivering the drug for a great span of time without the intervention of the patient to whom it is fixed.. wirelessly controlled, implantable, microchip-based devices can be stored and release drugs inside the body over many years.

The microchip delivery system consists of Substrate containing multiple reservoirs capable of holding chemicals in the solid, liquid, or gel form.



System can be customized as per the requirement. The four main in-built options are accessible here.

1. **Scan Medicine:** this option allows patient/ consumer to scan their medicine. The scanning will recognize the medicine and will show the information related to the product on the screen. After going through it, consumer is prompted to set an alarm as per the doctors prescription.
2. **My Medicine:** this is an overview of what medicines are prescribed to/used by the consumer. The consumer can access medicine specific information without the need of reading the package or leaflet.
3. **Community:** this is a place where consumers can share their experiences with the medicines they take. Long-term users will have useful information and tips on the medicine they take.
4. **Medicine Alarm:** to access a list with alarms; set for taking medicines in time. Consumers want to know what they are up to, this list ensures they always have insight into when they need to take their medicines.



Packaging of Future

Researcher: Future
Packaging Concept
Present Status: Yet to
be commercialized

Integrated Bluetooth and Tracker Tag

Bluetooth Technology incorporated in lid/pack and synced to wrist strap for audible/visual alert feature.
Ensures Dose compliance, alerts patients for missed dose and improved product efficacy regime.



Talking Packaging



VTT Technical Research Centre of Finland used NFC based technology that would allow elderly, visually impaired, and blind people to identify everyday items through a speech based item identification system. NFC tags could be added to medicines so a user could touch the code on the packaging with the NFC enabled mobile phone to download text, audio or video or webpage product information which can be played back on their handset. The tags could include links to information such as the origins of the product, ecological aspects and possible allergy risks.

Packaging of Future

IOT (Internet of things) in Packaging

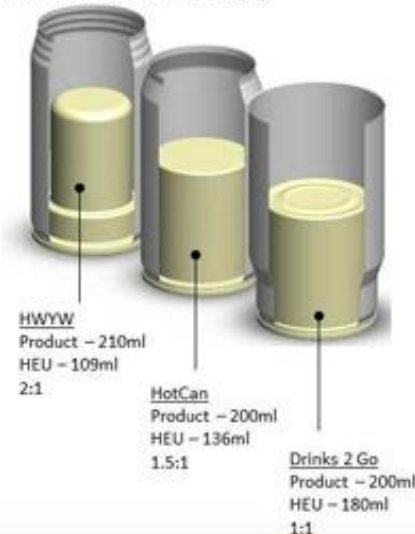
Imagine you have uploaded your prescription to a e-commerce medicine website and your product comes in unit dose sachets of tablets that needs to be administer together. That day is not too far and IOT or Industry 4.0 is making this possible, where consumer, and machine connected through server, as the server receive the order from consumer, it directs to machine to produce such packs and deliver to consumer.



Self Heating packaging

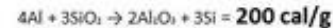
Quicklime

(Calcium Oxide + Water → Calcium Hydroxide)



Dry-Thermic

(Aluminium + Silicon Dioxide → Aluminium Oxide + Silicon)



**HEAT
GENIE**

Product – 270ml*
HEU – 54ml*
5:1*



* = development figures

Sometime to induce effect of the medicine physician advise to take medicine with luke warm water. Thanks to Heat Genie for developing self packaging. Its approach to self-heating is unlike other self-heating technologies involving mixing quicklime or other chemicals with water. The heating element contains aluminium and silica, two benign materials, which in an intimately mixed powdered state can undergo a chemical reaction to give off a large amount of heat. Aluminium can react with a source of oxygen to release large amounts of energy through oxidation.

Packaging's plays important Role in 'The Fate of Patient wellbeing'

Over two decades of research studies, support the use of modern packaging solutions to improve adherence.

Smarter packaging can help improve the welfare of patients.

Good to remember

Consumers expect packaging to make life easier for them and to provide clear information, in addition to preserving the freshness of a product and protecting it during transport

Companies pay growing attention to user-centered design; better grip, easier opening, clear instructions ,etc.

Much remains to be done to make life easier for elderly people as well as safe for kids.