Arthritis Foundation®





Ease of Use Rigid Packaging Guide | CHILD RESISTANT

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INTRODUCTION

In the United States, arthritis is the #1 cause of disability, affecting nearly 60 million adults and hundreds of thousands of children. This complex disease can cause chronic, debilitating pain — and make daily activities difficult to do — while also impacting physical and social wellness and mental health. People of all ages, races and sexes live with arthritis.

Arthritis symptoms include pain, stiffness, swelling and diminished range of motion in joints. Symptoms vary, from mild to severe, and may come and go, getting progressively worse over time. Arthritis can also cause permanent joint damage, often leading to immobility. In addition, arthritis can affect the heart, lungs, kidneys, eyes, skin and other organs.

For almost eight decades, the Arthritis Foundation has led the way in supporting people with arthritis and their caregivers. As the largest nonprofit organization focused on arthritis and related conditions, we've played a key role in the development of groundbreaking arthritis treatments — and have successfully advocated for policies and laws that make health care more accessible and affordable for arthritis patients. We also create life-changing resources that help patients take control of their disease. And we nurture a vibrant, caring community where they can connect with others and know they're not alone.

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EASE OF USE PRODUCTS AND PACKAGING

The Arthritis Foundation's Ease of Use certification program recognizes products and packaging that have been tested, approved and certified as easy to use for people who live with arthritis and chronic pain.

Consumer products and packaging are often not designed to meet the needs of those challenged by arthritis and chronic pain. When easy-to-use designs are implemented, products and packages are made easier to use for the arthritis community, which means they are easier to use by everyone.

Each product and package considered for Ease of Use is first independently tested by the Intuitive Design Applied Research Institute (IDARI). Upon receiving a favorable review, they are then eligible to license the Ease of Use certified seal, which may be incorporated in all marketing initiatives as a shelf differentiator, in both retail and e-commerce, as well as become part of the Arthritis Foundation's Ease of Use annual marketing strategy.

Did You Know?

86% of consumers with arthritis and 76% of general consumers consider easy to use packaging important when making purchasing decisions - *Nielsen Ease of Use Survey 2024*

Both the consumer and corporate sectors are gaining great value in updated designs of products and packages that are easy to use. Carrying the seal, brands like Pilot Pen, Nexium, Advil®, IMAK, SafeStep and others are seeing sales that outpace their competition. Many brands use the seal in presentations and buyer meetings, along with marketing in print, digital and television.

People living with arthritis and chronic pain also make shopping decisions when they see the item has been certified as easy to use. Easier to use designs are easier for everyone, whether living with chronic pain or not, and often become a shelf differentiator.

"I trust all products that are labeled Ease of Use. My absolute favorite that I use the most is the Advil® Easy Open Arthritis Cap. I've had arthritis for almost 20 years, and I've always struggled to open a medicine bottle cap. Advil made it so much easier. My second favorite is the Ezy Dose® Pill Organizer. This helps me organize my meds and have easier access to them, despite any pain I may have in my hands. I'm grateful for the partnerships the Arthritis Foundation has made to create products that make life easier with arthritis."

–Ashley Nicole, autoimmune health coach and master trainer, diagnosed with rheumatoid arthritis at age 27

Intuitive Design Applied Research Institute

The Intuitive Design Applied Research Institute (IDARI, LLC) aims to assist in identifying user needs and scientifically evaluating consumer product and packaging solutions. IDARI offers many research and evaluation services, specializing in objectively measuring human performance that delivers key insights. In turn, drives innovation — especially for the needs, aspirations and latent demands of consumers dealing with arthritis, chronic pain and other functional limitations.

IDARI serves as the official consumer product Ease of Use test lab for the Arthritis Foundation. A favorable evaluation by IDARI qualifies the manufacturer for inclusion in the Arthritis Foundation's Ease of Use cCertification program.

Dr. Brad Fain, IDARI founder and Georgia Tech Regents' Researcher, has more than three decades of experience researching human factors engineering and design. From Ease of Use evaluation and universal design studies, to ethnographic research and consumer product design, Dr. Fain founded IDARI to conduct usability and accessibility testing for the Arthritis Foundation and other entities across the globe. At Georgia Tech, his research has spanned projects for the U.S. Department of Defense to manufacturers of critical health systems. He established the Accessibility Evaluation Facility at Georgia Tech, which performs objective accessibility evaluations of workplace information technology for both industry and government customers. Learn more about Dr. Fain and his research at https://idarinstitute.com/.

Dr. Brad Fain

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PARTNERSHIP

The Arthritis Foundation is boldly pursuing a cure for America's #1 cause of disability, while championing the fight to conquer arthritis through life-changing science, resources, advocacy and community connections. Until a cure is found, the Arthritis Foundation strives to empower people with arthritis and remove barriers that limit quality of life. Supporting programs that make life easier for people living with arthritis is our top priority.

Target is one of America's leading retailers and an iconic brand with a single purpose: to help all families discover the joy of everyday life. Diversity, equity and inclusion are part of Target's core values, shaping culture and driving business. At the heart of this organization is the Owned Brand Product Design & Packaging organization. This team designs and engineers the product and packaging for an industry leading portfolio of over 45 Target Owned Brands which generate more than 30 billion in annual sales. Inclusive design and improving accessibility have been long-term goals of this team, and Target collaborates with external partners to advance Target's Owned Brand portfolio with exclusive designs only found at Target.

Target is the financial sponsor of this research and a contributor to the illustrations, photographs and graphic design of these guides. However, some knowledge is too important to keep exclusive and Target has decided to publish this information with the Arthritis Foundation.

Together, this collaborative partnership is leading the way and driving innovation on product and package designs. Our mutual goal is to provide products and packages that are easier to use for people living with arthritis and chronic pain, along with consumers also looking for easy-to-use items. Together, we want to help all families discover the joy of everyday life, driving innovation that leads to life-changing satisfaction.

This innovative partnership of the Arthritis Foundation, Target and IDARI - provides so many opportunities to educate engineers and designers on how to implement easy-to-use designs in the development stage of a product and/or package. The Ease of Use Design Guide includes the first guidelines developed in the United States, offering resources for engineers and designers in the requirements definition and design development stage. Our collaboration is leading the way in design accessibility.

HIGH-LEVEL CONSIDERATIONS: ISSUES AND RECOMMENDATIONS

Common Issues and High-Level Recommendations

Packaged items are too heavy. People with arthritis can have difficulty holding and transporting heavy items. Items over 5.0 pounds can be difficult to carry with one hand. If items exceed 5.0 pounds, consider adding design elements to facilitate a two-handed hold. Items over 10.0 pounds can be difficult to carry regardless of handle placement.

The linear force required is too high. People with arthritis can experience pain when asked to apply a linear force to a design element. Consider requiring less than 3.0 pounds of linear force for design elements meant to be operated with a single finger or designed to be pinched between two fingers. Consider requiring less than 5.0 pounds of force for design elements that are to be operated by multiple fingers or a palm press.

The rotational force requirement is too high. People with arthritis may have difficulty rotating design elements, such as twist-off closures. The amount of force a user can apply to a rotating design element will depend on multiple factors such as the diameter, height, coefficient of friction and the knurling pattern of the element. Small - and large-diameter rotating design elements can be particularly difficult to operate. Avoid design element shapes or knurling patterns that directly apply pressure to finger joints during rotation.

Users become fatigued after prolonged usage. Users with arthritis may become fatigued when using products that must be held or actuated repeatedly over a prolonged period. When designing the product for extended use, reduce the number of individual actions required and minimize the amount of effort required for each action.

Use of the product causes joints to be placed in an uncomfortable position or posture. Some products require users to articulate their joints in an uncomfortable position. Whenever possible, design the product to maintain a neutral position of the wrist joint. Do not require users to extend their arms above shoulder height.

Use of the product causes painful pressure across finger joints. Ridges, bumps, and other small-radius protrusions along the graspable area of the product can increase pressure along painful finger joints. Ensure that all graspable areas are designed to distribute the load across the entire grasp point, so that pressure is not concentrated on individual finger joints.

Use of the product requires an excessive grip span. Some users with arthritis have increasingly diminishing grip strength once the grip span exceeds 2.5 to 3.0 inches. Design graspable items that require user strength to not require excessive grip span.

The product requires the use of a tool. Users with arthritis are more likely to injure themselves if interacting with the product requires a sharp instrument like scissors or a knife. Consider designs that do not require the use of a tool to open or interact with the product.

The product requires simultaneous actions. Some users with arthritis have difficulty performing two actions at the same time, such as rotating and pinching a closure. If the use of the product requires multiple actions, design the product in a way that those actions can be performed sequentially.

Sharp edges cause pain. Sharp edges can create a hazard or may be uncomfortable if users are required to apply force to the edge. Consider rolling metal edges or finishing plastic edges to create a smooth, rounded edge.

OVERVIEW

Child-resistant packages contain components and materials that prevent young children from accessing the contents of a package within a short period of time while still allowing adults to access the contents. Child-resistant packages are not designed to be "child-proof" where no child can access the contents. Instead, they are designed to be temporarily resistant and must pass specific testing standards to meet label requirements that market a package as child resistant. In the USA, the Consumer Product Safety Commission publishes testing protocols for child resistant testing.

There are many types of child-resistant packages used to limit a child's access to harmful or toxic materials. This guide utilizes the classification system from ASTM D3475, Standard Classification of Child-Resistant Packages, published by ASTM International. Most of these package types are used for high-volume retail packaging in the United States in the early 2020s. This guide is part of a series of guides covering rigid bottles and bases, rigid components, films and pouches, sealed trays, cards, boxes and bags. This guide starts with a review of the high-level issues and recommendations across all packaging. Following this section, the guide discusses optimum design guidelines, common issues and recommendations for child-resistant packaging.

Reclosable Closure Designs

Throughout this guide the term "closure" will be used to refer to the cap or lid of a package. This guide covers both reclosable and single-use packaging. Reclosable packaging is intended to be opened and closed multiple times, while single-use packaging is intended to be used one time only. With reclosable packaging, most child-resistant designs require the user to perform two or more actions simultaneously or in sequence. This section will review some of the most common designs including push and turn, squeeze and turn, align points, hold a mechanism and using a key or device to unlock the container.

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PUSH AND TURN

The push and turn designs are one of the most used designs. To open this design, a user pushes down on the closure and turns simultaneously. The threads in the closure are not molded into the closure. Instead, the threads are a separate part that can move up or down slightly while the closure is secured to the bottle. With no force applied, the closure threads do not engage with the threads on the bottle. However, when force is applied, the closure threads engage with the bottle threads and the closure can be removed by turning.

Examples of Push and Turn

Push and turn designs are notoriously difficult for people with arthritis to access. By design, they violate a major design recommendation which is to avoid requiring simultaneous actions. However, it is still possible to develop a push and turn design that is both arthritis-friendly and child-resistant.

Minimize downforce requirements while maintaining child resistance.

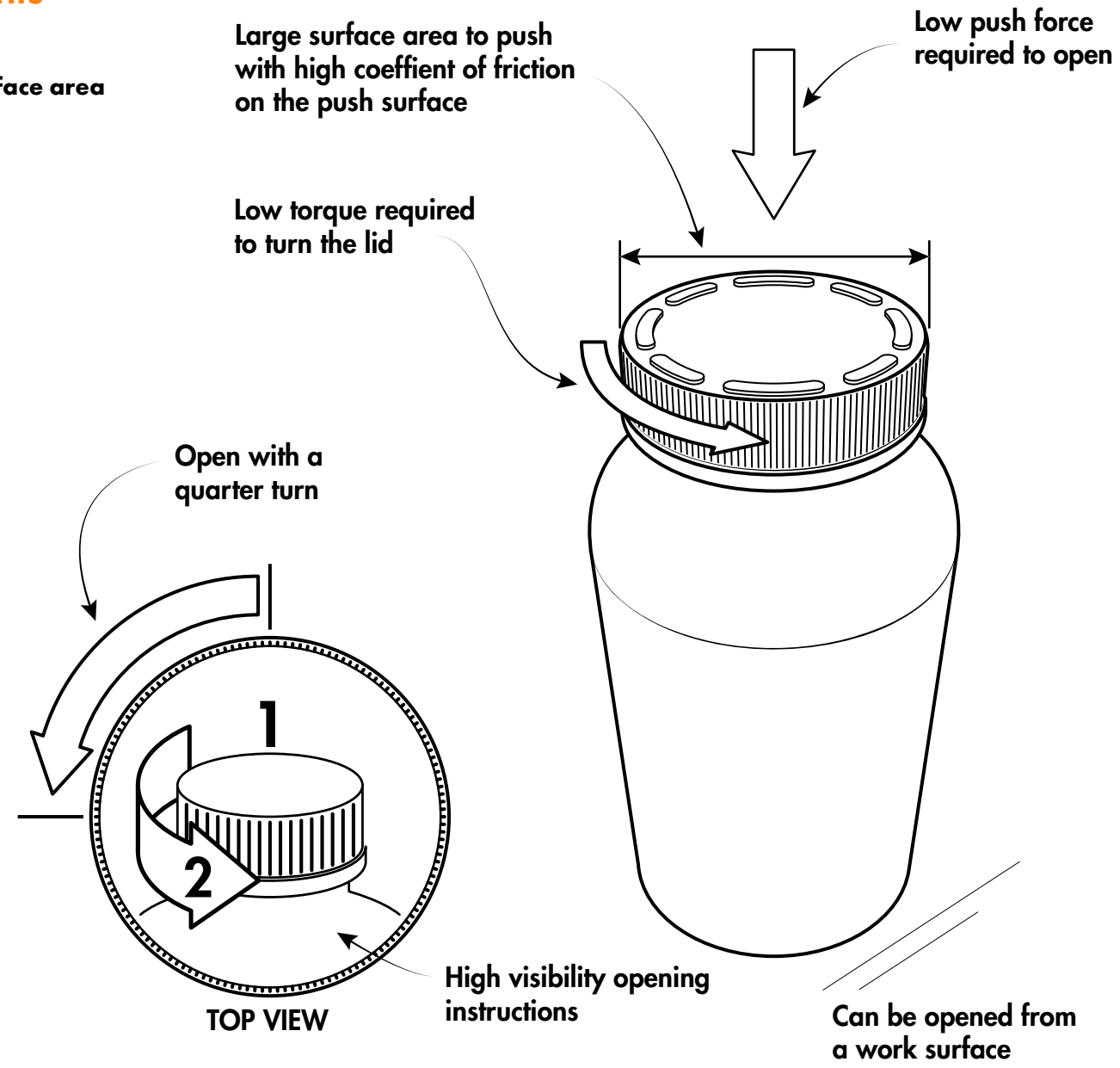
Things to consider

- Cap diameter
- Opening instructions
- Palm press surface area
- Palm press comfort
- Palm press coefficient of friction
- Closure coefficient of friction (material and knurling patterns)
- Initial rotational force requirement
- Cap push down travel distance

Optimum Push and Turn Guidelines

Recommendation Highlights

- **Large push surface area**
- **High coefficient of friction push surface area**
- **Low push force requirement**
- **Low torque requirement**
- **One quarter turn removal**
- **Openable from a work surface**
- **High visibility opening instructions**



PUSH AND TURN ISSUES

Child-resistant push and turn closures can be difficult for people with arthritis to open successfully. The effort required to simultaneously push down on the closure while providing a rotational force may exceed the functional capabilities of the user. While it is possible to balance the requirements for child resistance and ease of use for people with arthritis, the design process will likely require multiple iterations and extensive testing. When feasible, consider other closure options. Below is a summary of the common issues with each task. The following pages have detailed descriptions, population impact considerations and potential solutions for each issue.

1. Transport Issues

1.1. The bottle or container does not have a comfortable, graspable area.

1.2. The bottle or container is too heavy.

2. Opening Issues

2.1. The opening instructions are difficult to read or comprehend.

2.2. The force required to push down on the closure is too high.

2.3. The torque required to remove the closure is too high.

2.4. The user has difficulty gripping the bottle or container while removing the closure.

2.5. The inner seal interferes with closure removal.

2.6. The inner seal is difficult to remove.

3. Closing Issues

3.1. The closure is difficult to align.

3.2. The user may overtighten the closure.

1.1 The bottle or container does not have a comfortable, graspable area.

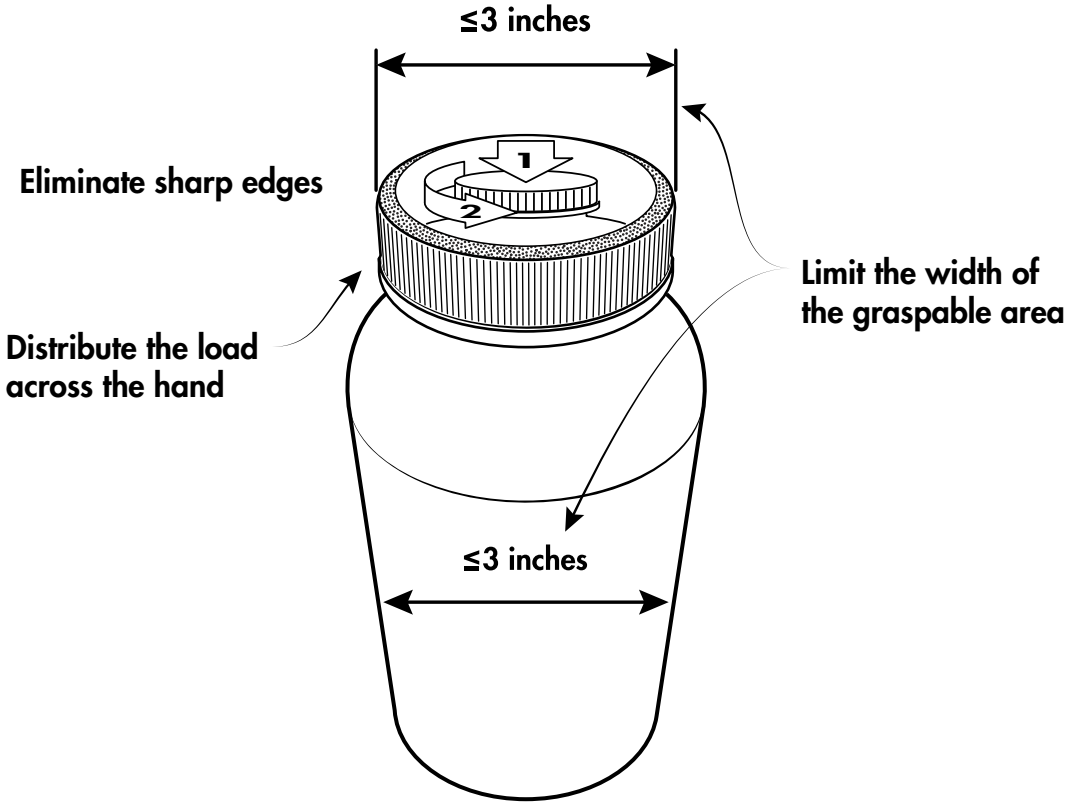
Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the container or may not know where to grasp the container if a clear graspable area is not provided.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Limit the width of the graspable area.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Select a graspable area circumference that allows the adult hand to grasp the container without exceeding a comfortable grip span.

Design the shape of the graspable area to distribute the load across the inner surface area of the graspable area. Pressure points at the load-bearing portion of the graspable area can cause discomfort across painful finger joints. Consider designing the graspable area to distribute the load across the hand, avoiding ridges, seams and small-radius protrusions.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic-part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.



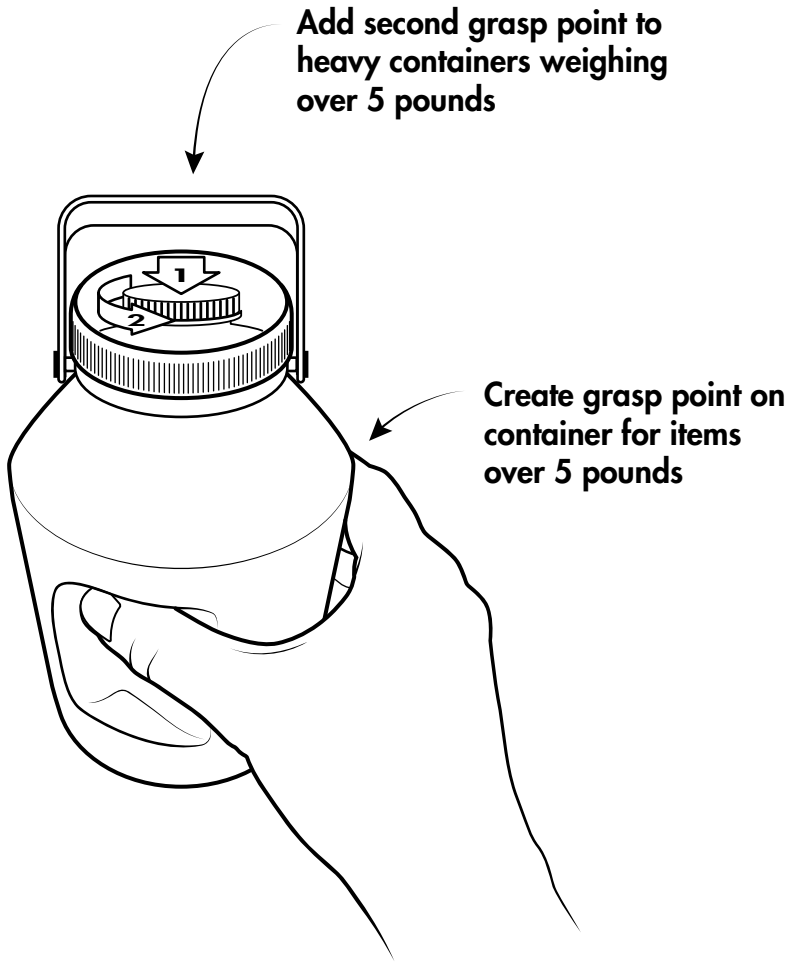
1.2 The bottle or container is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting bottles or containers that exceed 5.0 pounds for long distances. Heavier items that exceed 10.0 pounds may require a two-handed carry.

Populations Impacted: Limited strength

Potential Solutions: *Reduce weight of the container for a single-handle design to less than 5.0 pounds.* Users may need to use two hands to carry and transport containers exceeding 5.0 pounds.

Design a second grasp point to facilitate a two-handed carry for containers that weigh more than 5.0 pounds. Heavy containers over 5.0 pounds should be designed to allow two-handed carrying. A grasp point built into the container, in addition to the handle, can be useful when the container needs to be transported as part of the intended use of the product.



2.1 The opening instructions are difficult to read or comprehend.

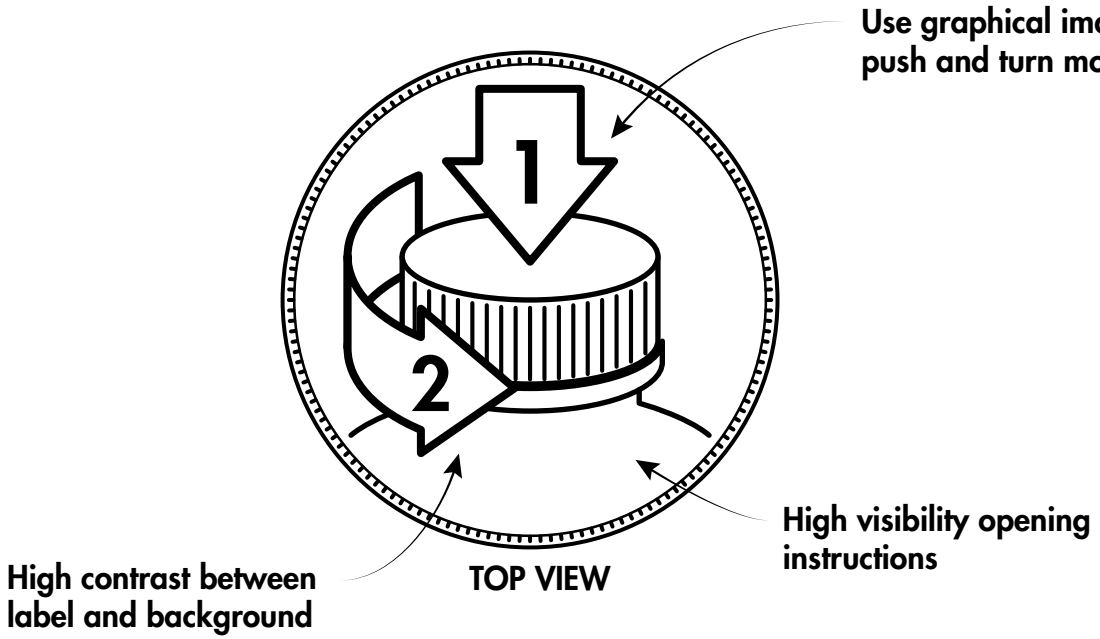
Detailed Description: Graphical or textual labels indicating the procedure for removing the closure can be difficult to read. Graphical elements or textual labels may be too small or have poor contrast, creating readability issues. Lighting conditions can exacerbate readability issues.

Populations Impacted: Limited vision

Potential Solutions: *Increase the size of critical labels or graphical elements.* Critical information should be sized in a 10-point font or equivalent to accommodate individuals with poor visual acuity.

Increase the visual contrast between the closure label and the closure background. A contrast ratio of at least 10:1 would increase the readability of the closure label under all lighting conditions.

Provide a clear graphical depiction of the push and turn movement. Graphical imagery should clearly depict both the product and a human hand grasping the product in the manner intended for closure movement. The graphical depiction should show that a simultaneous downward and rotational movement is required to remove the closure from the bottle or container.



2.2 The force required to push down on the closure is too high.

Detailed Description: Push-and-turn closures require a sufficient downward force before the mechanism that allows the closure to be removed is engaged. In some designs, the amount of force required to engage the mechanism may be too high.

Populations Impacted: Limited strength, limited grip

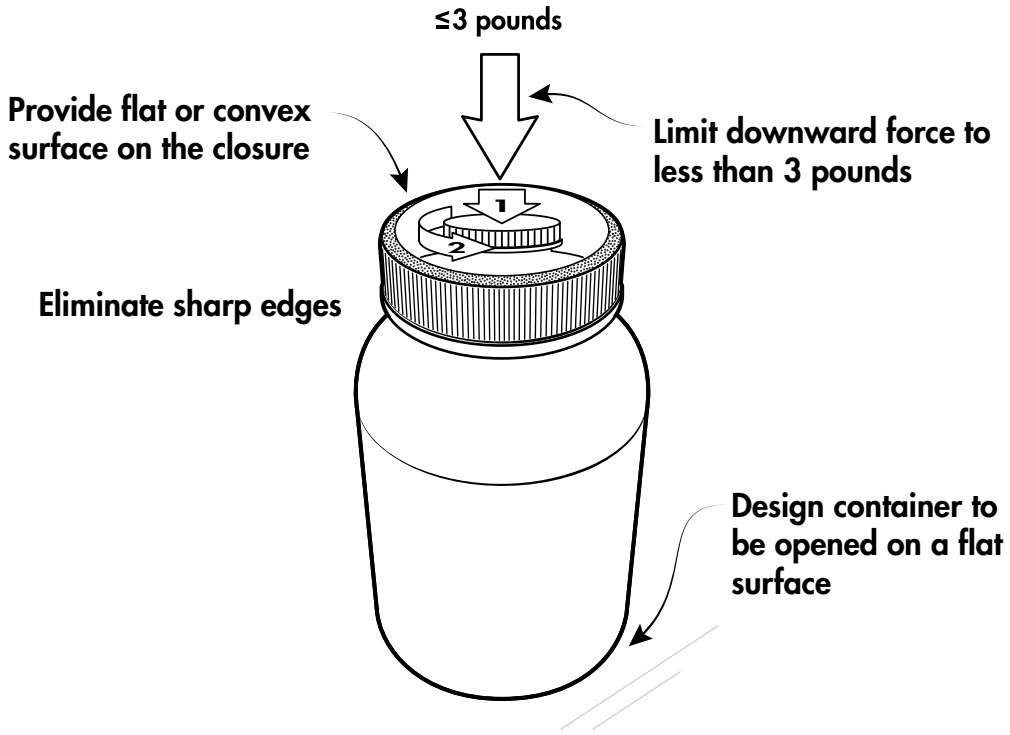
Potential Solutions: *Limit the linear force requirement.* Downward force requirements exceeding 3.0 pounds may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a downward force exceeding 3.0 pounds, select the minimum force required to achieve child resistance.

Provide a sufficiently large surface area. A large surface area for applying downward force can make opening easier for people with arthritis. Consider designing the closure so that users can apply downward force with their palms rather than along the sides of the closure.

Design the bottle or container so that it can be opened while resting on a flat surface. If the bottle or container can be opened on a flat surface such as a countertop or table, the user is not required to apply an opposing force to the bottle or container while pushing down on the closure. This can reduce the likelihood of the user experiencing pain or discomfort in the hand applying the opposing force.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.

Provide a flat or slightly convex closure surface. Provide a closure surface that facilitates pressing the palm down without causing discomfort. A flat or slightly convex surface will maximize the surface area of the palm coming in contact with the closure, thereby distributing the force across the surface of the palm.



2.3 The torque required to remove the closure is too high.

Detailed Description: Twist off closures with excessive torque requirements may be difficult to remove. The shape of some twist off closures may make the closure difficult to grip without causing painful pressure points.

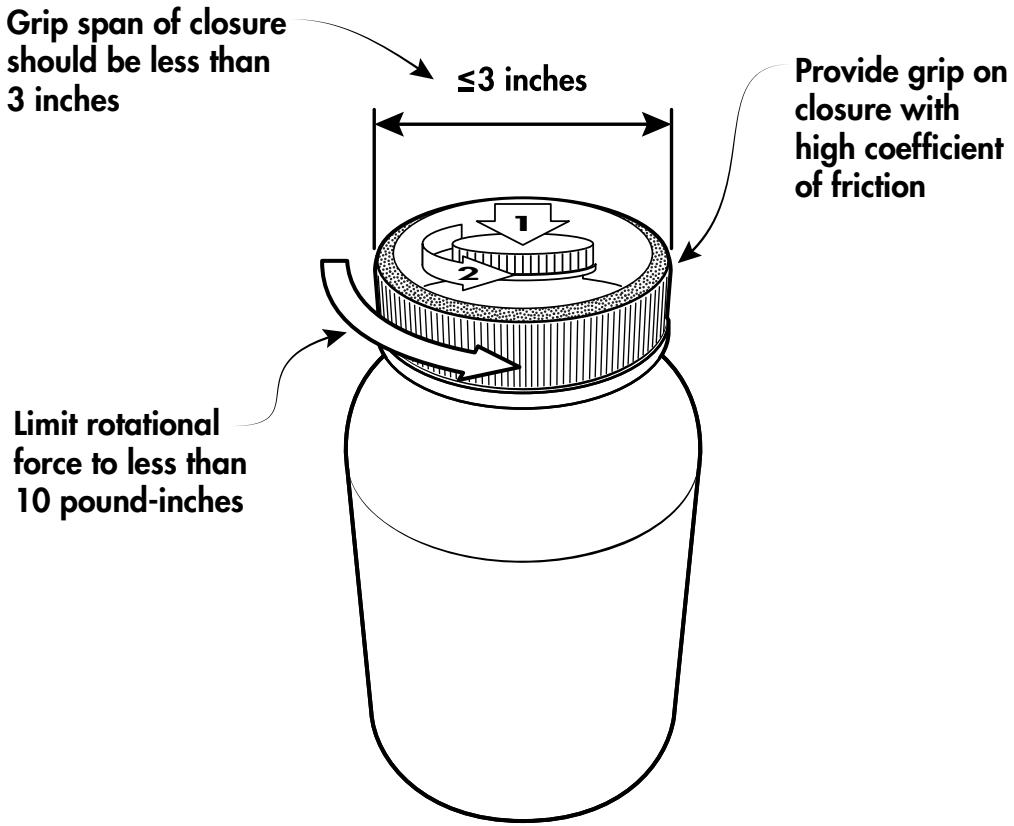
Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the circumference of the closure.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the torque required to remove the closure. Excessive torque may make it difficult or impossible for users with arthritis to remove the closure.

Limit the rotational force requirement. Rotational force requirements exceeding 10.0 pound-inches may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a rotational force exceeding 10.0 pound-inches, select the minimum force required to achieve child resistance.

Provide a high coefficient of friction closure grip. Consider using a high coefficient of friction material at the grasp point of the closure or using a knurling pattern that maximizes grip.

Provide a knurling pattern or high coefficient of friction grip surface. Consider providing a visible grip surface for removal.



2.4 The user has difficulty gripping the bottle or container while removing the closure.

Detailed Description: Push and turn closures with excessive downward force and torque requirements may be difficult to remove. Removing the closure requires a firm grip on the bottle or container. The shape of some bottles or containers may make the bottle or container difficult to grip without causing painful pressure points.

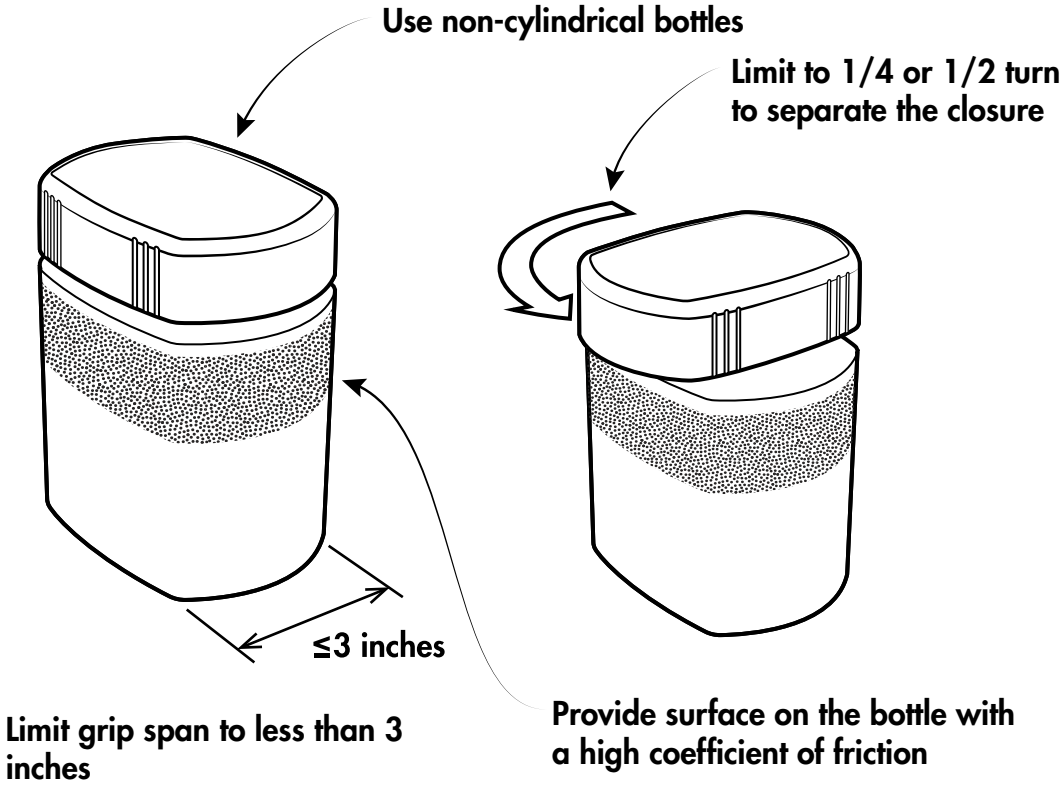
Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the circumference of the bottle or container grasp point.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the diameter of the bottle or container or build a grasp point into the bottle or container that does not require an excessive grip span.

Provide a bottle or container surface with a high coefficient of friction. Consider using a high coefficient of friction material at the grasp point of the bottle or container.

Use a non-cylindrical bottle or container design. Cylindrical bottles or containers are more likely to slip in the hand as compared to non-cylindrical bottles or containers. Consider using an oval shaped bottle or container that is less likely to rotate in the hand while the user is removing the closure.

Limit wrist movements. Limit wrist movements to ¼ or ½ turn of the wrist to separate the closure from the bottle or container. Closures requiring extensive turning can cause pain and discomfort for people with arthritis.



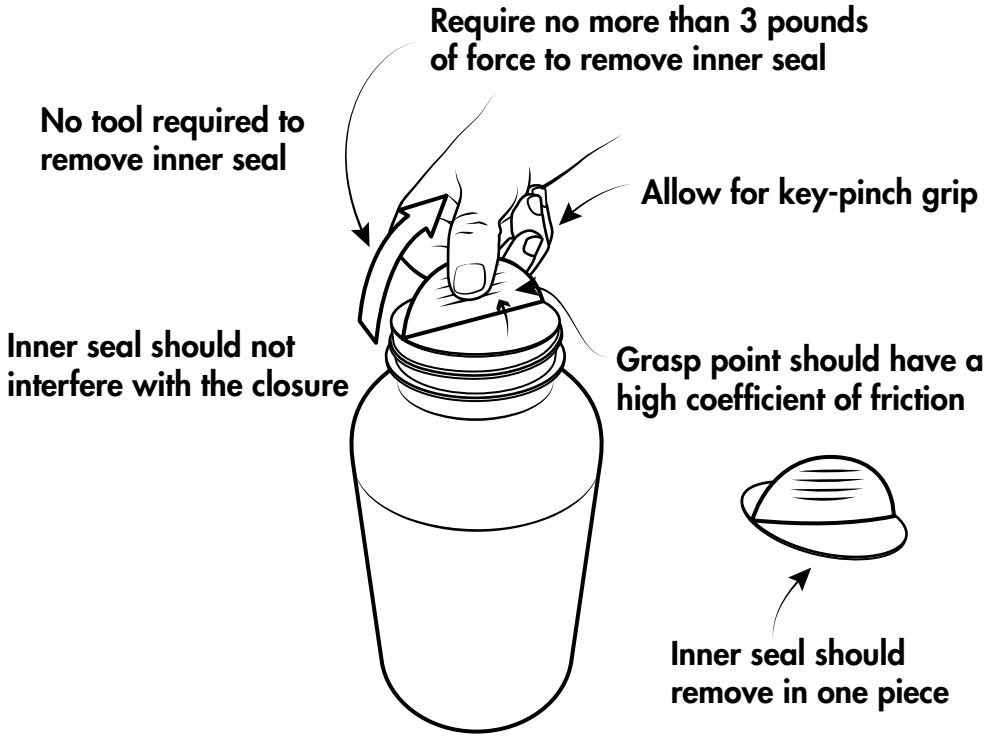
2.5 The inner seal interferes with closure removal.

Detailed Description: Some bottles and containers feature an inner seal located at the top of the bottle or container under the closure. The seal may make it difficult to separate the closure from the bottle or container. The seal may also increase the amount of downward pressure required to remove the closure from the bottle or container.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Design the closure to accommodate the outer diameter of the inner seal and any lift points attached to the inner seal.* The inner seal should not cause additional resistance when removing the closure from the bottle or container.

Consider the overall downward force required to engage the closure. The total downward pressure required to engage the child-resistant closure should include any force imposed by the seal itself if the seal interacts with the closure during opening. Changes in the inner seal design should be evaluated to determine if they impact child resistance or ease of use.



2.6 The inner seal is difficult to remove.

Detailed Description: Some containers feature an inner seal located at the top of the container under the closure. Users with arthritis may have difficulty removing the inner seal due to the absence of a grasp point and the amount of force required to separate the seal from the container.

Populations Impacted: Limited strength, limited grip

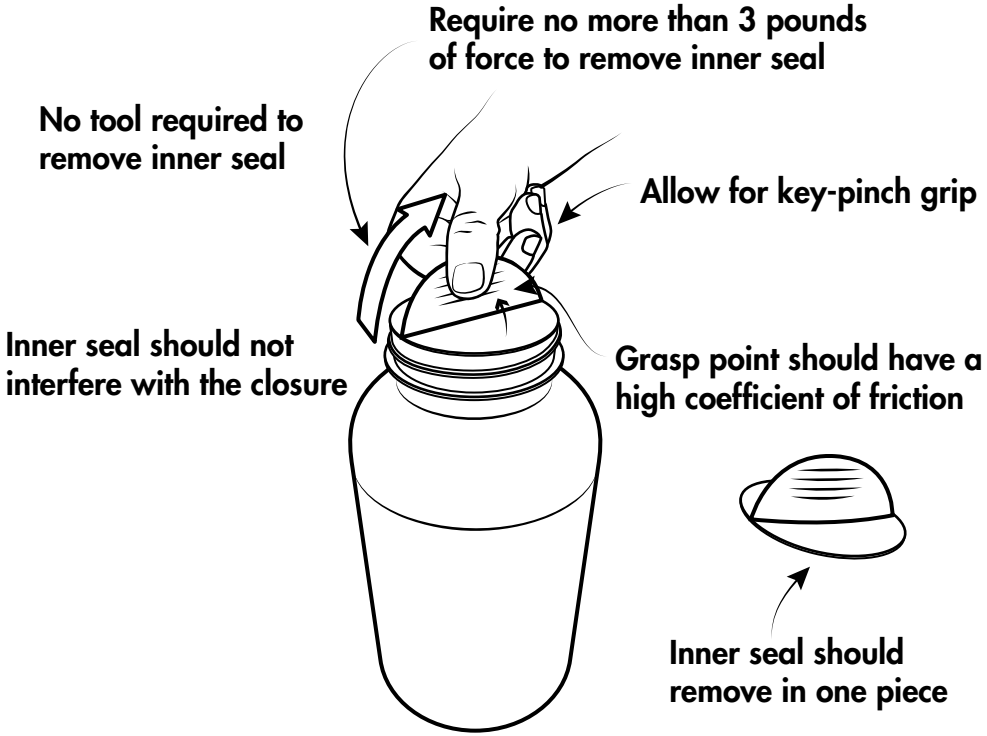
Potential Solutions: *Limit the amount of force required to remove the seal to 3.0 pounds or less.* Minimize the amount of force required to remove the seal. Require no more than 3.0 pounds of force to remove the seal when an adequate grasp point is provided, and the user can utilize a key-pinch grip to securely grasp the grasp point.

Provide an adequate grasp point for the removal of the inner seal. Consider providing a grasp point that can be easily grasped between the thumb and knuckle using a key-pinch grip. The grasp point should extend beyond the seal and be visually apparent to the user.

Do not require the use of a tool. Inner seals that require puncturing with a tool can pose a potential hazard for users with arthritis. Do not require a knife or scissors to remove the inner seal. If appropriate, reduce the amount of force required to puncture the seal to allow users to puncture it with a fingernail.

Ensure the grasp point has a sufficient coefficient of friction. Inner-seal grasp points can be difficult to pinch securely without slipping. Consider the use of a texture or high coefficient of friction coating to facilitate a secure grip on the grasp point.

Inner seal removes in one piece. The inner seal can be extremely difficult to remove if it separates into multiple pieces. The remaining pieces not connected to the pull tab may require a tool or fine motor control to remove. The inner seal should be removable in one piece with one continuous motion.



3.1 The closure is difficult to align.

Detailed Description: People with arthritis may lack the fine motor control to successfully align the separated closure with the bottle or container if the closure requires precise alignment to engage.

Populations Impacted: Limited fine motor control

Potential Solutions: *Limit the requirement for precise alignment.* Do not require precise alignment to connect the closure with the bottle or container. Do not require precise alignment to screw the closure onto the bottle or container. Design features into the product to allow flexible coupling of the closure with the bottle or container.

Provide a visual indication of alignment if alignment is required. If a task requires alignment, consider adding a visual indication on the closure and the bottle or container to indicate proper alignment.

Funnel the closure onto the bottle or container. Provide a funnel-type feature designed to align the closure with the bottle or container opening if the alignment cannot be achieved visually.

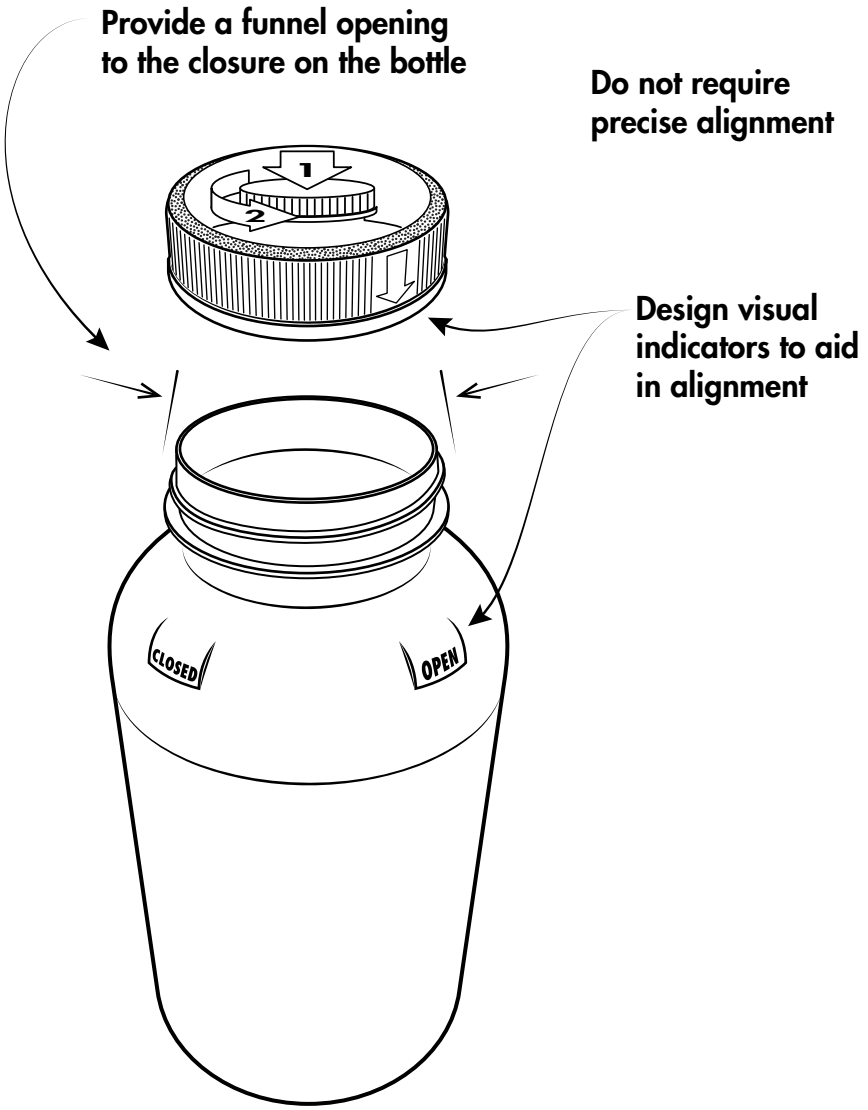
3.2 Users may overtighten the closure.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the container or may not know where to grasp the container if a clear graspable area is not provided.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Provide an indication of sufficient closure tightening.* Consider providing an audible click or visual cues to indicate that the closure has been sufficiently tightened.

Prevent overtightening. Provide a design feature that prevents overtightening of the closure. Closures that are overtightened may become difficult or impossible to open for people with arthritis.



SQUEEZE AND TURN

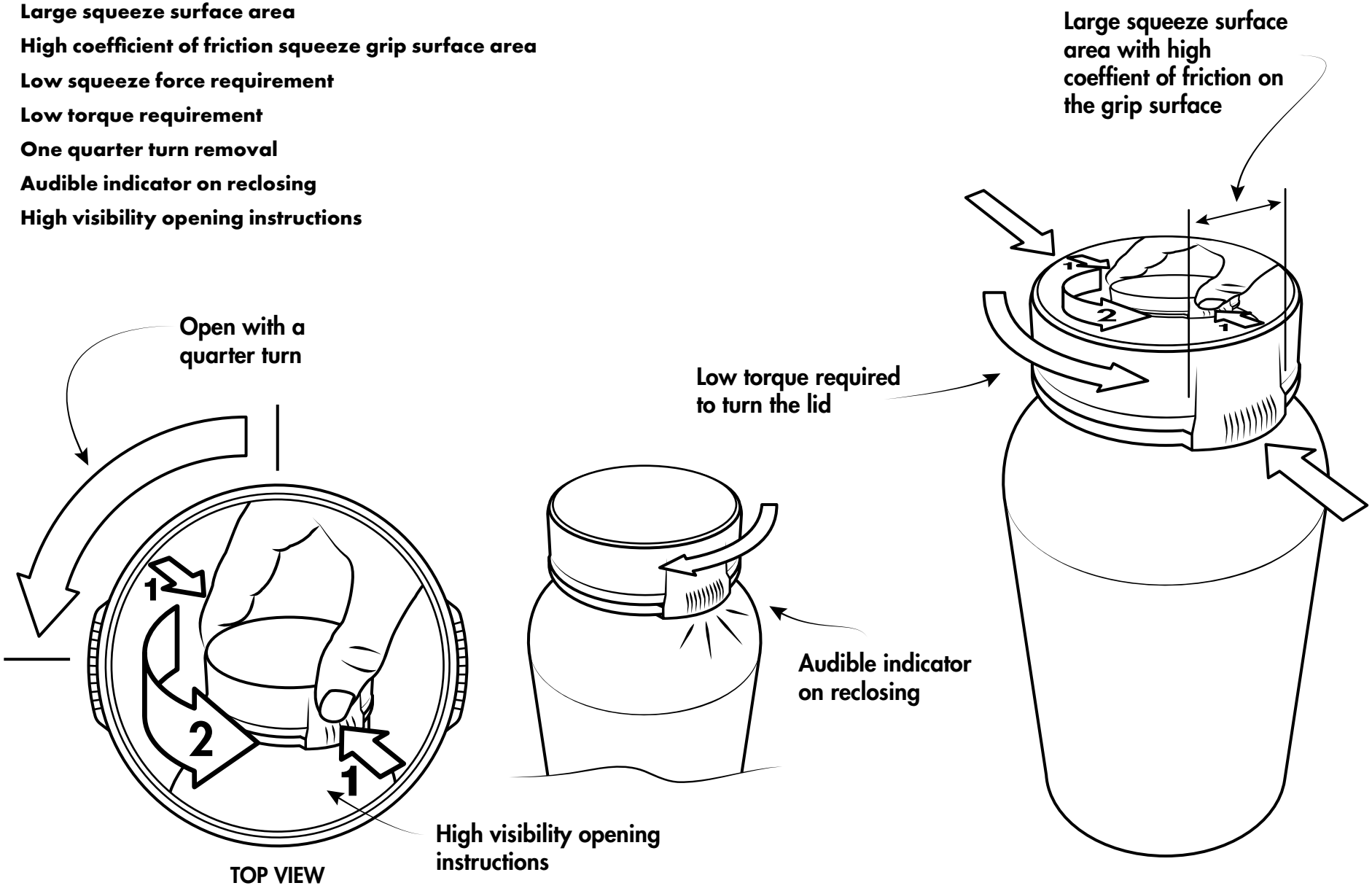
To open this design, a user squeezes part of the closure and turns the closure simultaneously. Most designs have a motion limiting feature such as a small protrusion on the interior of the closure that engages with a block of plastic on the neck of the bottle. When these two blocks of plastic are engaged, the closure cannot be rotated. However, when a user squeezes part of the closure in a specific way, deforming or flexing the closure, the motion-limiting feature on the closure is moved away from the neck feature and the closure can be rotated.

Examples of Squeeze and Turn

Optimum Squeeze and Turn Guidelines

Recommendation Highlights

- **Large squeeze surface area**
- **High coefficient of friction squeeze grip surface area**
- **Low squeeze force requirement**
- **Low torque requirement**
- **One quarter turn removal**
- **Audible indicator on reclosing**
- **High visibility opening instructions**



SQUEEZE AND TURN ISSUES

Child-resistant squeeze and turn closures can be difficult for people with arthritis to open successfully. The effort required to simultaneously pinch the sides of the closure while providing a rotational force may exceed the functional capabilities of the user. While it is possible to balance the requirements for child resistance and ease of use for people with arthritis, the design process will likely require multiple iterations and extensive testing. When feasible, consider other closure options. Below is a summary of the common issues with each task. The following pages have detailed descriptions, population impact considerations and potential solutions for each issue.

1. Transport Issues

1.1. The bottle or container does not have a comfortable, graspable area.

1.2. The bottle or container is too heavy.

2. Opening Issues

2.1. The opening instructions are difficult to read or comprehend.

2.2. The force required to squeeze the sides of the closure is too high.

2.3. The torque required to remove the closure is too high.

2.4. The user has difficulty gripping the bottle or container while removing the closure.

2.5. The inner seal interferes with closure removal.

2.6. The inner seal is difficult to remove.

3. Closing Issues

2.1. The closure is difficult to align.

2.2. The user may overtighten the closure.

1.1 The bottle or container does not have a comfortable, graspable area.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the container or may not know where to grasp the container if a clear graspable area is not provided. The closure may not facilitate a comfortable key-pinch across the grasp points.

Populations Impacted: Limited strength, limited range of motion

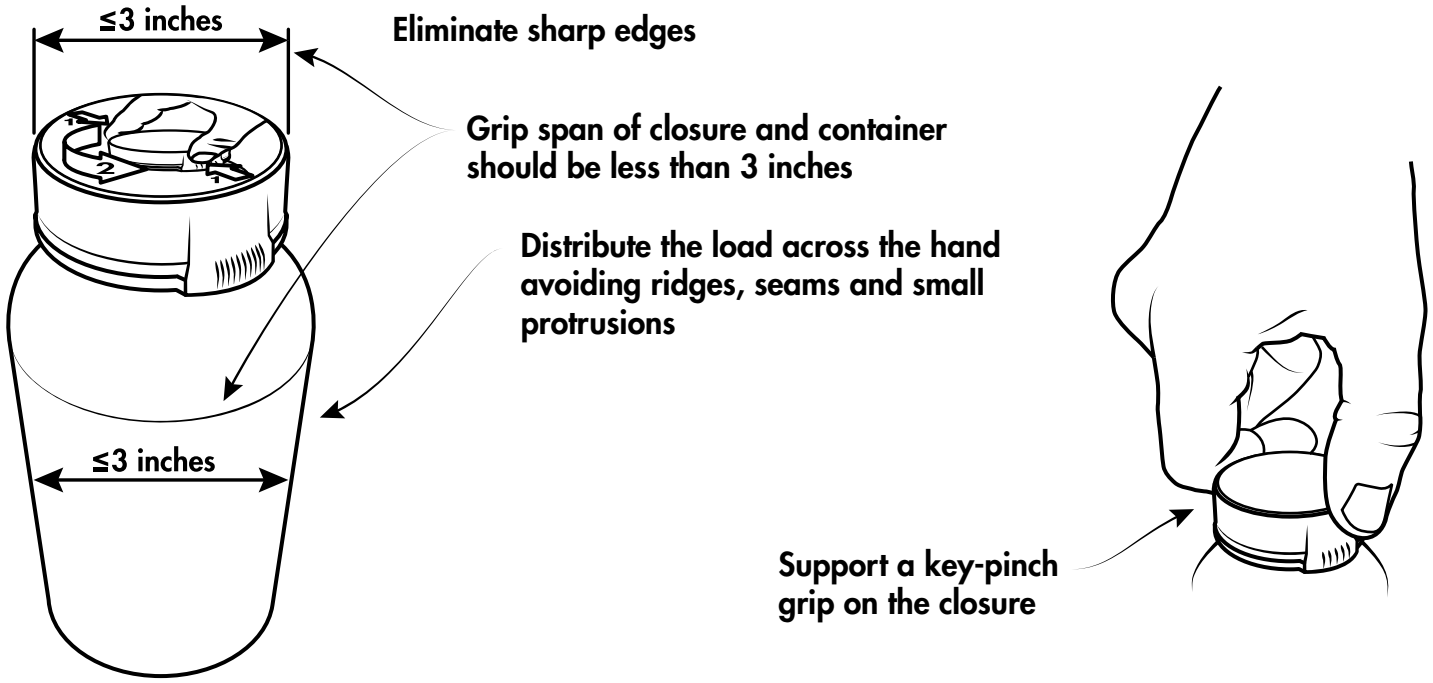
Potential Solutions: *Limit the width of the graspable area.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Select a graspable circumference that allows the adult hand to grasp the container without exceeding a comfortable grip span.

Design the shape of the graspable area to distribute the load across the inner surface area of the graspable area. Pressure points at the load-bearing portion of the graspable area can cause discomfort across painful finger joints. Consider designing the graspable area to distribute the load across the hand, avoiding ridges, seams and small-radius protrusions.

Make sure the squeeze-travel path is clear of obstructions. When pressing in the sides of the closure, make sure the fingers do not meet surfaces that could cause pressure along painful finger joints.

Make sure the grasp points on the closure support a key-pinch. Users with arthritis can apply more pressure comfortably using a key-pinch. Ensure the design of the closure and the grasp points support a key-pinch grip.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.



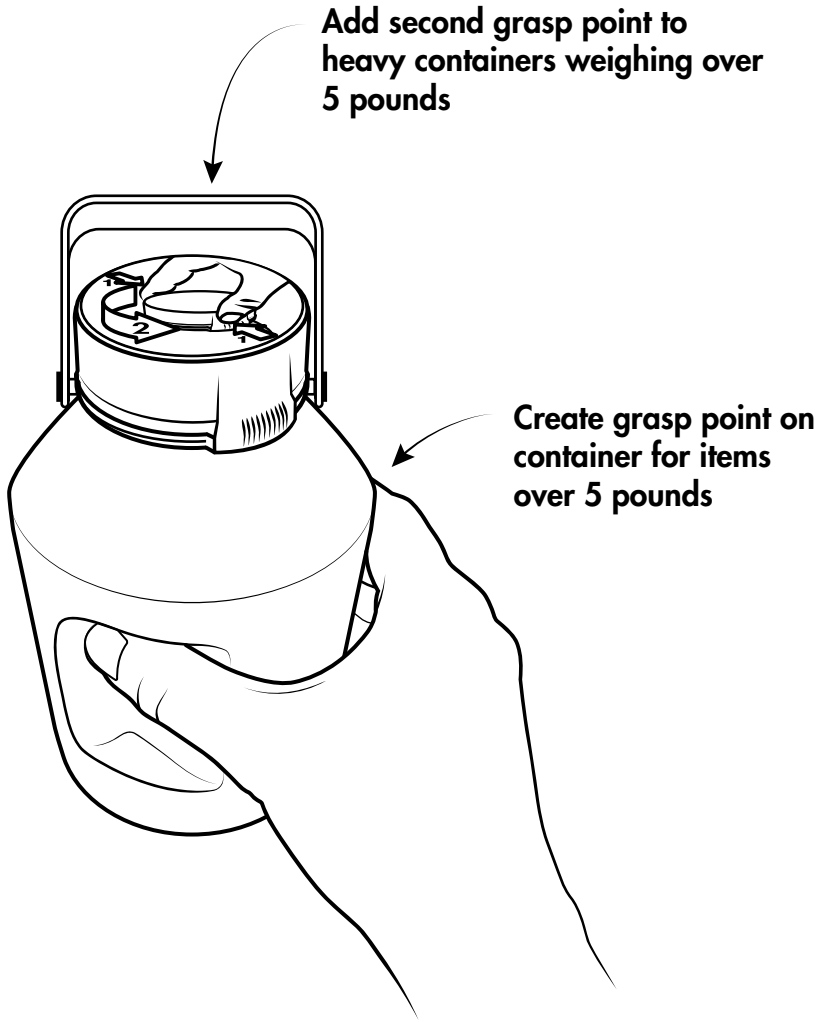
1.2 The bottle or container is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting bottles or containers that exceed 5.0 pounds for long distances. Heavier items that exceed 10.0 pounds may require a two-handed carry.

Populations Impacted: Limited strength

Potential Solutions: *Reduce weight of the container for a single-handle design to below 5.0 pounds.* Users may need to use two hands to carry and transport containers exceeding 5.0 pounds.

Design a second grasp point to facilitate a two-handed carry for containers that weigh more than 5.0 pounds. Heavy containers over 5.0 pounds should be designed to be carried using two hands. A grasp point built into the container, in addition to the handle, can be useful when the container needs to be transported as part of the intended use.



2.1 The opening instructions are difficult to read or comprehend.

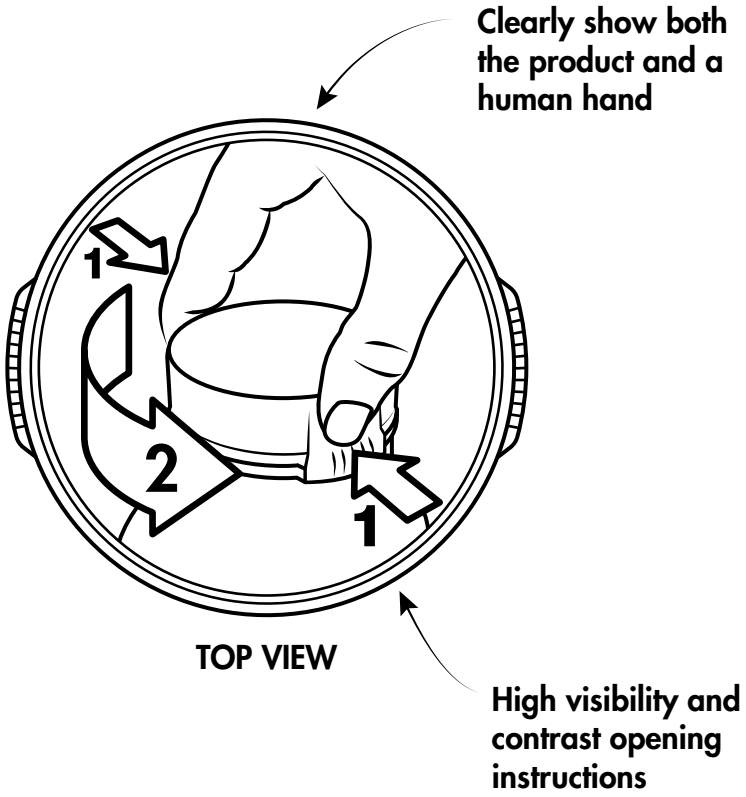
Detailed Description: Graphical or textual labels indicating the procedure for removing the closure can be difficult to read. Graphical elements or textual labels may be too small or have poor contrast, creating readability issues. Lighting conditions can exacerbate readability issues.

Populations Impacted: Limited vision

Potential Solutions: *Increase the size of critical labels or graphical elements.* Critical information should be sized in a 10-point font or equivalent to accommodate individuals with poor visual acuity.

Increase the visual contrast between the label and the closure background. A contrast ratio of at least 10:1 would increase the readability of the closure label under all lighting conditions.

Provide a clear graphical depiction of the squeeze-and-turn movement. Graphical imagery should clearly depict both the product and a human hand grasping the product in the manner intended for closure movement. The graphical depiction should show that a simultaneous squeezing and rotational movement is required to remove the closure from the bottle or container.



2.2 The force required to squeeze the sides of the closure is too high.

Detailed Description: Squeeze and turn closures require a sufficient pinch-force before the mechanism that allows the closure to be removed is engaged. In some designs the amount of force required to engage the mechanism may be too high.

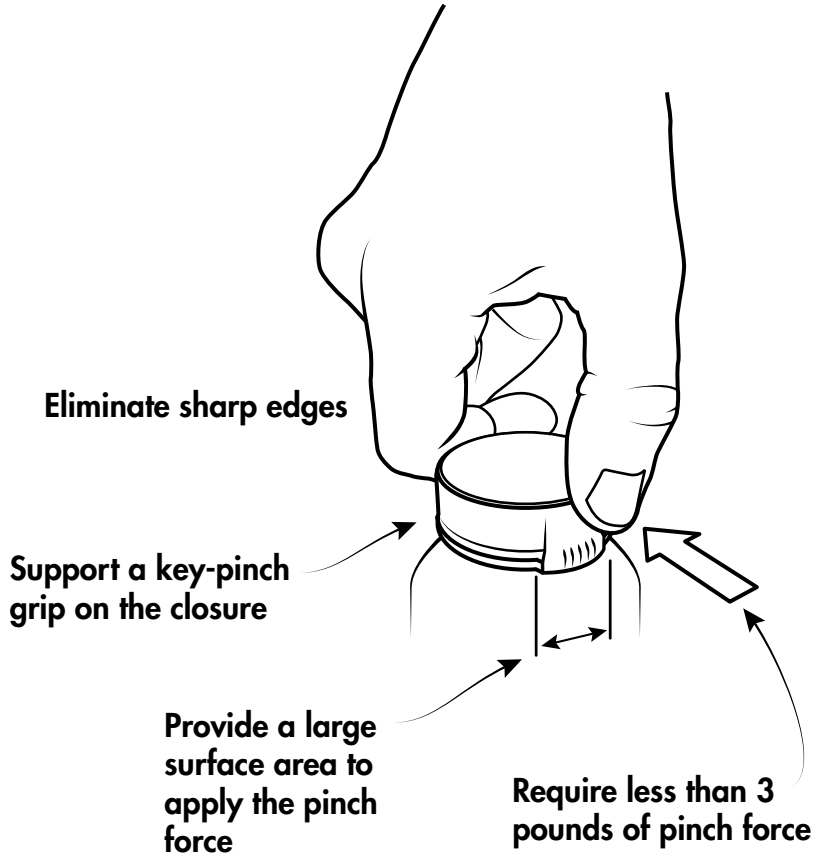
Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the linear force requirement.* Pinch-force requirements exceeding 3.0 pounds, may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a pinch-force exceeding 3.0 pounds select the minimum force required to achieve child resistance.

Facilitate a key-pinch. Pinching the closure with the sides of the index finger and the thumb may be easier for some people with arthritis. Consider designing the closure to facilitate the use of a key-pinch to grasp the closure.

Provide sufficient grip surface area. A large surface area for applying the pinch force can make it easier for people with arthritis. Support a key-pinch grip if possible.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.



2.3 The torque required to remove the closure is too high.

Detailed Description: Twist off closures with excessive torque requirements may be difficult to remove. The shape of some twist off closures may make the closure difficult to grip without causing painful pressure points.

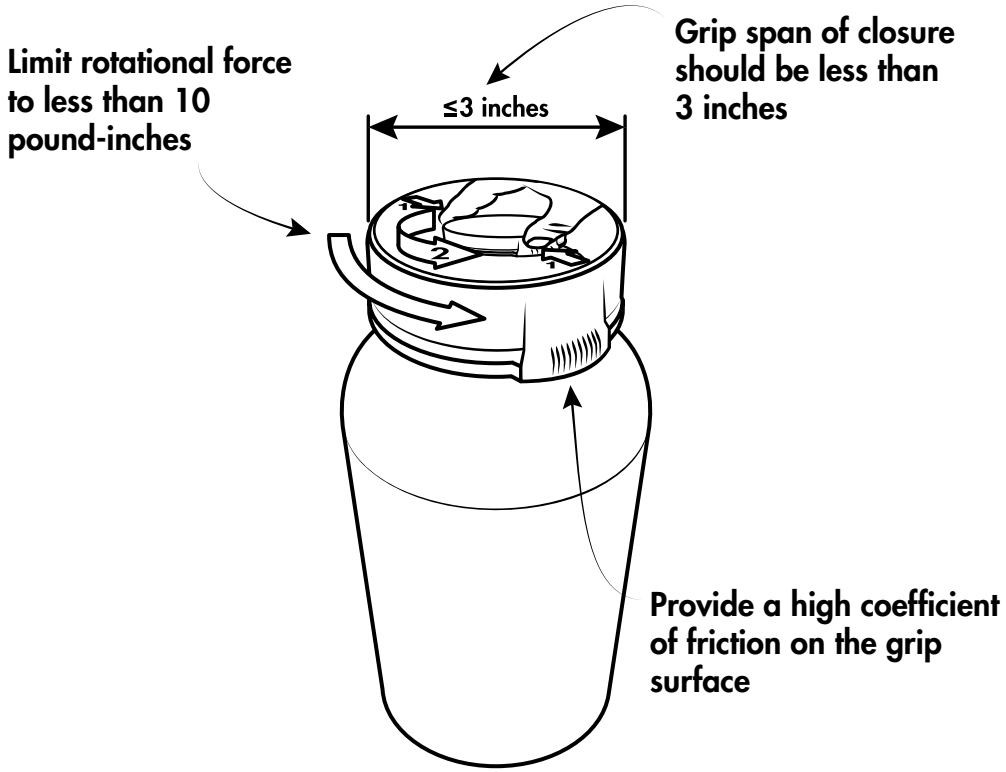
Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the circumference of the closure.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the torque required to remove the closure. Excessive torque may make it difficult or impossible for users with arthritis to remove the closure.

Limit the rotational force requirement. Rotational force requirements exceeding 10.0 pound-inches may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a rotational force exceeding 10.0 pound-inches, select the minimum force required to achieve child resistance.

Provide a high coefficient of friction closure grip. Consider using a high coefficient of friction material at the grasp point of the closure or using a knurling pattern that maximizes grip.

Provide a knurling pattern or high coefficient of friction grip surface. Consider providing a visible grip surface for removal.



2.4 The user may have difficulty gripping the bottle or container while removing the closure.

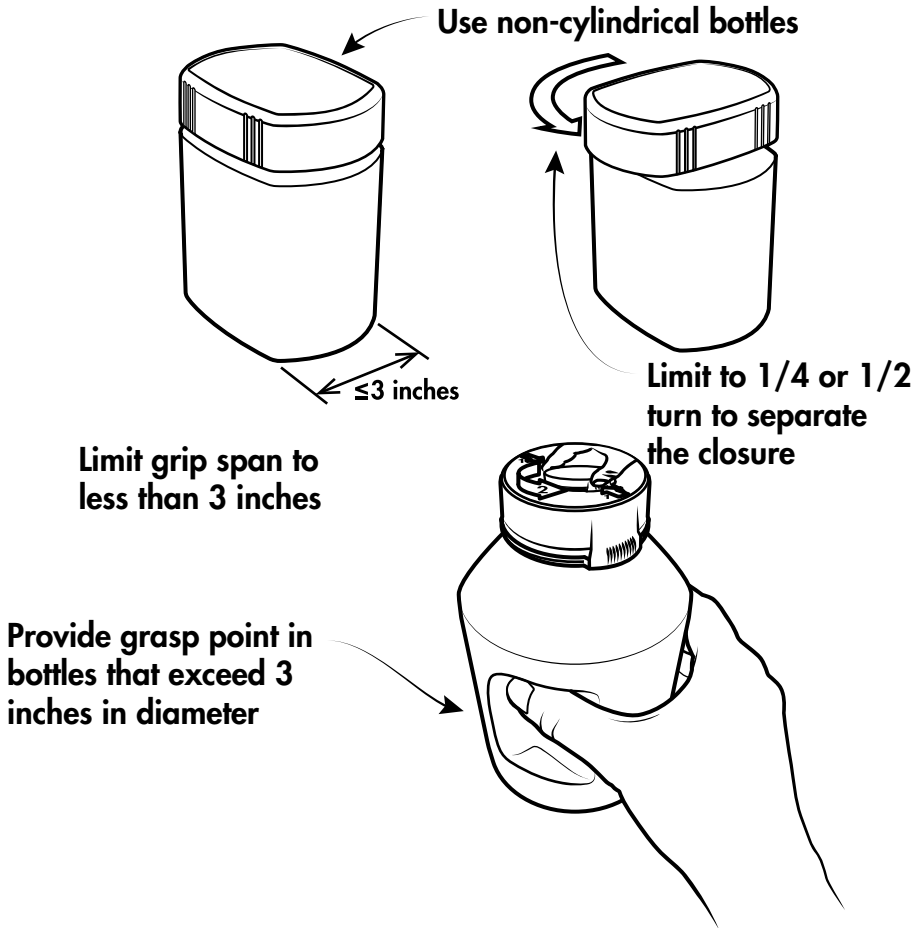
Detailed Description: The removal of the closure requires that users firmly grasp the container while rotating the closure. The container may be difficult to grasp if the container is too large or if the container slips easily while being held.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the circumference of the bottle or container grasp point.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the diameter of the bottle or container or build a grasp point into the bottle or container that does not require an excessive grip span.

Provide a bottle or container surface with a high coefficient of friction. Consider using a high coefficient of friction material at the grasp point of the bottle or container.

Use a non-cylindrical bottle or container design. Cylindrical bottles or containers are more likely to slip in the hand as compared to non-cylindrical bottles or containers. Consider using an oval shaped bottle or container that is less likely to rotate in the hand while the user is removing the closure.



2.5 The inner seal interferes with closure removal.

Detailed Description: Some bottles and containers feature an inner seal located at the top of the bottle or container under the closure. The seal may make it difficult to separate the closure from the bottle or container. The seal may also increase the amount of force required to remove the closure from the bottle or container.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Design the closure to accommodate the outer diameter of the inner seal and any lift points attached to the inner seal.* The inner seal should not cause additional resistance to removing the closure from the bottle or container.

2.6 The inner seal is difficult to remove.

Detailed Description: Some containers feature an inner seal located at the top of the container under the closure. Users with arthritis may have difficulty removing the inner seal due to the absence of a grasp point and the amount of force required to separate the seal from the container.

Populations Impacted: Limited strength, limited grip

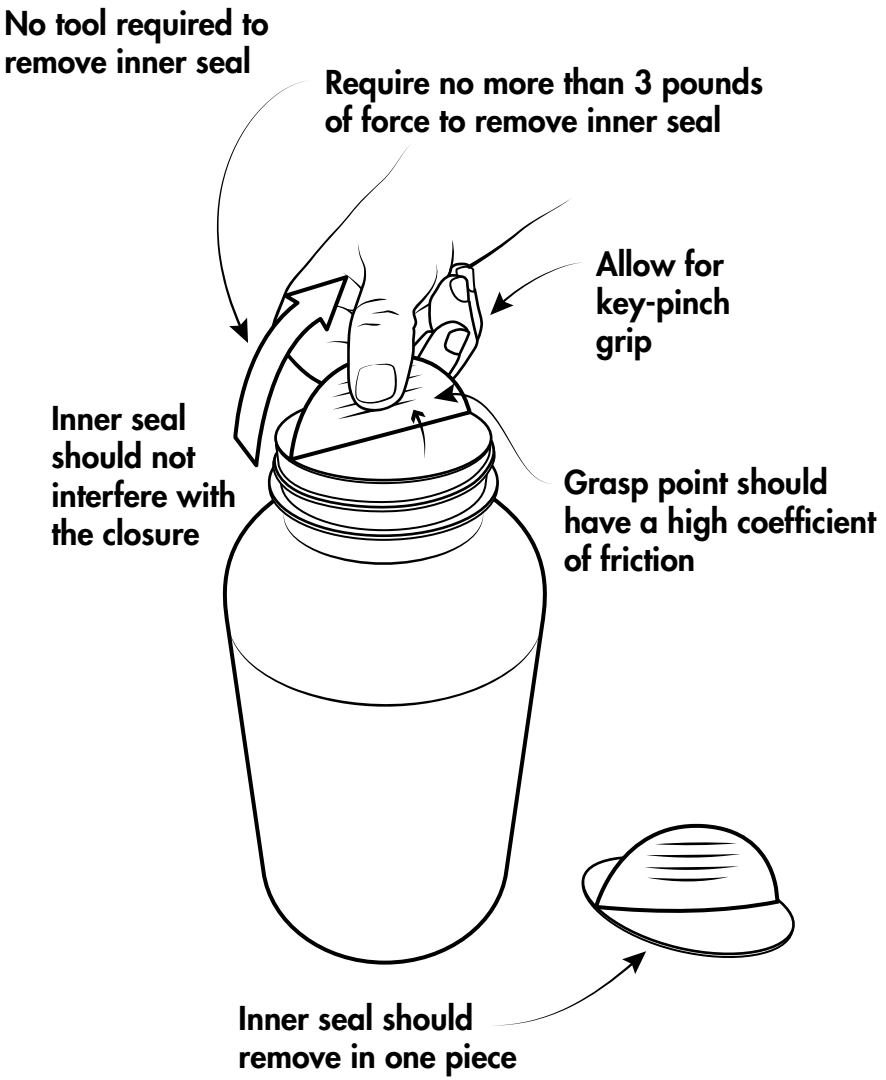
Potential Solutions: *Limit the amount of force required to remove the seal to 3.0 pounds or less.* Minimize the amount of force required to remove the seal. Require no more than 3.0 pounds of force to remove the seal when an adequate grasp point is provided, and the user can utilize a key-pinch grip to securely grasp the grasp point.

Provide an adequate grasp point for the removal of the inner seal. Consider providing a grasp point that can be easily grasped between the thumb and knuckle using a key-pinch grip. The grasp point should extend beyond the seal and be visually apparent to the user.

Do not require the use of a tool. Inner seals that require puncturing with a tool can pose a potential hazard for users with arthritis. Do not require a knife or scissors to remove the inner seal. If appropriate, reduce the amount of force required to puncture the seal to allow users to puncture it with a fingernail.

Ensure the grasp point has a sufficient coefficient of friction. Inner seal grasp points can be difficult to pinch securely without slipping. Consider the use of a texture or high coefficient of friction coating to facilitate a secure grip on the grasp point.

Inner seal removes in one piece. The inner seal can be extremely difficult to remove if it separates into multiple pieces. The remaining pieces not connected to the pull tab may require a tool or fine motor control to remove. The inner seal should be removable in one piece with one continuous motion.



3.1 The closure is difficult to align.

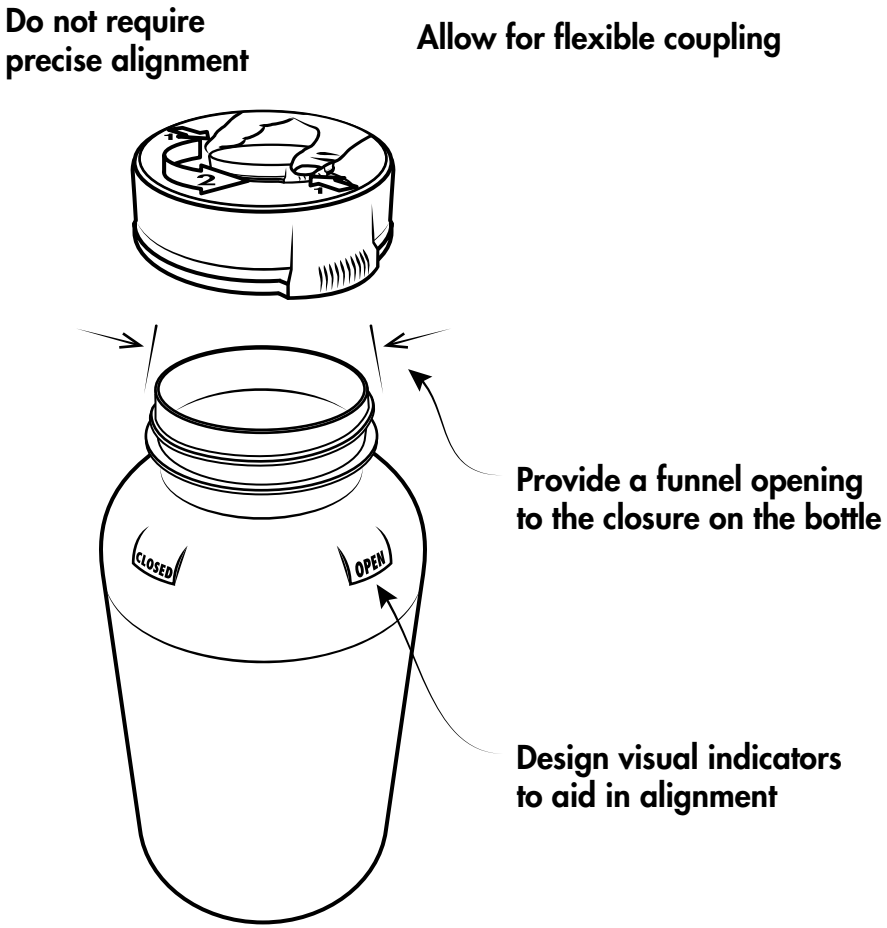
Detailed Description: People with arthritis may lack the fine motor control to successfully align the separated closure with the bottle or container if the closure requires precise alignment to engage.

Populations Impacted: Limited fine motor control

Potential Solutions: *Limit the requirement for precise alignment.* Do not require precise alignment to connect the closure with the bottle or container. Do not require precise alignment to screw the closure onto the bottle or container. Design features into the product to allow flexible coupling of the closure with the bottle or container.

Provide a visual indication of alignment if alignment is required. If a task requires alignment, consider adding a visual indication on the closure and the bottle or container to indicate proper alignment.

Funnel the closure onto the bottle or container. Provide a funnel type feature designed to align the closure with the bottle/container opening if the alignment cannot be achieved visually.



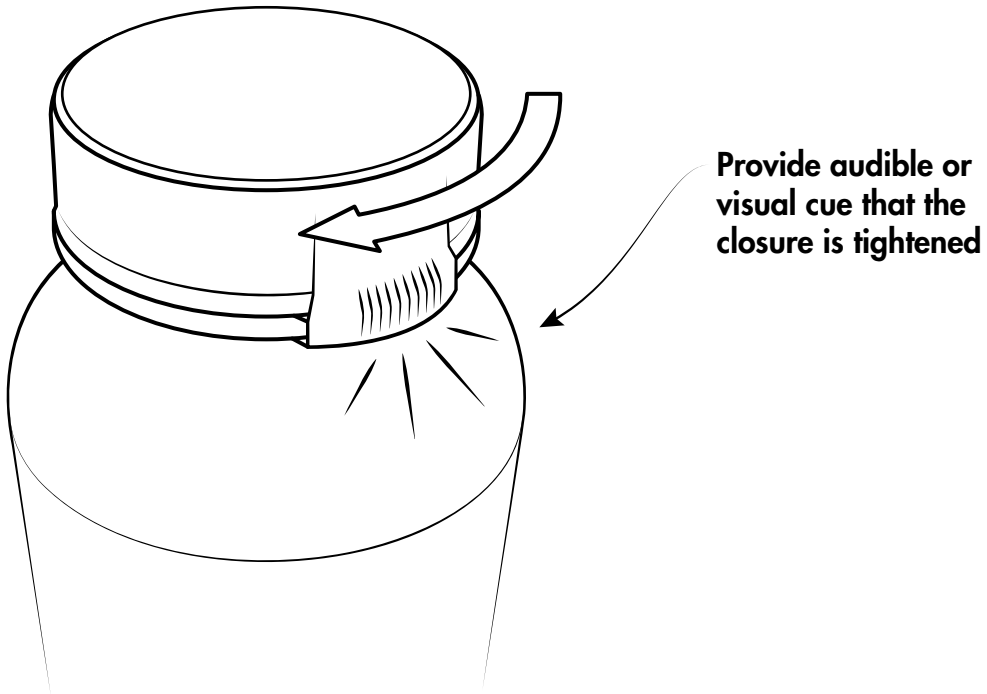
3.2 The user may overtighten the closure.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the container or may not know where to grasp the container if a clear graspable area is not provided.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Provide an indication of sufficient closure tightening.* Consider providing an audible click or visual cues to indicate that the closure has been sufficiently tightened.

Prevent overtightening. Provide a design feature that prevents overtightening of the closure. Closures that are overtightened may become difficult or impossible to open for people with arthritis.



ALIGN POINTS

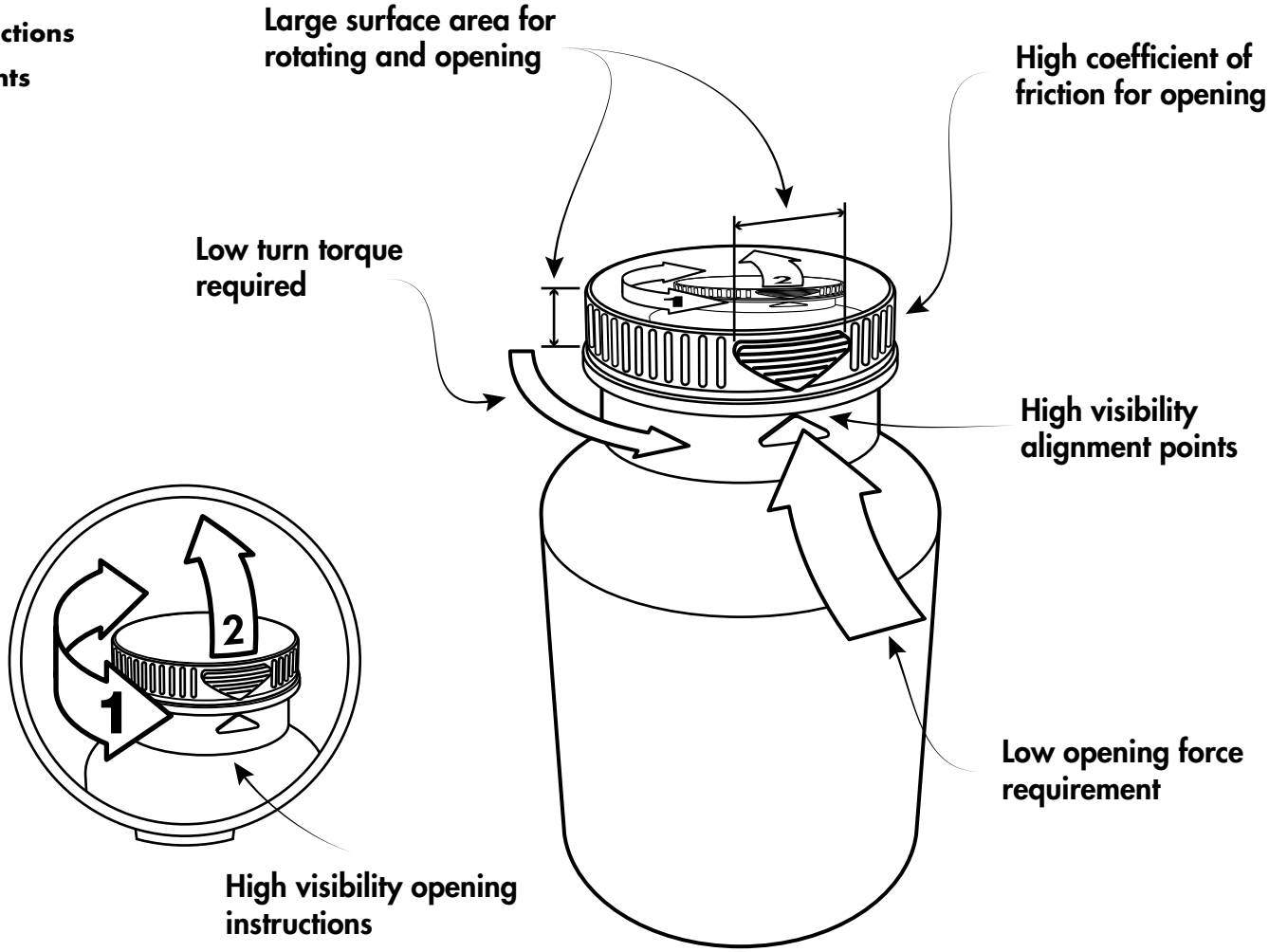
This design requires a user to rotate the closure to a specific location indicated by arrows or some other symbol and lift the closure. The closure will have a motion-limiting feature such as a small protrusion on the interior of the closure. This feature will ride within a track on the neck of the bottle that has a gap in the track at a specific location. When the closure is rotated to this specific location, the small protrusion on the interior of the closure aligns with the gap on the track on the neck of the bottle, disabling the motion-limiting feature. At this point, the user lifts the closure off the bottle.

Example of Align Points

Optimum Align Points Guidelines

Recommendation Highlights

- **Large lift, pull, push or turn surface area**
- **High coefficient of friction lift, pull, push or turn surface area**
- **Low lift, pull or push force requirement**
- **Low turn torque requirement**
- **High visibility opening instructions**
- **High visibility alignment points**



ALIGN POINTS ISSUES

Child-resistant align points closures can be difficult for people with arthritis to open successfully. The align and life, pull, push or turn closures have an advantage over push and turn and squeeze and turn closures in that they do not require simultaneous actions. However, the effort required to rotate the cap and remove the cap may exceed the functional capabilities of some users. Below is a summary of the common issues with each task. The following pages have detailed descriptions, population impact considerations and potential solutions for each issue.

1. Transport Issues

1.1. The bottle or container does not have a comfortable, graspable area.

1.2. The bottle or container is too heavy.

2. Opening Issues

2.1. The opening instructions are difficult to read or comprehend.

2.2. Aligning the components is difficult.

2.3. The force required to remove the closure is too high.

2.4. The user has difficulty gripping the bottle or container while removing the closure.

2.5. The inner seal interferes with closure removal.

2.6. The inner seal is difficult to remove.

3. Closing Issues

3.1. The closure is difficult to align.

3.2. The closure is difficult to reattach.

1.1 The bottle or container does not have a comfortable, graspable area.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the container or may not know where to grasp the container if a clear graspable area is not provided.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Limit the width of the graspable area.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Select a graspable area circumference that allows the adult hand to grasp the container without exceeding a comfortable grip span.

Design the shape of the graspable area to distribute the load across the inner surface area of the graspable area. Pressure points at the load-bearing portion of the graspable area can cause discomfort across painful finger joints. Consider designing the graspable area to distribute the load across the hand, avoiding ridges, seams and small-radius protrusions.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.

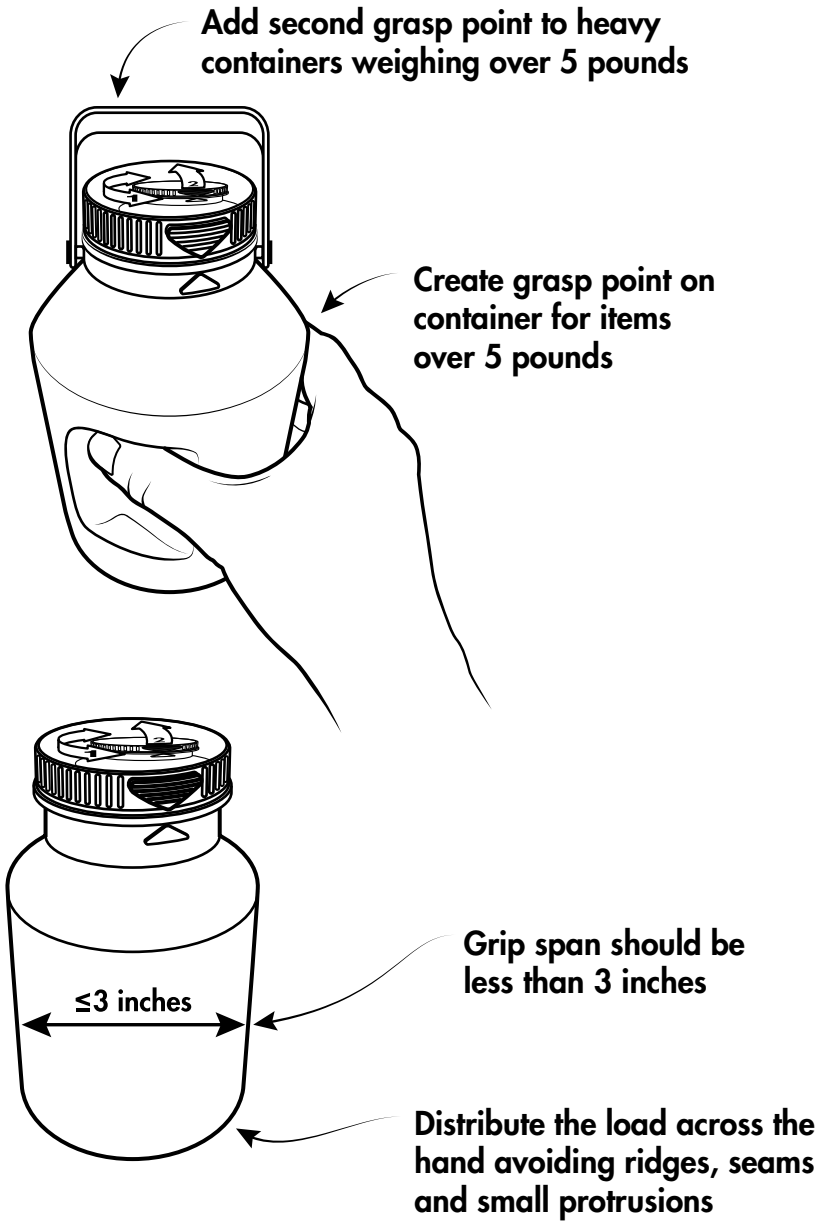
1.2 The bottle or container is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting bottles or containers that exceed 5.0 pounds for long distances. Heavier items that exceed 10.0 pounds may require a two-handed carry.

Populations Impacted: Limited strength

Potential Solutions: *Reduce weight of the container for a single-handle design to below 5.0 pounds.* Users may need to use two hands to carry and transport containers exceeding 5.0 pounds.

Design a second grasp point to facilitate a two-handed carry for containers that weigh more than 5.0 pounds. Heavy containers over 5.0 pounds should be designed to be carried using two hands. A grasp point built into the container, in addition to the handle, can be useful when the container needs to be transported as part of the use case.



2.1 The opening instructions are difficult to read or comprehend.

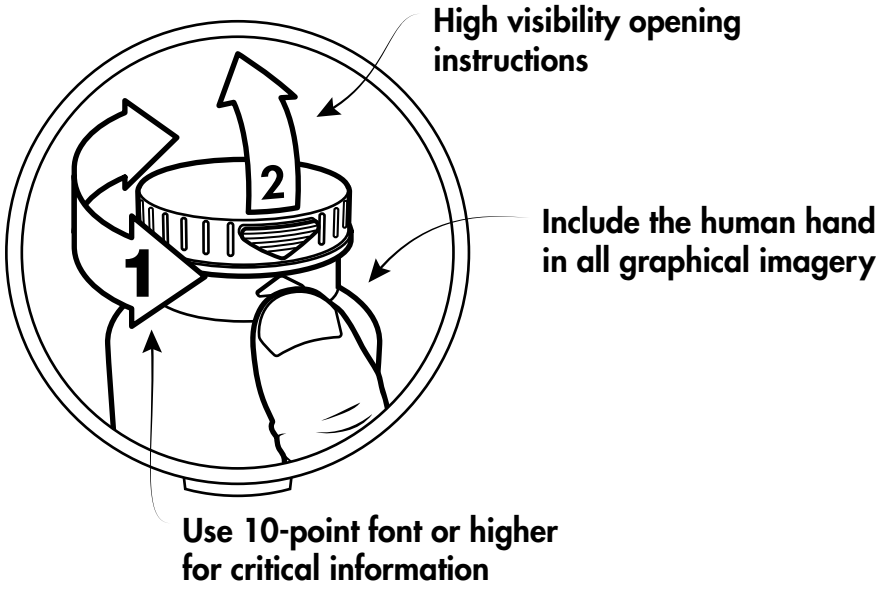
Detailed Description: Graphical or textual labels indicating the procedure for removing the closure can be difficult to read. Graphical elements or textual labels may be too small or have poor contrast, creating readability issues. Lighting conditions can exacerbate readability issues.

Populations Impacted: Limited vision

Potential Solutions: *Increase the size of critical labels or graphical elements.* Critical information should be sized in a 10-point font or equivalent to accommodate individuals with poor visual acuity.

Increase the visual contrast between the embossed label and the closure background. A contrast ratio of at least 10:1 would increase the readability of the closure opening instructions under all lighting conditions.

Provide a clear graphical depiction of the align and lift, pull, push or turn movement. Graphical imagery should clearly depict both the product and a human hand grasping the product in the manner intended for closure movement. The graphical depiction should show that both proper alignment and lift, pull, push or turn movement is required to remove the closure from the bottle or container.



2.2 Aligning the components is difficult.

Detailed Description: align and lift, pull, push or turn closures require two components to be aligned prior to application of a linear or rotational force. Users with arthritis may have difficulty aligning the components precisely or may not be able to determine when the components are properly aligned.

Populations Impacted: Limited strength, limited grip, limited vision

Potential Solutions: *Do not require precise alignment.* Users with arthritis may lack fine motor skills. Precise alignment of two components may be difficult or impossible. Design the release mechanism to require approximate alignment when possible.

Increase visibility of the alignment indicators. Provide a large, high-contrast indicator on both the rotating and non-rotating component of the mechanism. Ensure that the indicators are visible while the rotating component is being rotated.

Do not require alignment to reattach. Alignment should not be required to reattach the closure to the bottle or container. Design the closure so that it can be reattached to the bottle or container at any orientation once the closure is placed over the bottle or container.

2.3 The force required to remove the closure is too high.

Detailed Description: Align and lift, pull, push or turn closures require an excessive linear or rotational force before the closure is separated from the container. In some designs, the amount of force required to remove the closure may be too high.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the linear force requirement.* Linear force requirements exceeding 3.0 pounds may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a linear force exceeding 3.0 pounds, select the minimum force required to achieve child resistance.

Limit the rotational force requirement. Rotational force requirements exceeding 10.0 pound-inches may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a rotational force exceeding 10.0 pound-inches, select the minimum force required to achieve child resistance.

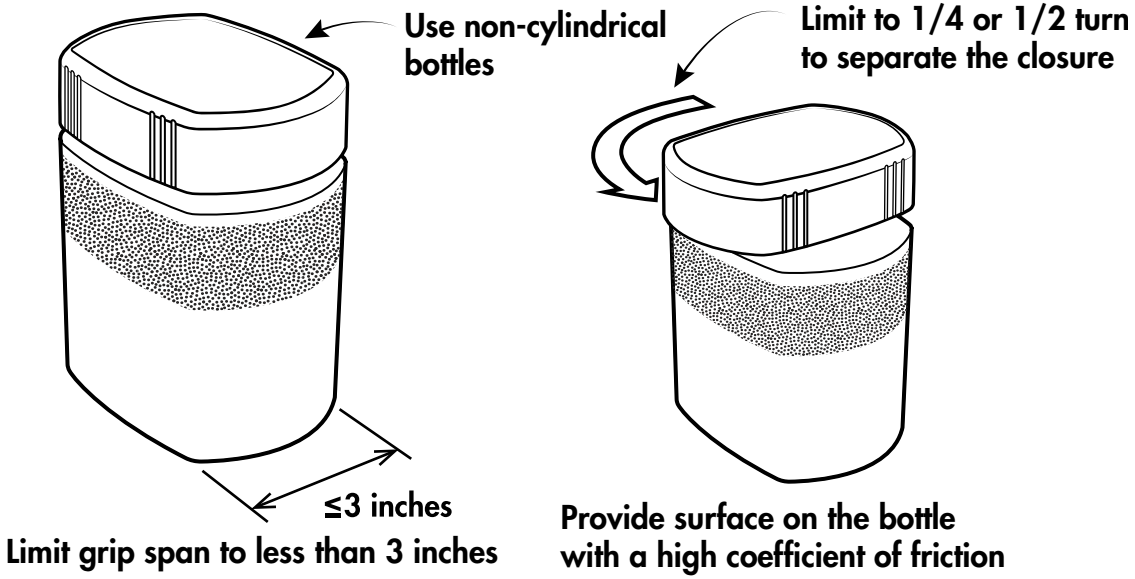
Provide a sufficiently large surface area. A large surface area for applying the pinch force can make it easier for people with arthritis. Support a key-pinch grip if possible.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.

Limit the circumference of the closure. Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the torque required to remove the closure. Excessive torque may make it difficult or impossible for users with arthritis to remove the closure.

Provide a high coefficient of friction closure grip. Consider using a high coefficient of friction material at the grasp point of the closure or using a knurling pattern that maximizes grip.

Provide a knurling pattern or high coefficient of friction grip surface. Consider providing a visible grip surface for removal of the closure.



2.4 The user has difficulty gripping the bottle or container while removing the closure.

Detailed Description: Align and lift, pull, push or turn closures with excessive linear force and torque requirements may be difficult to remove. Removing the closure requires a firm grip on the bottle or container. The shape of some bottles or containers may make the bottle or container difficult to grip without causing painful pressure points.

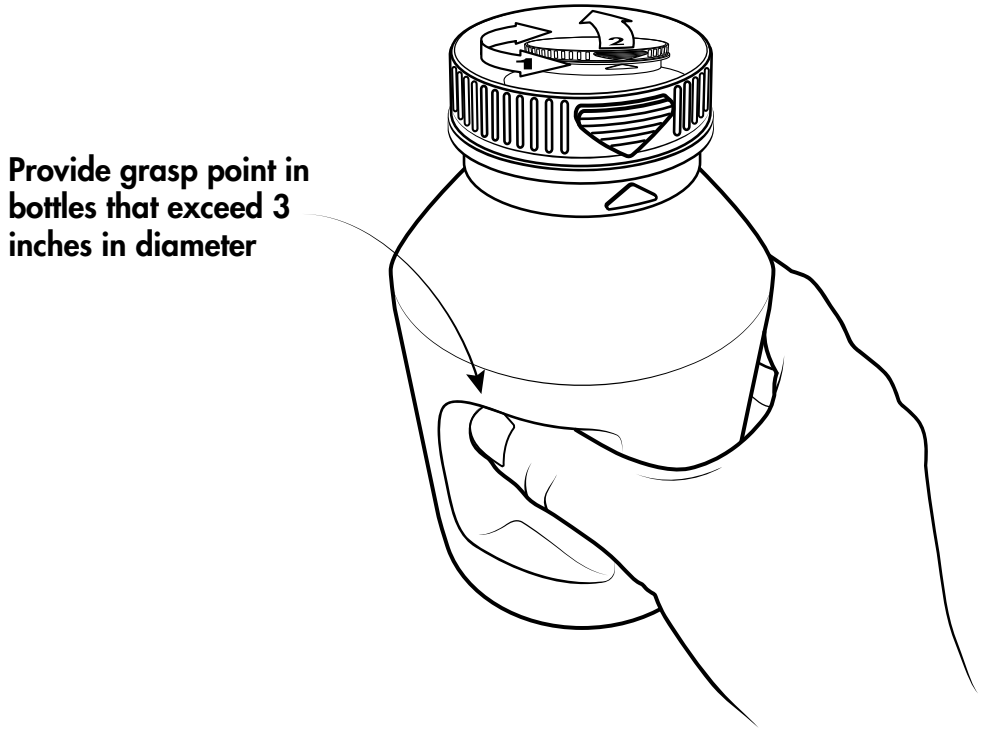
Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the circumference of the bottle or container grasp point.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the diameter of the bottle or container or build a grasp point into the bottle or container that does not require an excessive grip span.

Provide a high coefficient of friction bottle or container surface. Consider using a high coefficient of friction material at the grasp point of the bottle or container.

Use a non-cylindrical bottle or container design. Cylindrical bottles or containers are more likely to slip in the hand as compared to non-cylindrical bottles or containers. Consider using an oval-shaped bottle or container that is less likely to rotate in the hand while the user is removing the closure.

Limit wrist movements. Limit wrist movements to ¼ or ½ turn of the wrist to separate the closure from the bottle/container. Closures requiring extensive turning can cause pain and discomfort for people with arthritis.



2.5 The inner seal may interfere with closure removal.

Detailed Description: Some bottles and containers feature an inner seal located at the top of the bottle or container under the closure. The seal may make it difficult to separate the closure from the bottle or container. The seal may also increase the amount of force required to remove the closure from the bottle or container.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Design the closure to accommodate the outer diameter of the inner seal and any lift points attached to the inner seal.* The inner seal should not cause additional resistance to removing the closure from the bottle or container.

2.6 The inner seal is difficult to remove.

Detailed Description: Some containers feature an inner seal located at the top of the container under the closure. Users with arthritis may have difficulty removing the inner seal due to the absence of a grasp point and the amount of force required to separate the seal from the container.

Populations Impacted: Limited strength, limited grip

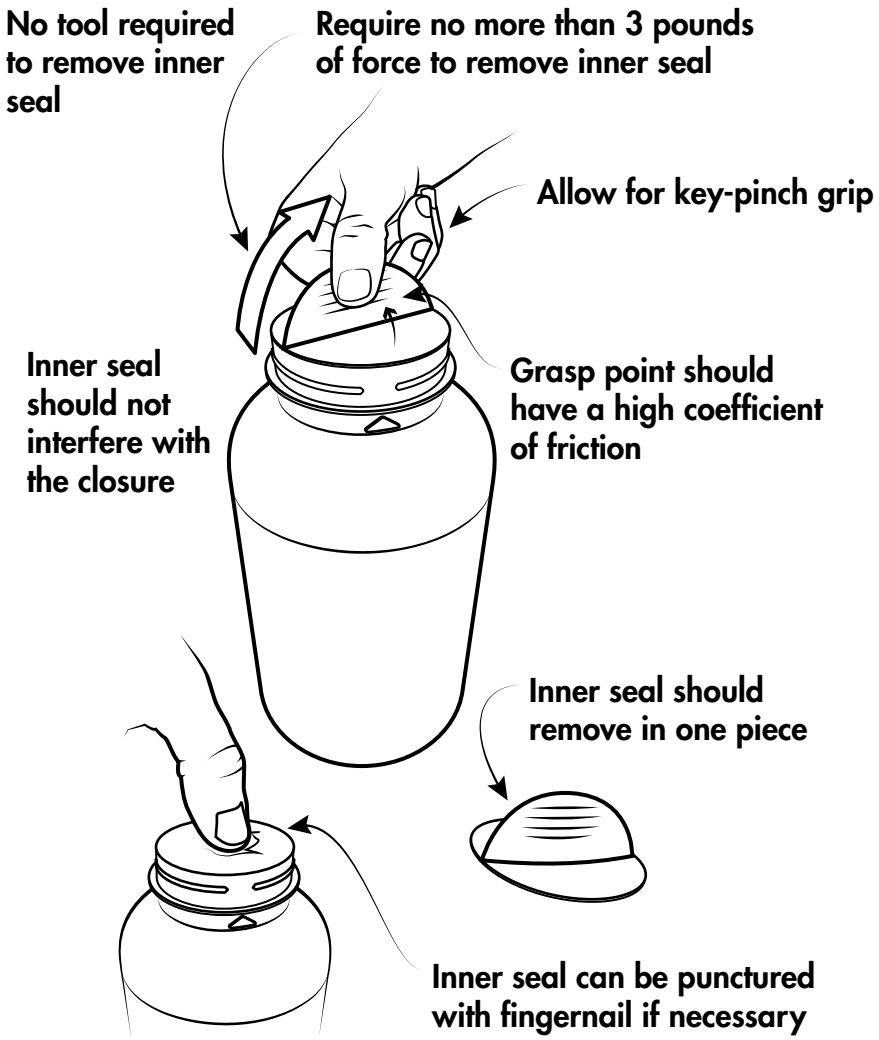
Potential Solutions: *Limit the amount of force required to remove the seal to 3.0 pounds or less.* Minimize the amount of force required to remove the seal. Require no more than 3.0 pounds of force to remove the seal when an adequate grasp point is provided, and the user can utilize a key-pinch grip to securely grasp the grasp point.

Provide an adequate grasp point for the removal of the inner seal. Consider providing a grasp point that can be easily grasped between the thumb and knuckle using a key-pinch grip. The grasp point should extend beyond the seal and be visually apparent to the user.

Do not require the use of a tool. Inner seals that require puncturing with a tool can pose a potential hazard for users with arthritis. Do not require a knife or scissors to remove the inner seal. If appropriate, reduce the amount of force required to puncture the seal to allow users to puncture it with a fingernail.

Ensure the grasp point has a sufficient coefficient of friction. Inner-seal grasp points can be difficult to pinch securely without slipping. Consider the use of a texture or high-coefficient-of-friction coating to facilitate a secure grip on the grasp point.

Inner seal removes in one piece. The inner seal can be extremely difficult to remove if it separates into multiple pieces. The remaining pieces not connected to the pull tab may require a tool or fine motor control to remove. The inner seal should be removable in one piece with one continuous motion.



3.1 The closure is difficult to align.

Detailed Description: People with arthritis may lack the fine motor control to successfully align the separated closure with the bottle/container if the closure requires precise alignment to engage.

Populations Impacted: Limited fine motor control

Potential Solutions: *Limit the requirement for precise alignment.* Do not require precise alignment to connect the closure with the bottle/container. Do not require precise alignment to screw the closure onto the bottle/container. Design features into the product to allow flexible coupling of the closure with the bottle / container.

Provide a visual indication of alignment if alignment is required. If a task requires alignment, consider adding a visual indication on the closure and the bottle/container to indicate proper alignment.

Funnel the closure onto the bottle/container. Provide a funnel type feature designed to align the closure with the bottle/container opening if the alignment cannot be achieved visually.

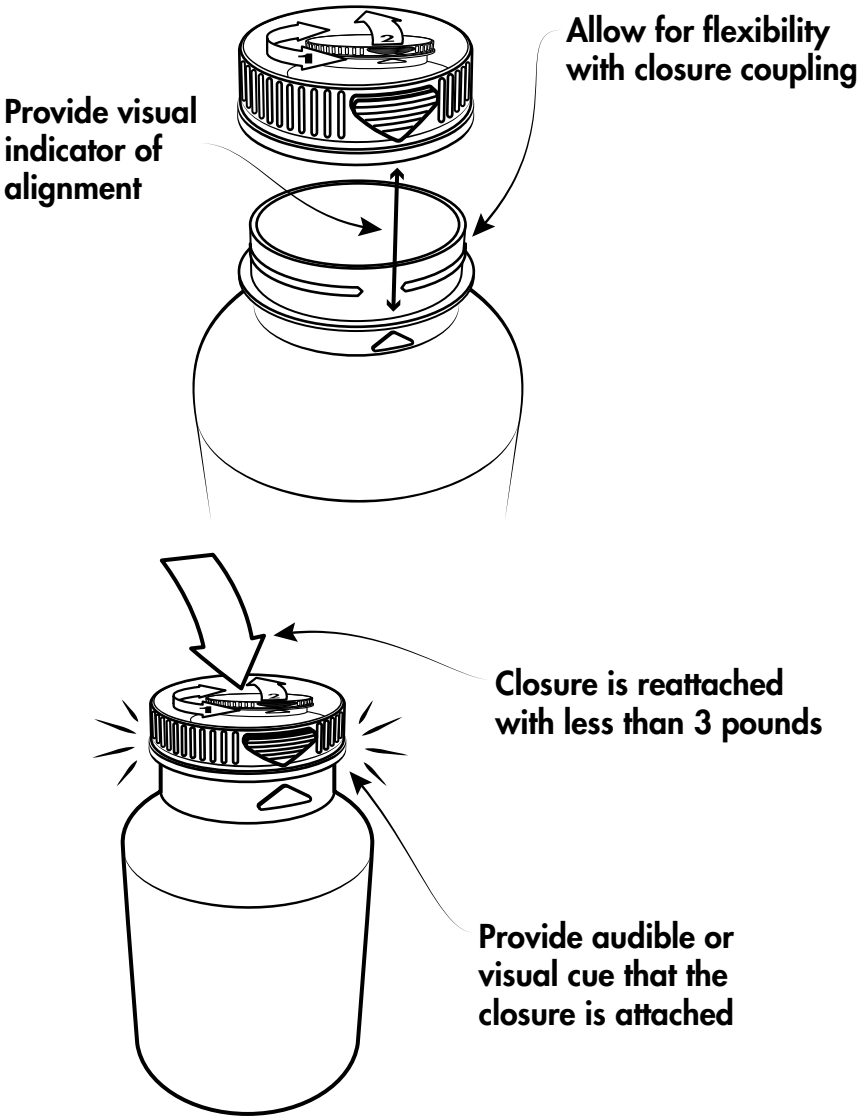
3.2 The closure is difficult to reattach.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty reattaching the closure to the bottle or container or may not know how to reattach the closure.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Provide an indication of closure attachment.* Consider providing an audible click or visual cue to indicate that the closure has been reattached.

Limit the linear force requirement. Linear force requirements exceeding 3.0 pounds may be difficult for people with arthritis. Limit the amount of force required to reattach the closure to 3.0 pounds or less.



HOLD-THE-MECHANISM

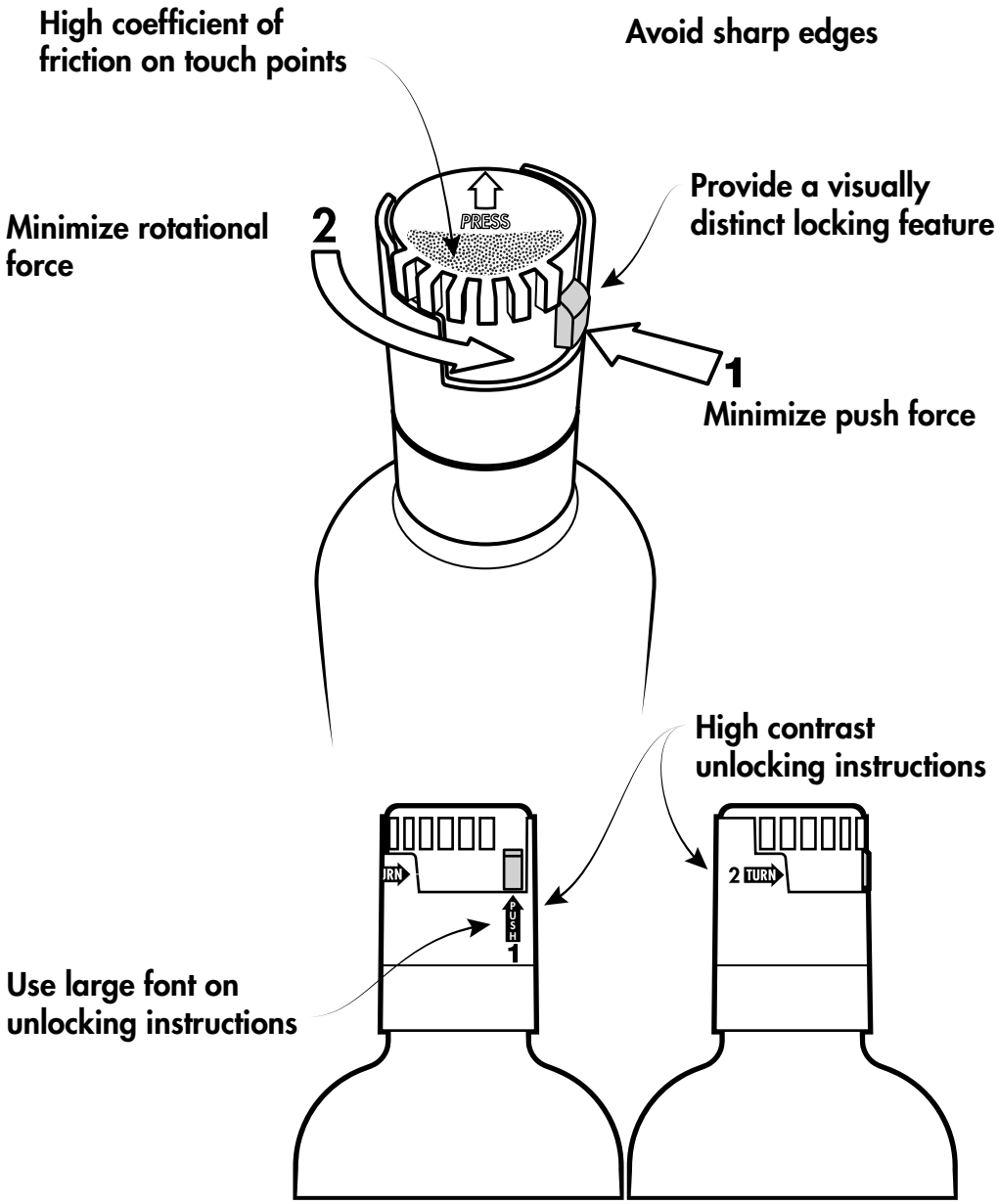
This design requires a user to press a lever or hold down a secondary feature such as a locking collar while turning or lifting a closure. This design is like the squeeze and turn design because it requires a user to disengage a motion-limiting feature, but most of these designs require the user to activate only one feature before turning or lifting, whereas the squeeze and turn designs usually require activation of two features by squeezing.

Example of Hold-the-Mechanism

Optimum Hold-the-Mechanism Guidelines

Recommendation Highlights

- **Avoid sharp edges**
- **Minimize rotational force**
- **Minimize push force**
- **Visually distinct locking feature**
- **One action hold and turn/lift mechanism**
- **High coefficient of friction touch points**
- **High contrast unlocking instructions**
- **Large font unlocking instructions**



OPTIMUM HOLD-THE-MECHANISM USEABILITY ISSUES

Squeeze and turn child-resistant closures can be difficult for people with arthritis to open successfully. The effort required to simultaneously apply pressure to a closure feature while providing a rotational force may exceed the functional capabilities of the user. If the hold-the-mechanism closure feature is too small, users may lack sufficient fine motor control to successfully activate the feature while simultaneously rotating the closure. While it is possible to balance the requirements for child resistance and ease of use for people with arthritis, the design process will likely require multiple iterations and extensive testing. When feasible, consider other closure options. Below is a summary of the common issues with each task. The following pages have detailed descriptions, population impact considerations and potential solutions for each issue.

1. Transport Issues

1.1. The bottle or container does not have a comfortable, graspable area.

1.2. The bottle or container is too heavy.

2. Opening Issues

2.1. The opening instructions are difficult to read or comprehend.

2.2. The force required to hold the child-resistant mechanism of the closure is too high.

2.3. The torque required to remove the closure is too high.

2.4. The user has difficulty gripping the bottle or container while removing the closure.

2.5. The inner seal interferes with closure removal.

2.6. The inner seal is difficult to remove.

3. Closing Issues

3.1. The closure is difficult to align.

3.2. The user may overtighten the closure.

1.1 The bottle or container does not have a comfortable, graspable area.

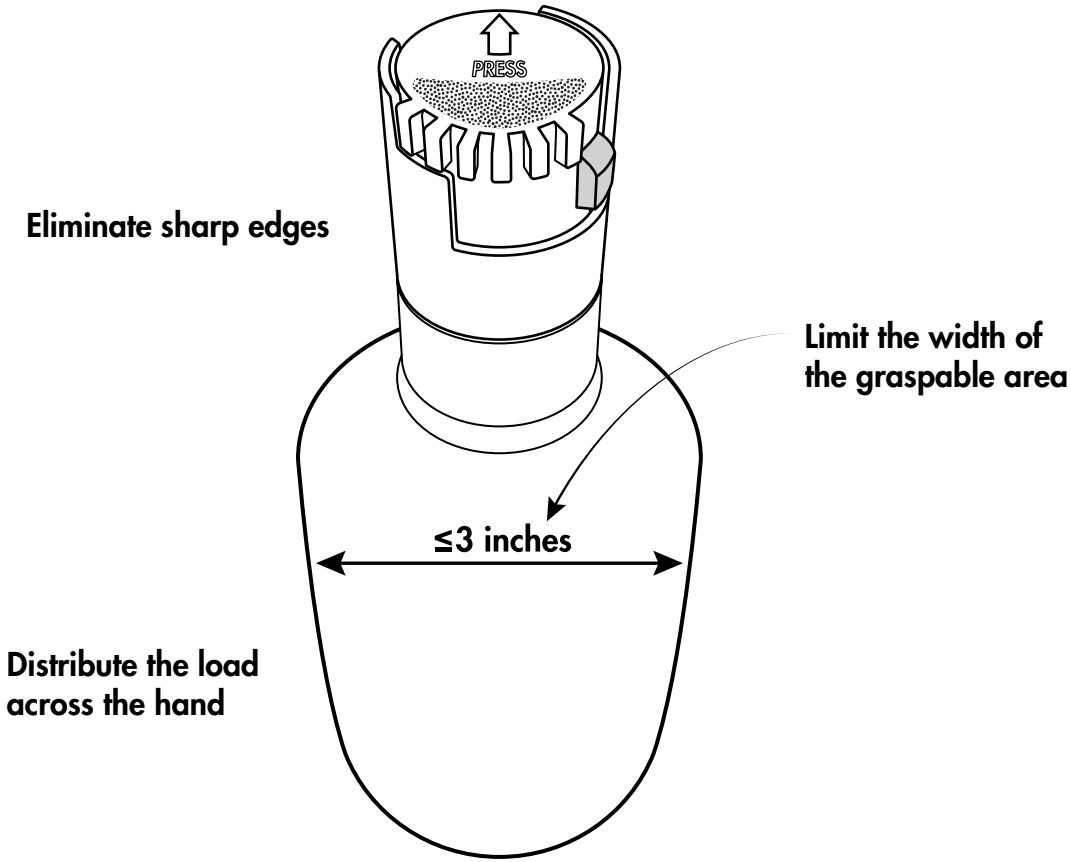
Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the container or may not know where to grasp the container if a clear graspable area is not provided. The closure may not facilitate a comfortable key-pinch across the grasp points.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Limit the width of the graspable area.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Select a graspable area circumference that allows the adult hand to grasp the container without exceeding a comfortable grip span.

Design the shape of the graspable area to distribute the load across the inner surface area of the graspable area. Pressure points at the load-bearing portion of the graspable area can cause discomfort across painful finger joints. Consider designing the graspable area to distribute the load across the hand, avoiding ridges, seams and small-radius protrusions.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.



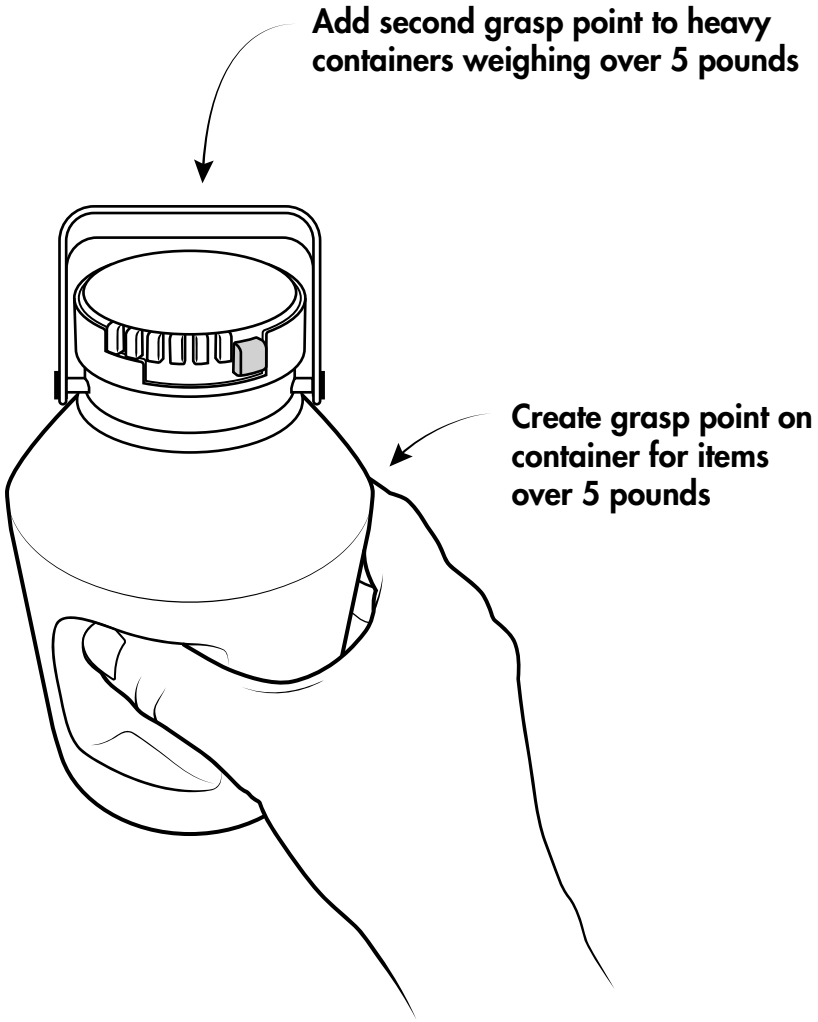
1.2 The bottle or container is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting bottles or containers that exceed 5.0 pounds for long distances. Heavier items that exceed 10.0 pounds may require a two-handed carry.

Populations Impacted: Limited strength

Potential Solutions: *Reduce weight of the container for a single-handle design to below 5.0 pounds.* Users may need to use two hands to carry and transport containers exceeding 5.0 pounds.

Design a second grasp point to facilitate a two-handed carry for containers that weigh more than 5.0 pounds. Heavy containers over 5.0 pounds should be designed to be carried using two hands. A grasp point built into the container, in addition to the handle, can be useful when the container needs to be transported as part of the use case.



2.1 The opening instructions are difficult to read or comprehend.

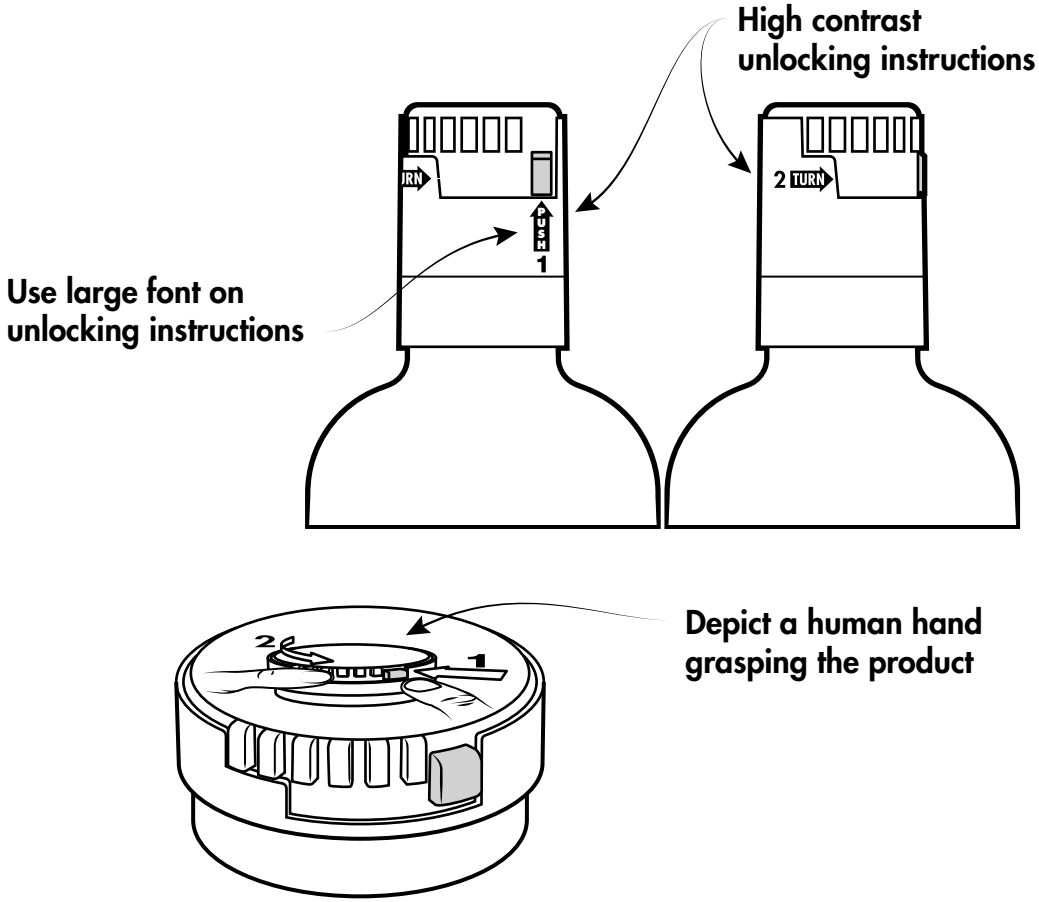
Detailed Description: Graphical or textual labels indicating the procedure for removing the closure can be difficult to read. Graphical elements or textual labels may be too small or have poor contrast, creating readability issues. Lighting conditions can exacerbate readability issues.

Populations Impacted: Limited vision

Potential Solutions: *Increase the size of critical labels or graphical elements.* Critical information should be sized in a 10-point font or equivalent to accommodate individuals with poor visual acuity.

Increase the visual contrast between the label and the closure background. A contrast ratio of at least 10:1 would increase the readability of the closure label under all lighting conditions.

Provide a clear graphical depiction of the hold and turn child-resistant feature movement. Graphical imagery should clearly depict both the product and a human hand grasping the product in the manner intended for closure movement. The graphical depiction should show that simultaneous force applied to the hold and turn child-resistant feature and rotational movement is required to remove or activate the closure.



2.2 The force required to hold the child-resistant mechanism of the closure is too high.

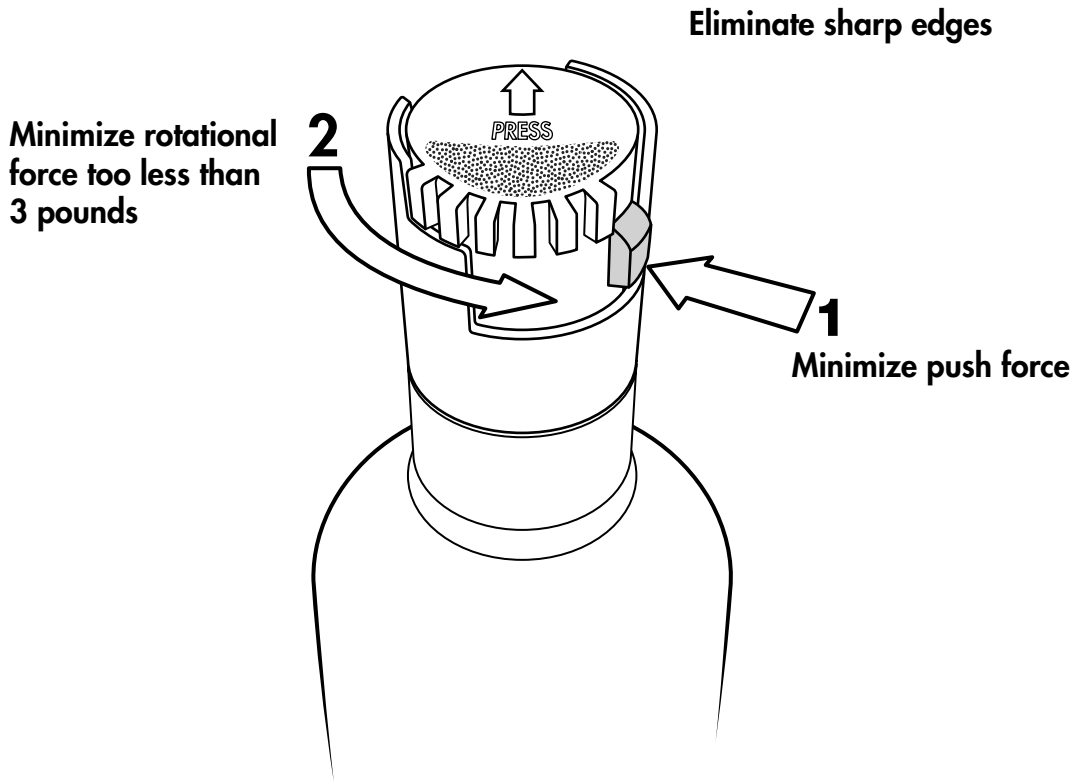
Detailed Description: Hold-the-mechanism closures require a sufficient amount of force before the mechanism that allows the closure to be removed is engaged. In some designs, the amount of force required to engage the mechanism may be too high.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the linear force requirement.* Linear force requirements exceeding 3.0 pounds may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a pinch force exceeding 3.0 pounds, select the minimum force required to achieve child resistance.

Provide a sufficiently large surface area. A large surface area for applying the linear force can make it easier for people with arthritis.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.



2.3 The torque required to remove the closure may be too high.

Detailed Description: Rotating components may be difficult to operate while applying sufficient force to engage the hold-the-mechanism child-resistant feature. Similarly, twist-off closures with excessive torque requirements may be difficult to remove while the child resistant mechanism is engaged. The shape of some closures may make the closure difficult to grip without causing painful pressure points.

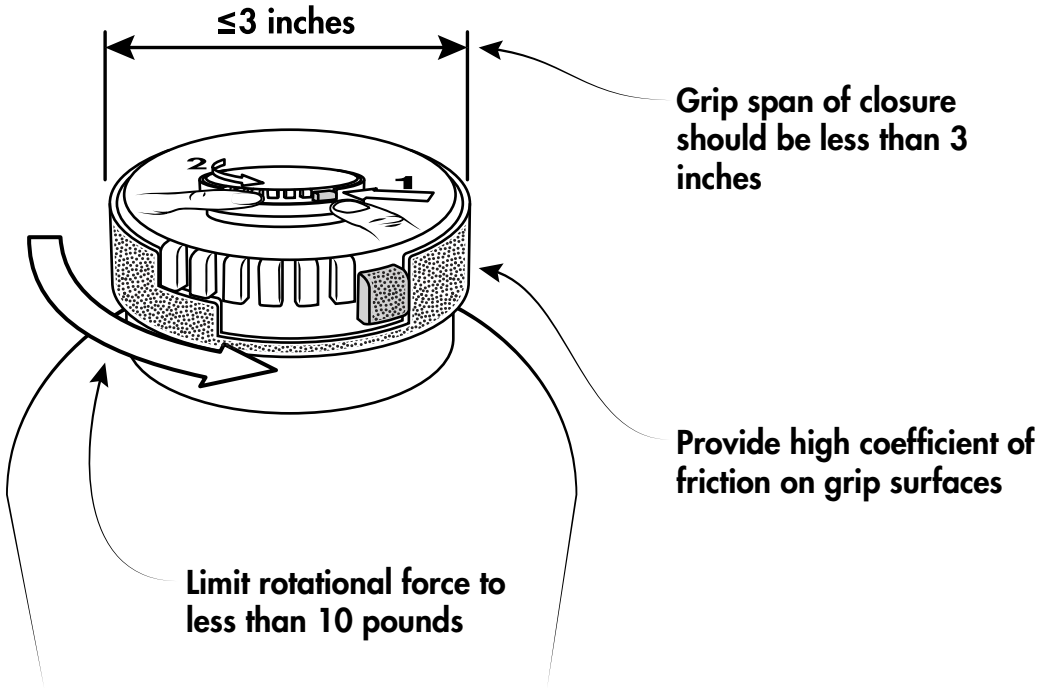
Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the circumference of the closure.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the torque required to remove the closure. Excessive torque may make it difficult or impossible for users with arthritis to remove the closure.

Limit the rotational force requirement. Rotational force requirements exceeding 10.0 pounds-inches may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a rotational force exceeding 10.0 pounds-inches, select the minimum force required to achieve child resistance.

Provide a high-coefficient-of-friction-closure grip. Consider using a high-coefficient-of-friction material at the grasp point of the closure or using a knurling pattern that maximizes grip.

Provide a knurling pattern or high coefficient of friction grip surface. Consider providing a visible grip surface for removal.



2.4 The user has difficulty gripping the bottle or container.

Detailed Description: Hold the mechanism closures with excessive linear force and torque requirements may be difficult to remove. Removing or activating the closure requires a firm grip on the bottle or container. The shape of some bottles or containers may make the bottle or container difficult to grip without causing painful pressure points.

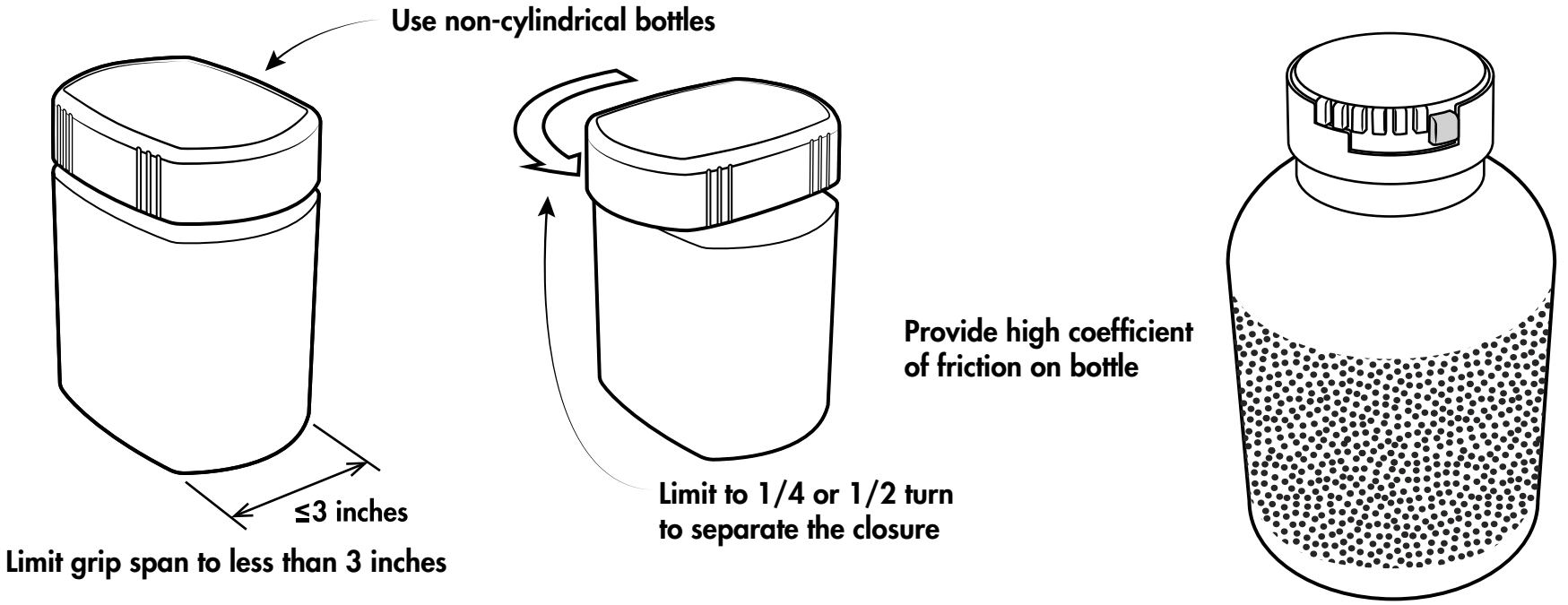
Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the circumference of the bottle or container grasp point.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the diameter of the bottle or container or build a grasp point into the bottle or container that does not require an excessive grip span.

Provide a high coefficient of friction bottle or container surface. Consider using a high coefficient of friction material at the grasp point of the bottle or container.

Use a non-cylindrical bottle or container design. Cylindrical bottles or containers are more likely to slip in the hand as compared to non-cylindrical bottles or containers. Consider using an oval-shaped bottle or container that is less likely to rotate in the hand while the user is removing the closure.

Limit wrist movements. Limit wrist movements to ¼ or ½ turn of the wrist to separate the closure from the bottle or container. Closures requiring extensive turning can cause pain and discomfort for people with arthritis.



2.5 The inner seal may interfere with closure removal.

Detailed Description: Some bottles and containers feature an inner seal located at the top of the bottle or container under the closure. The seal may make it difficult to separate the closure from the bottle or container. The seal may also increase the amount of force required to remove the closure from the bottle or container.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Design the closure to accommodate the outer diameter of the inner seal and any lift points attached to the inner seal.* The inner seal should not cause additional resistance to removing the closure from the bottle or container.

2.6 The inner seal is difficult to remove.

Detailed Description: Some containers feature an inner seal located at the top of the container under the closure. Users with arthritis may have difficulty removing the inner seal due to the absence of a grasp point and the amount of force required to separate the seal from the container.

Populations Impacted: Limited strength, limited grip

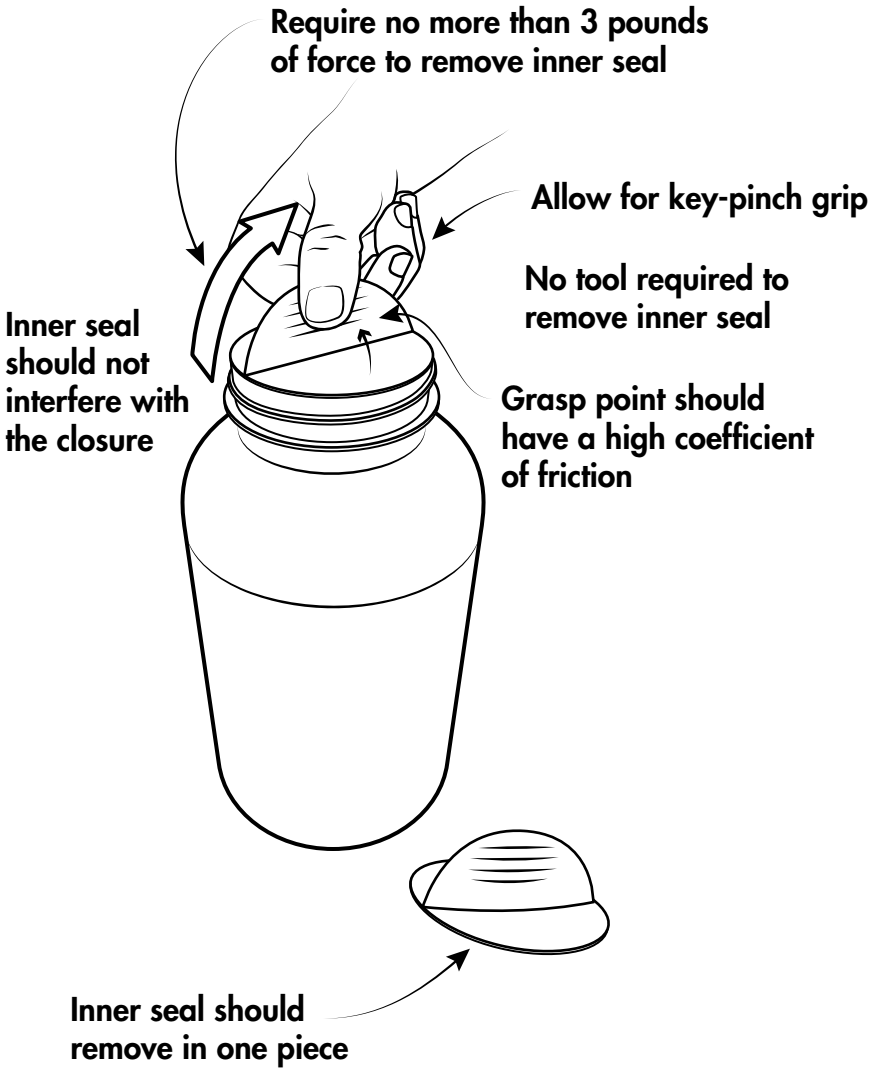
Potential Solutions: *Limit the amount of force required to remove the seal to 3.0 pounds or less.* Minimize the amount of force required to remove the seal. Require no more than 3.0 pounds of force to remove the seal when an adequate grasp point is provided, and the user can utilize a key-pinch grip to securely grasp the grasp point.

Provide an adequate grasp point for the removal of the inner seal. Consider providing a grasp point that can be easily grasped between the thumb and knuckle using a key-pinch grip. The grasp point should extend beyond the seal and be visually apparent to the user.

Do not require the use of a tool. Inner seals that require puncturing with a tool can pose a potential hazard for users with arthritis. Do not require a knife or scissors to remove the inner seal. If appropriate, reduce the amount of force required to puncture the seal to allow users to puncture it with a fingernail.

Ensure the grasp point has a sufficient coefficient of friction. Inner seal grasp points can be difficult to pinch securely without slipping. Consider the use of a texture or high coefficient of friction coating to facilitate a secure grip on the grasp point.

Inner seal removes in one piece. The inner seal can be extremely difficult to remove if it separates into multiple pieces. The remaining pieces not connected to the pull tab may require a tool or fine motor control to remove. The inner seal should be removable in one piece with one continuous motion.



3.1 The closure is difficult to align.

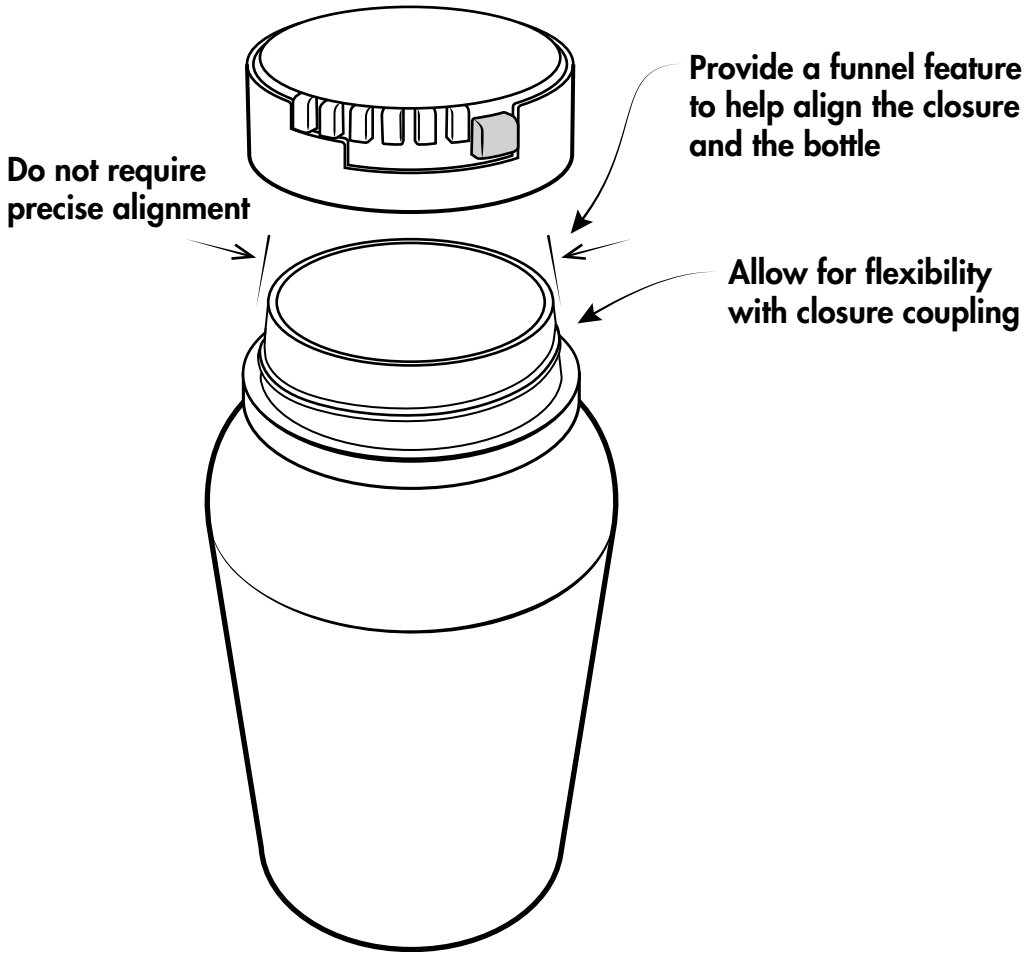
Detailed Description: People with arthritis may lack the fine motor control to successfully align the separated closure with the bottle or container if the closure requires precise alignment to engage.

Populations Impacted: Limited fine motor control

Potential Solutions: *Limit the requirement for precise alignment.* Do not require precise alignment to connect the closure with the bottle or container. Do not require precise alignment to screw the closure onto the bottle or container. Design features into the product to allow flexible coupling of the closure with the bottle or container.

Provide a visual indication of alignment if alignment is required. If a task requires alignment, consider adding a visual indication on the closure and the bottle or container to indicate proper alignment.

Funnel the closure onto the bottle or container. Provide a funnel type feature designed to align the closure with the bottle or container opening if the alignment cannot be achieved visually.



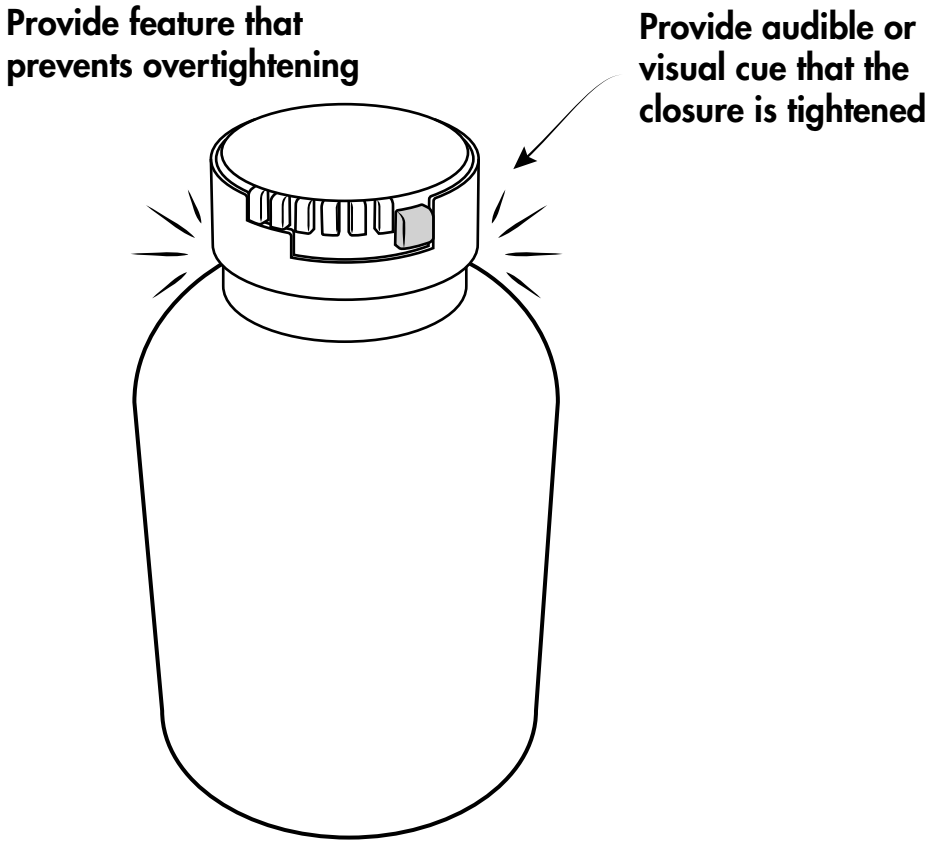
3.2 Users may overtighten the closure.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the container or may not know where to grasp the container if a clear graspable area is not provided.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Provide an indication of sufficient closure tightening.* Consider providing an audible click or visual cues to indicate that the closure has been sufficiently tightened.

Prevent overtightening. Provide a design feature that prevents overtightening of the closure. Closures that are overtightened may become difficult or impossible to open for people with arthritis.



PULL UP TO RELEASE

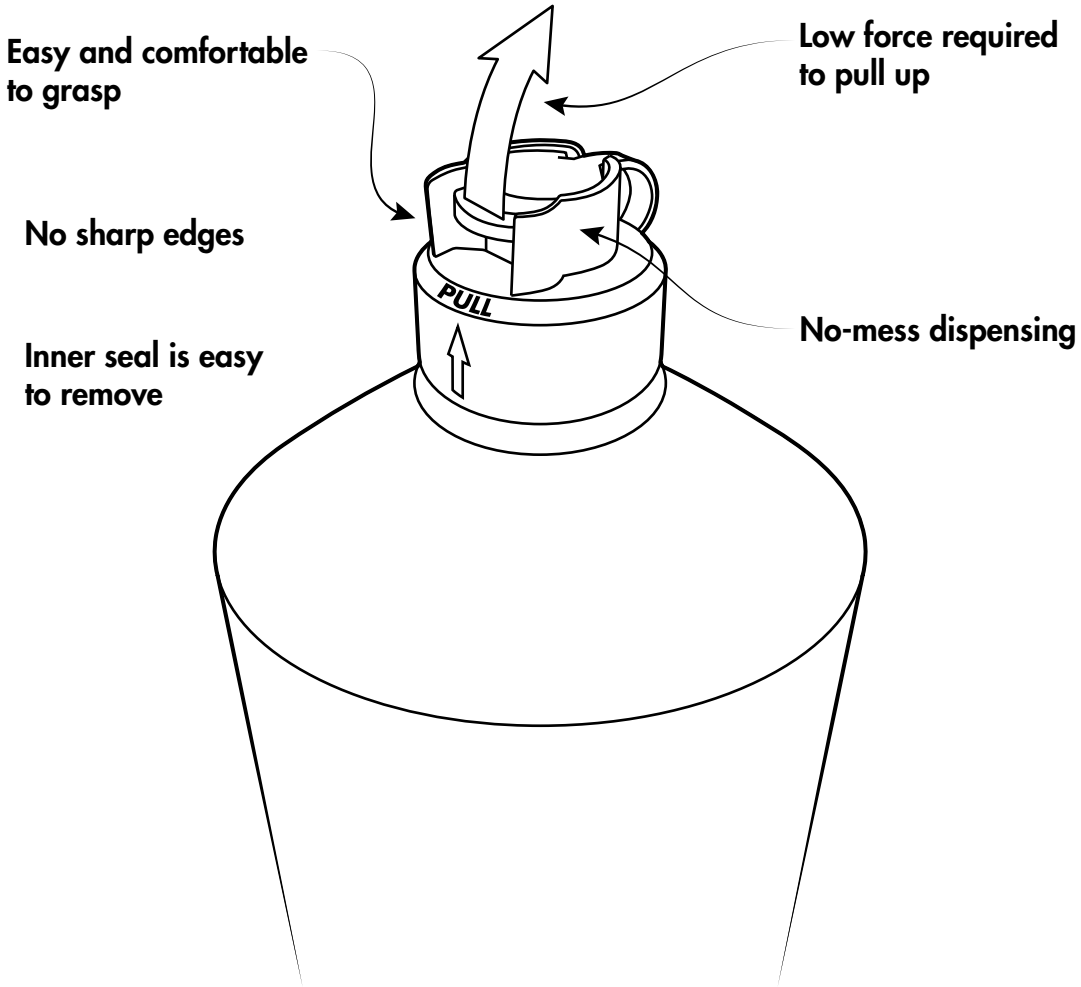
The pull up to release design requires a user to place a single finger into a depression on a tab and lift the tab off the base of the cap. The tab has a friction-fit cylinder on the underside of the tab that tightly fits into a cylinder on the base of the cap. The tab is permanently connected to the base with a strip of flexible plastic, a convenient feature because the user can immediately dispense the product and reseal the package without needing to set down and pick up a cap. This design is commonly used for lighter fluid and other dangerous liquids that can be squeezed for dispensing.

Examples of Pull Up To Release

Optimum Pull Up to Release Guidelines

Recommendation Highlights

- **Comfortable grasp area**
- **Easy open pull up to release feature**
- **Low force**
- **No sharp edges**
- **Easy to grasp**
- **No-mess dispensing**
- **Easy to remove seal**



PULL UP TO RELEASE ISSUES

Most ease of use associated with pull up to release closure issues are derived from three tasks: closure operation, dispensing and grip. Below is a summary of the common issues with each task. Many issues for people with arthritis stem from the shape of the child-resistant pull-up feature and the amount of force required to open the child-resistant pull-up feature. The following pages have detailed descriptions, population impact considerations and potential solutions for each issue.

1. Child-Resistant Closure Operation Issues

1.1. The force required to operate the child-resistant pull up to release feature is too high.
1.2. The user has difficulty locating the child-resistant pull up to release feature pull point.

2. Dispense Issues

2.1. The product is difficult to dispense precisely.
2.2. The product requires too much force to dispense.
2.3. The nozzle is difficult to keep clean.

3. Grip & Weight Issues

3.1. The bottle is too heavy.
3.2. The bottle is uncomfortable to hold.

1.1 The force required to operate the child-resistant pull-up-to-release feature may be too high.

Detailed Description: The force required to pull against the child-resistant pull up to release feature to open it may exceed the functional capacity of some users with arthritis. A user's ability to apply sufficient force may be influenced by the child-resistant feature shape and the friction between the child-resistant feature and the container top. Sharp edges may be uncomfortable and may limit the amount of force a user is willing to apply.

Populations Impacted: Limited strength

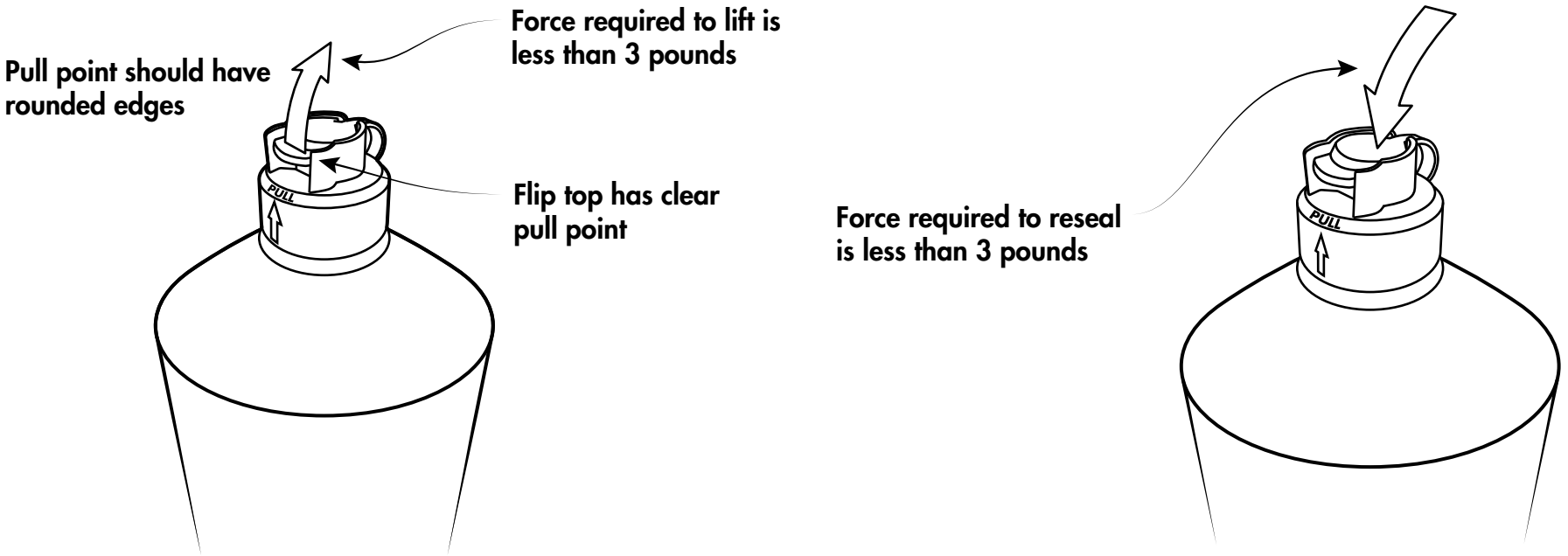
Potential Solutions: *Reduce the force required to lift the child-resistant pull up to release feature to below 3.0 pounds of force.* The amount of force required for the child-resistant pull-up-to-release feature should be below 3.0 pounds.

Design the flip-top lip to have a clear pull point. Child-resistant pull-up-to-release features that have a sharp edge at the front of the feature may be painful for some users with arthritis. Users may not be able to apply sufficient force to release the child-resistant pull-up-to-release feature prior to reaching their pain threshold. Consider providing a flat, finger-sized surface for users to apply pressure to the child-resistant pull-up-to-release feature to facilitate opening.

Avoid requiring the use of a tool. A tool such as a knife or a screwdriver should not be required to pry the child-resistant pull-up-to-release feature open.

Avoid sharp edges. Sharp edges on the child-resistant pull-up-to-release feature should be avoided. The pull point should be rounded and designed to comfortably accommodate the finger.

Reduce the force required to reseal the child-resistant pull-up-to-release feature to below 3.0 pounds of force. The amount of force required to reseal the child-resistant pull-up-to-release feature should be below 3.0 pounds.



1.2 The user has difficulty locating the child-resistant pull up to release feature pull point.

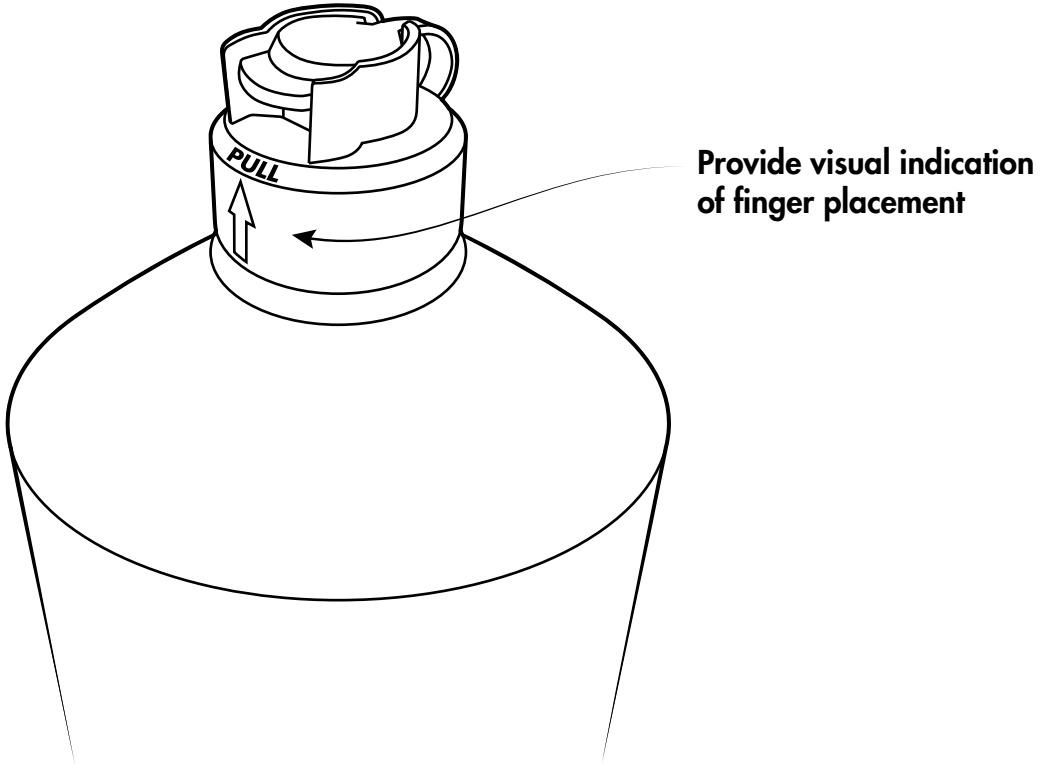
Detailed Description: Users may have difficulty locating the child-resistant pull up to release feature pull point if the pull point is not clearly indicated. Consider visually highlighting the child-resistant pull up to release feature pull point with a textured or contoured surface, a distinct color or with instructions indicating appropriate finger placement.

Populations Impacted: Limited fine motor control

Potential Solutions: *Provide a visual indication of appropriate finger placement.* Consider visually indicating the appropriate finger placement for applying pressure to operate the child-resistant pull up to release feature. Use a contrasting color, a textured push-point or a contoured push-point to highlight the finger placement location.

Provide instructions for finger placement. Consider adding an arrow or written instructions such as the word "PULL" to indicate the location of the pull point for the child-resistant pull-up-to-release feature.

Avoid providing texture cues or other indicators for removing the cap if the cap is not designed to be removed. Knurling patterns around a closure can be an indication that the cap is designed to be twisted off. If the closure is not designed to be removed by twisting the closure, avoid placing grip elements such as knurling patterns on the closure.



2.1 The product is difficult to dispense precisely.

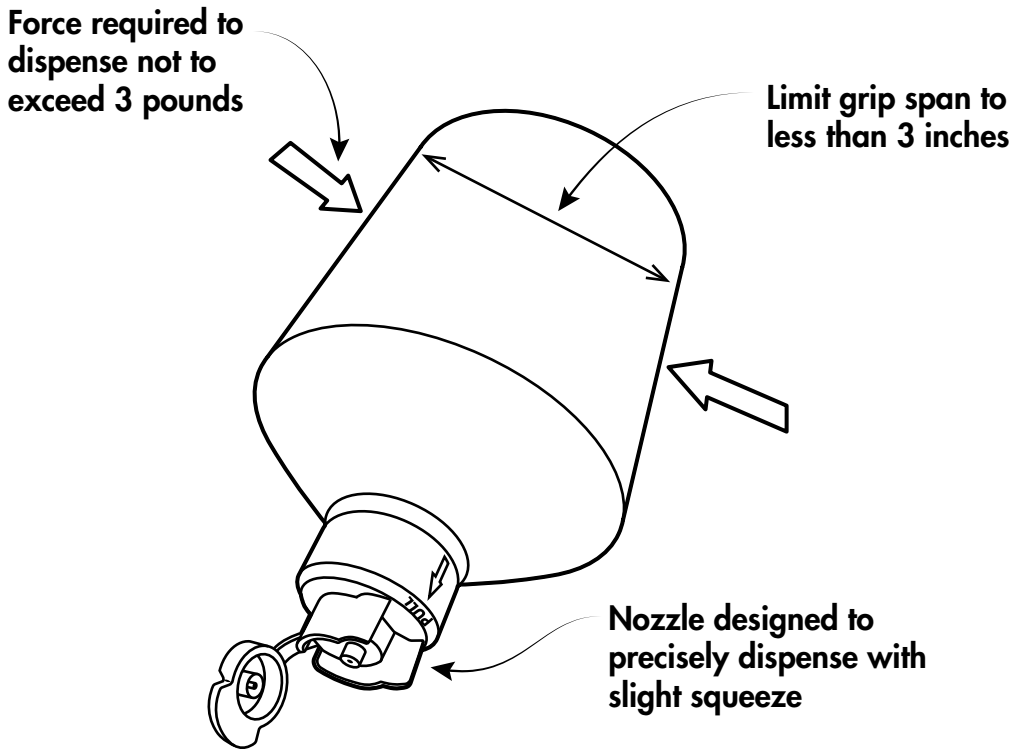
Detailed Description: Some use cases may require that a particular amount of product be dispensed, or the product must be dispensed in a precise location. Users with arthritis may have difficulty accurately dispensing the product. The amount of force required to dispense the product, the weight of the bottle, the size of the bottle and the shape of the nozzle may impact precise dispensing.

Populations Impacted: Limited strength, limited grip, prone to fatigue

Potential Solutions: *Limit the amount of force required to dispense the product.* Design the nozzle so that users are not required to use excessive force to dispense the product. If a user must use excessive force to dispense the product, they may not have enough fine-motor control to dispense the product precisely. The amount of force required to dispense the product should not exceed 3.0 pounds.

Design the nozzle to prevent inadvertent dispensing. Design the nozzle aperture to precisely dispense the product with a slight squeeze. Products that dispense without force being applied can be difficult to control.

Limit the required grip span. Users should not be required to use a grip span exceeding 2.5 to 3.0 inches to grasp the bottle while dispensing.



2.2 The product requires too much force to dispense.

Detailed Description: Users grasping a bottle while holding it inverted may have difficulty applying sufficient pressure to dispense the product.

Populations Impacted: Limited strength, limited grip, prone to fatigue

Potential Solutions: *Limit the amount of force required to dispense the product.* Design the nozzle so that users are not required to use excessive force to dispense the product.

Develop a no-drip nozzle. Design the nozzle so that excess product returns to the bottle at the end of the dispensing task, thereby preventing drips and clogs, instead of being deposited on the flip-top or inside the aperture of the nozzle.

Design the nozzle stopper to ensure the nozzle is cleared when closed. Design the nozzle stopper built into the flip-top closure to clear the nozzle when the flip-top is closed.

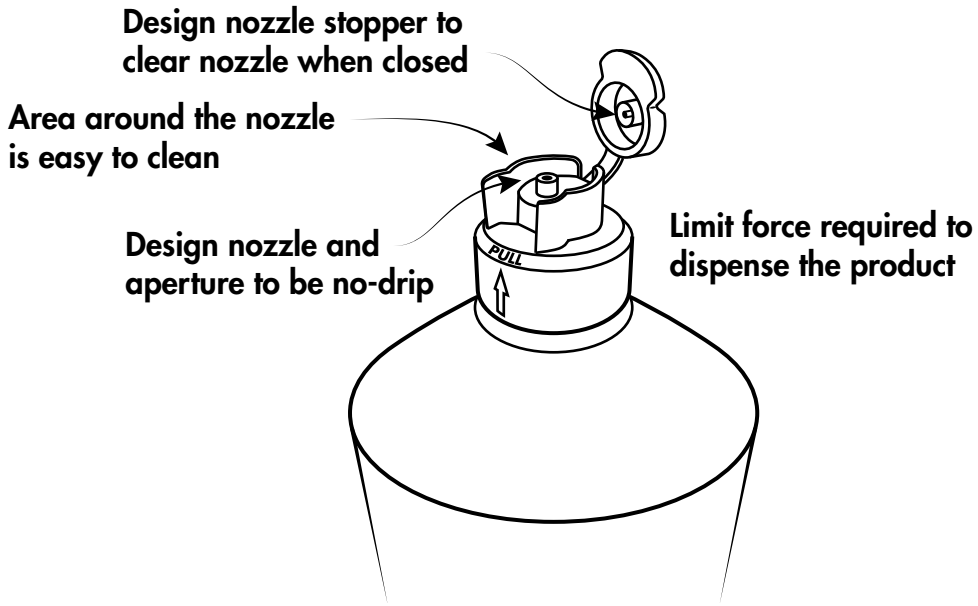
2.3 The nozzle is difficult to keep clean.

Detailed Description: Nozzles may be difficult to keep clean. Nozzles clogged with product can be difficult to dispense. If the area around the nozzle becomes contaminated with product, the flip top closure can be difficult to open and close.

Populations Impacted: Limited strength, limited grip, prone to fatigue

Potential Solutions: *Develop a keep-clean nozzle that prevents clogs.* Design the nozzle to include a nozzle stopper to clear the nozzle when the flip top closure is closed.

Design the area around the nozzle to be easy to clean. Avoid textures around the nozzle where product can be deposited. Design the surface of the nozzle flange so that it can be easily cleaned without contaminating the product.



3.1 The bottle is too heavy.

Detailed Description: Bottles over 3.0 pounds may be difficult to hold or invert. Heavy bottles can be impossible to use if the product needs to be dispensed precisely.

Populations Impacted: Limited strength, limited range of motion, limited grip, prone to fatigue

Potential Solutions: *Reduce the weight of the bottle.* A heavy bottle may be difficult to hold in position while the bottle is in use. Consider reducing the bottle's weight, particularly when it is expected to be used for a prolonged task.

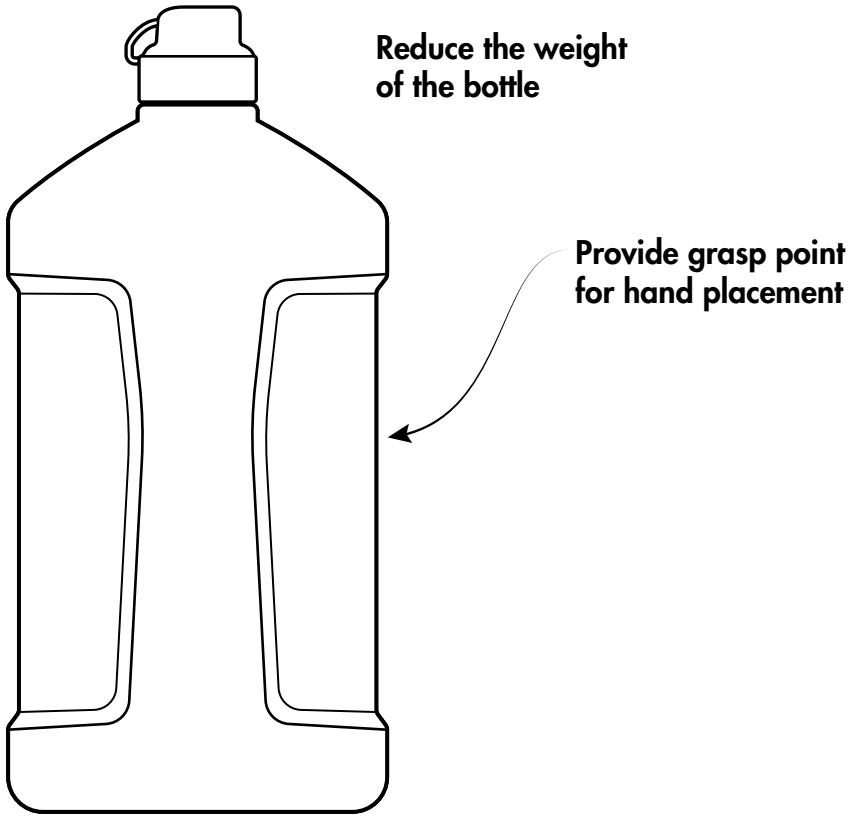
3.2 The bottle is uncomfortable to hold.

Detailed Description: The ability to hold the bottle in a comfortable position while transporting or using the product is critical to overall ease of use. Typically, child-resistant pull up to release containers must be inverted to dispense the product. The user may have difficulty comfortably holding an inverted bottle and applying a precise amount of pressure to the bottle to accurately dispense the contents.

Populations Impacted: Limited strength, limited grip, limited range of motion, prone to fatigue

Potential Solutions: *Reduce the weight of the bottle.* A heavy bottle may be difficult to hold in position while the bottle is in use. Consider reducing the bottle's weight, particularly when the contents of the bottle must be dispensed precisely.

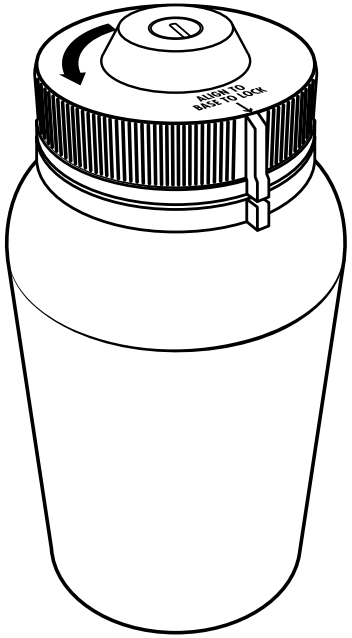
Provide a sufficient grasp point for hand placement. The bottle should provide an adequate grasp point to prevent bottle slippage while the bottle is being carried or held inverted during the dispensing process. When designing large diameter bottles, consider providing an indented area of the bottle with a grasp point requiring no greater than 2.5 to 3.0 inches in grip span to facilitate holding the bottle in a comfortable position while transporting or using the product.



KEY OR DEVICE MECHANISMS

The key or device design utilizes an external part such as a key or magnet to unlock a package. This is not widely used for over-the-counter or prescription medication but can be a good option for substances that need additional security. Another variation of this mechanism is a cap or closure with a small notch or opening at the base of the closure. A user inserts a standard or flat-head screwdriver into the opening to pry off the closure.

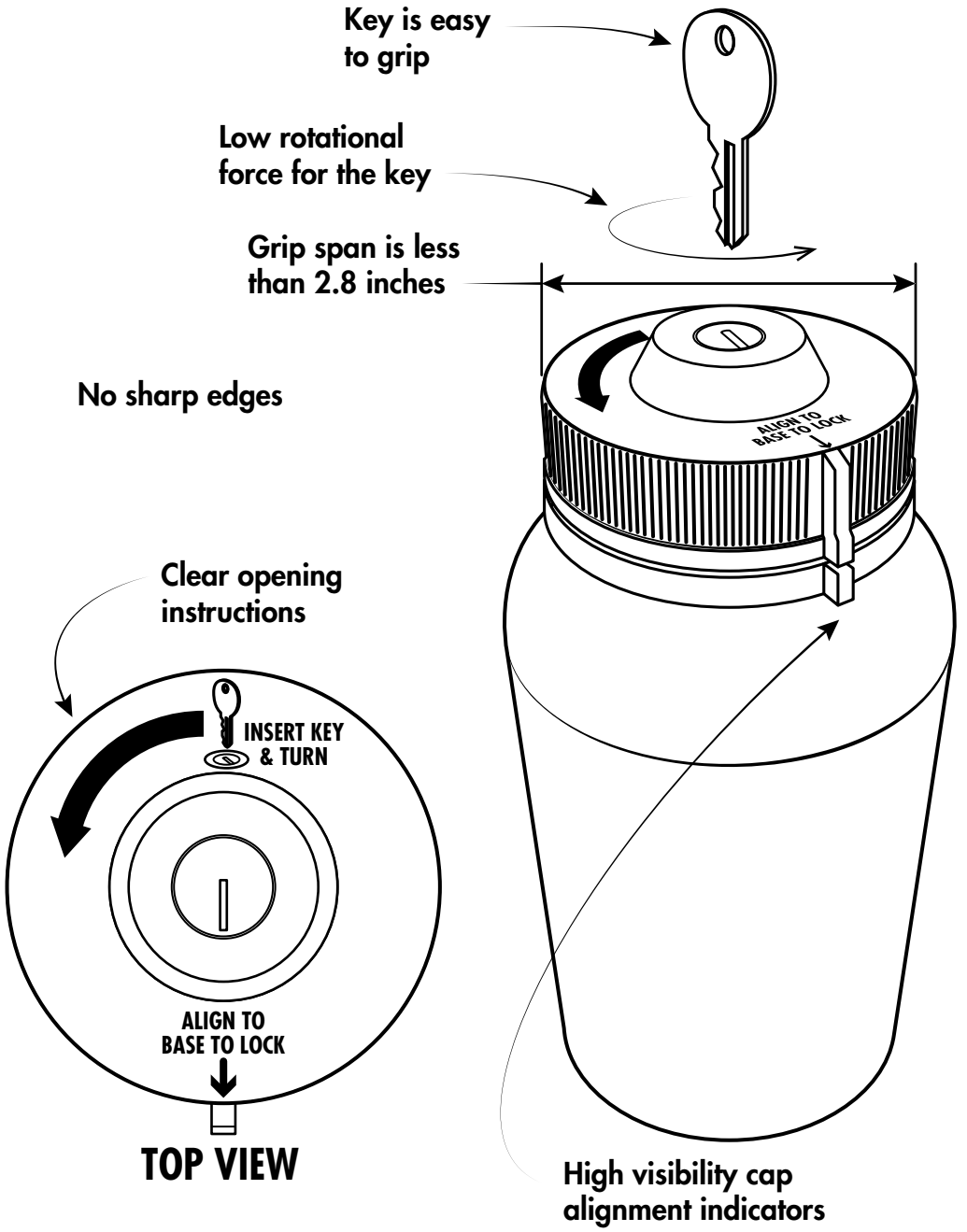
Example of Key or Device Mechanisms



Optimum Key or Device Mechanisms Guidelines

Recommendation Highlights

- **Grip span less than 2.8 inches**
- **Clear opening instructions**
- **Key easy to grip**
- **Low key rotation force**
- **Low cap removal and replacement force**
- **High visibility cap alignment indicators**
- **No sharp edges**



KEY OR DEVICE ISSUES

Key or device mechanisms in closures can be difficult for people with arthritis to open successfully. The effort required to rotate the key and remove the cap may exceed the functional capabilities of some users. Below is a summary of the common issues with each task. The following pages have detailed descriptions, population impact considerations and potential solutions for each issue.

1. Transport Issues

1.1. The bottle or container does not have a comfortable, graspable area.

1.2. The bottle or container is too heavy.

2. Opening Issues

2.1. The opening instructions may be difficult to read or comprehend.

2.2. The alignment of the components may be too difficult.

2.3. The force required to remove the closure is too high.

2.4. The user may have difficulty gripping the bottle or container while removing the closure.

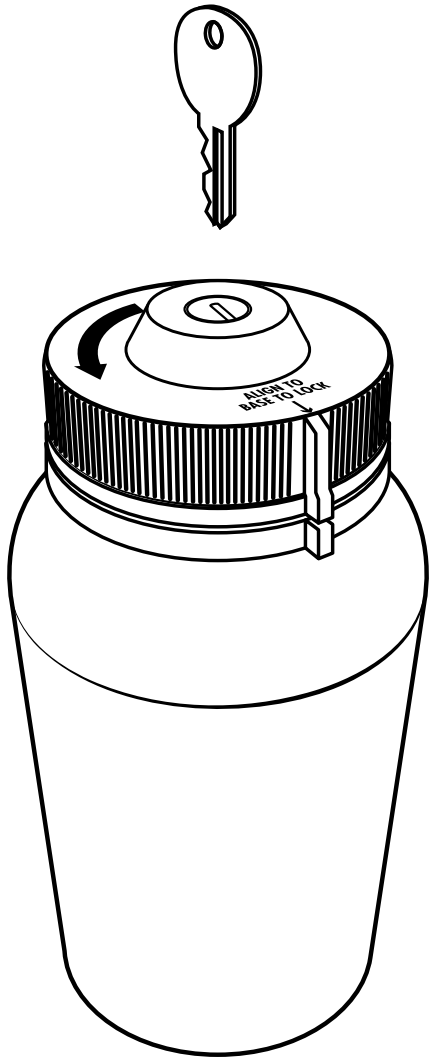
2.5. Keys may be lost.

2.6. Keys may be difficult to grasp.

3. Closing Issues

3.1. The closure is difficult to align.

3.2. The closure is difficult to reattach.



1.1 The bottle or container does not have a comfortable graspable area.

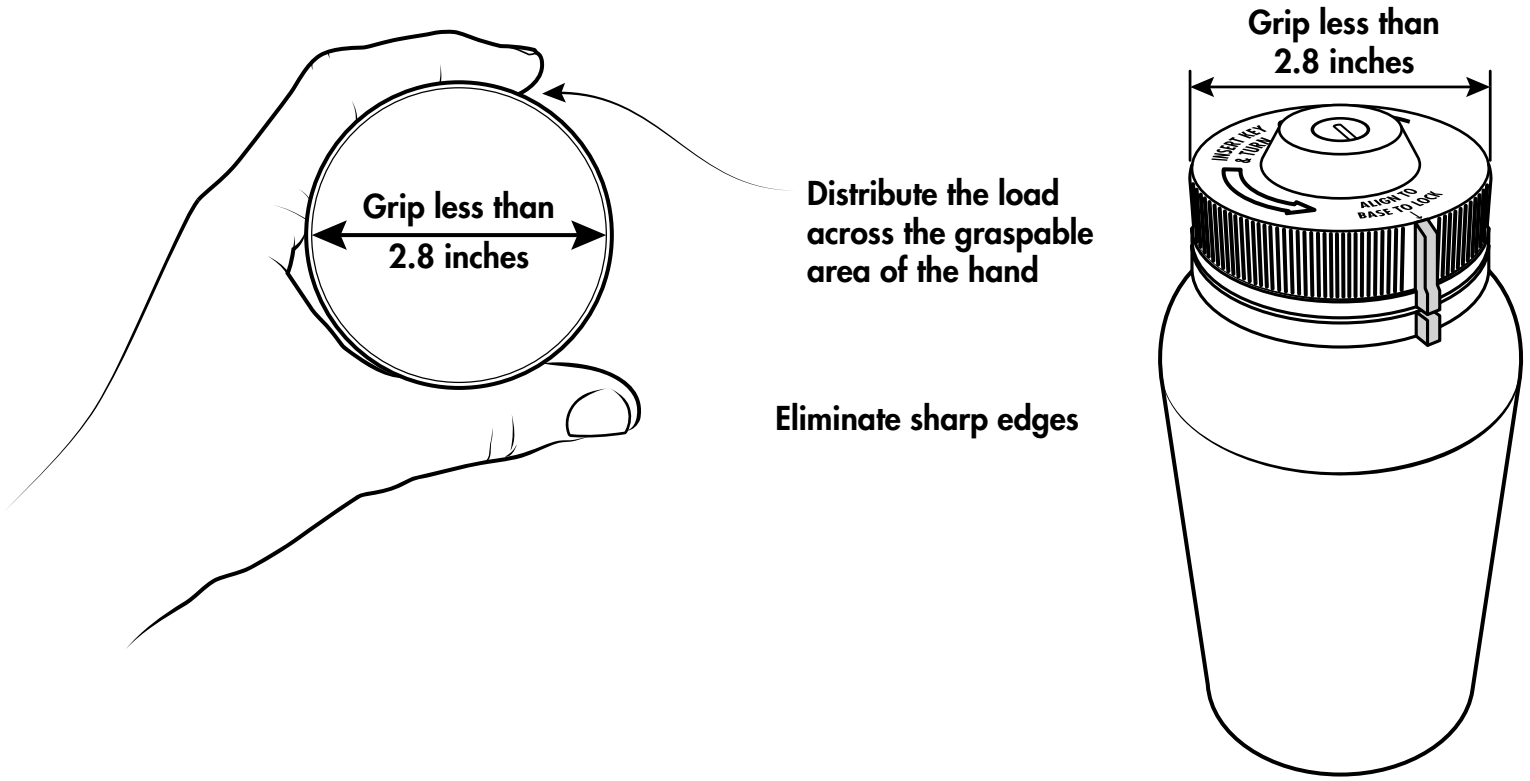
Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the container or may not know where to grasp the container if a clear graspable area is not provided.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Limit the width of the graspable area.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Select a graspable area circumference that allows the adult hand to grasp the container without exceeding a comfortable grip span.

Design the shape of the graspable area to distribute the load across the inner surface area of the graspable area. Pressure points at the load-bearing portion of the graspable area can cause discomfort across painful finger joints. Consider designing the graspable area to distribute the load across the hand, avoiding ridges, seams and small-radius protrusions.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.



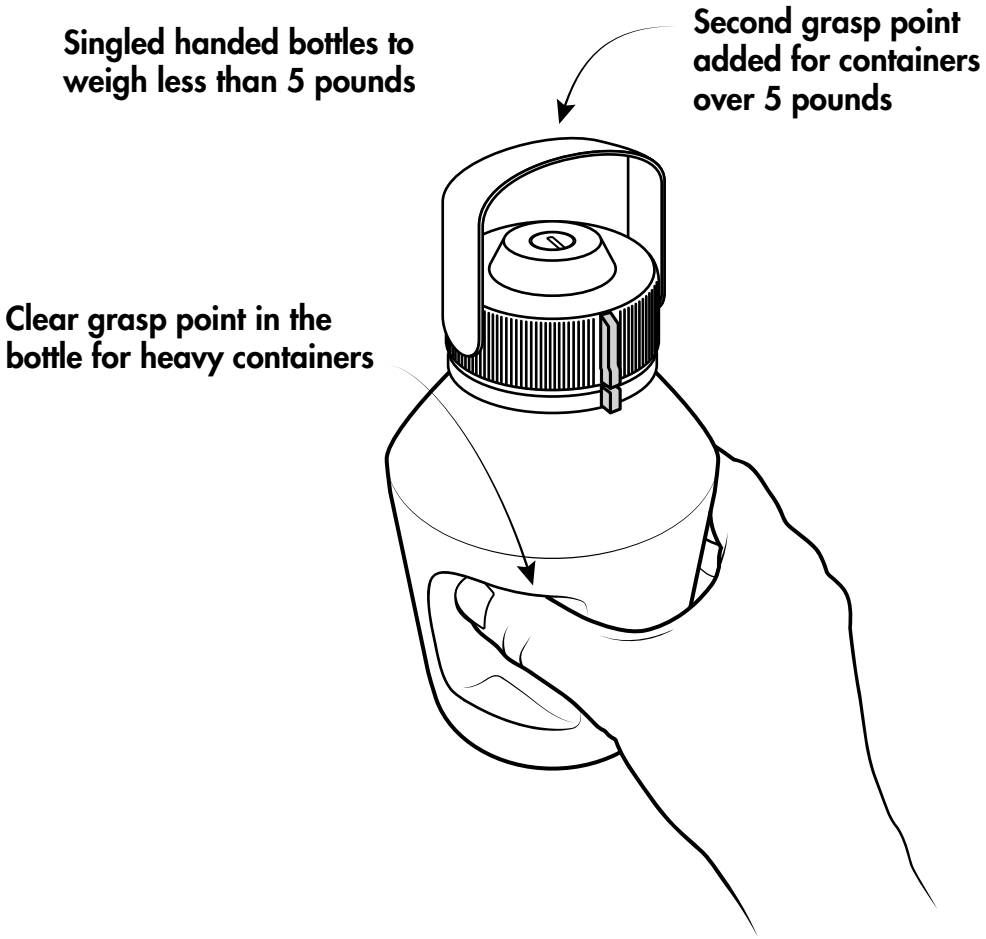
1.2 The bottle or container is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting bottles or containers that exceed 5.0 pounds for long distances. Heavier items that exceed 10.0 pounds may require a two-handed carry.

Populations Impacted: Limited strength

Potential Solutions: *Reduce weight of the container for a single-handle design to below 5.0 pounds.* Users may need to use two hands to carry and transport containers exceeding 5.0 pounds.

Design a second grasp point to facilitate a two-handed carry for containers that weigh more than 5.0 pounds. Heavy containers over 5.0 pounds should be designed to be carried using two hands. A grasp point built into the container, in addition to the handle, can be useful when the container needs to be transported as part of the use case.



2.1 The opening instructions may be difficult to read or comprehend.

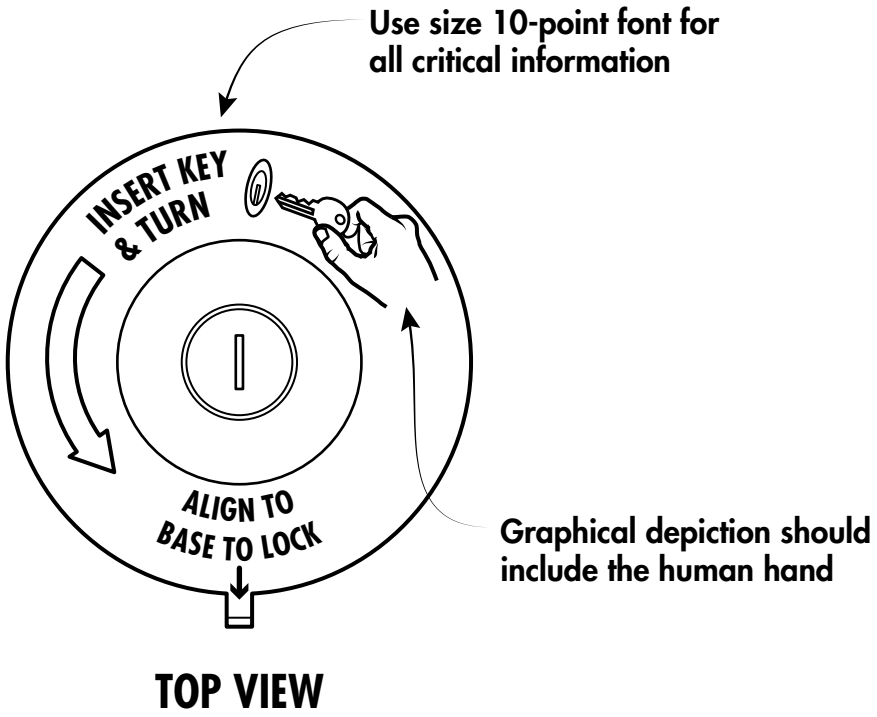
Detailed Description: Graphical or textual labels indicating the procedure for unlocking and removing the closure can be difficult to read. Graphical elements or textual labels may be too small or have poor contrast, creating readability issues. Lighting conditions can exacerbate readability issues.

Populations Impacted: Limited vision

Potential Solutions: *Increase the size of critical labels or graphical elements.* Critical information should be sized in a 10-point font or equivalent to accommodate individuals with poor visual acuity.

Increase the visual contrast between the embossed label and the closure background. A contrast ratio of at least 10 to 1 would increase the readability of the closure-opening instructions under all lighting conditions.

Provide a clear graphical depiction of the unlocking and cap removal tasks. Graphical imagery should clearly depict both the product and a human hand grasping the product in the manner intended for unlocking and removing the cap. The graphical depiction should show proper alignment for cap replacement.



2.2 The alignment of the components is too difficult.

Detailed Description: Key locked closures require a key to be aligned prior to insertion and the cap to be aligned prior to replacement. Users with arthritis may have difficulty aligning the components precisely or may not be able to determine when the components are properly aligned.

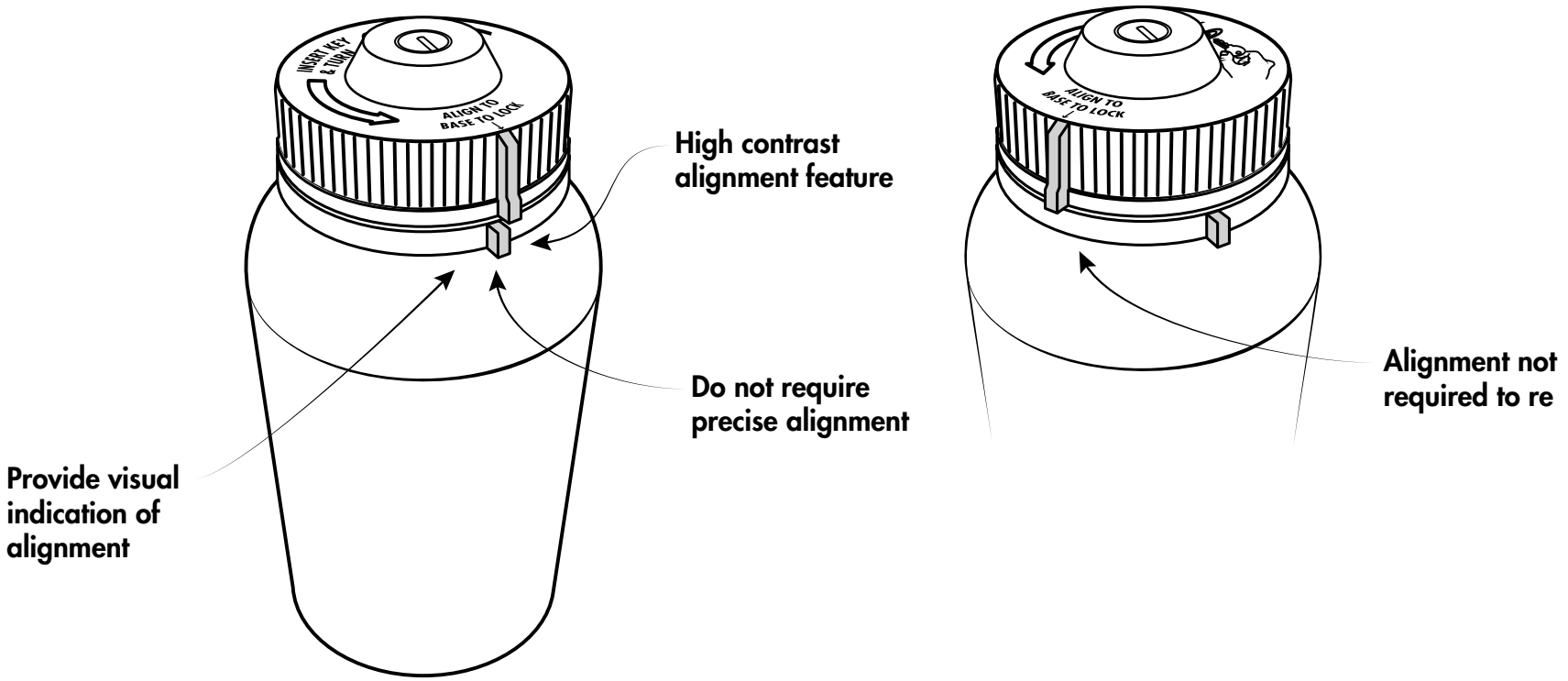
Populations Impacted: Limited strength, limited grip, limited vision

Potential Solutions: *Do not require precise alignment.* Users with arthritis may lack fine motor skills. Precise alignment of two components may be difficult or impossible. Design the release mechanism to require approximate alignment when possible.

Increase visibility of the alignment indicators. Provide a large, high contrast indicator on both the rotating and non-rotating components of the mechanism. Ensure that the indicators are visible while the rotating component is rotating.

Do not require alignment to reattach. Alignment should not be required to reattach the closure to the bottle or container. Design the closure such that it can be reattached to the bottle or container at any orientation once the closure is placed over the bottle or container.

Visually indicate proper alignment. If alignment is required, provide visual indications of proper alignment on all components to be aligned.



2.3 The force required to remove the closure is too high.

Detailed Description: Some closures require an excessive linear or rotational force before the closure is separated from the container. In some designs, the amount of force required to remove the closure may be too high.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the linear force requirement.* Linear force requirements exceeding 3.0 pounds may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a linear force exceeding 3.0 pounds, select the minimum force required to achieve child resistance.

Limit the rotational force requirement. Rotational force requirements exceeding 10.0 pound-inches may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a rotational force exceeding 10.0 pound-inches, select the minimum force required to achieve child resistance.

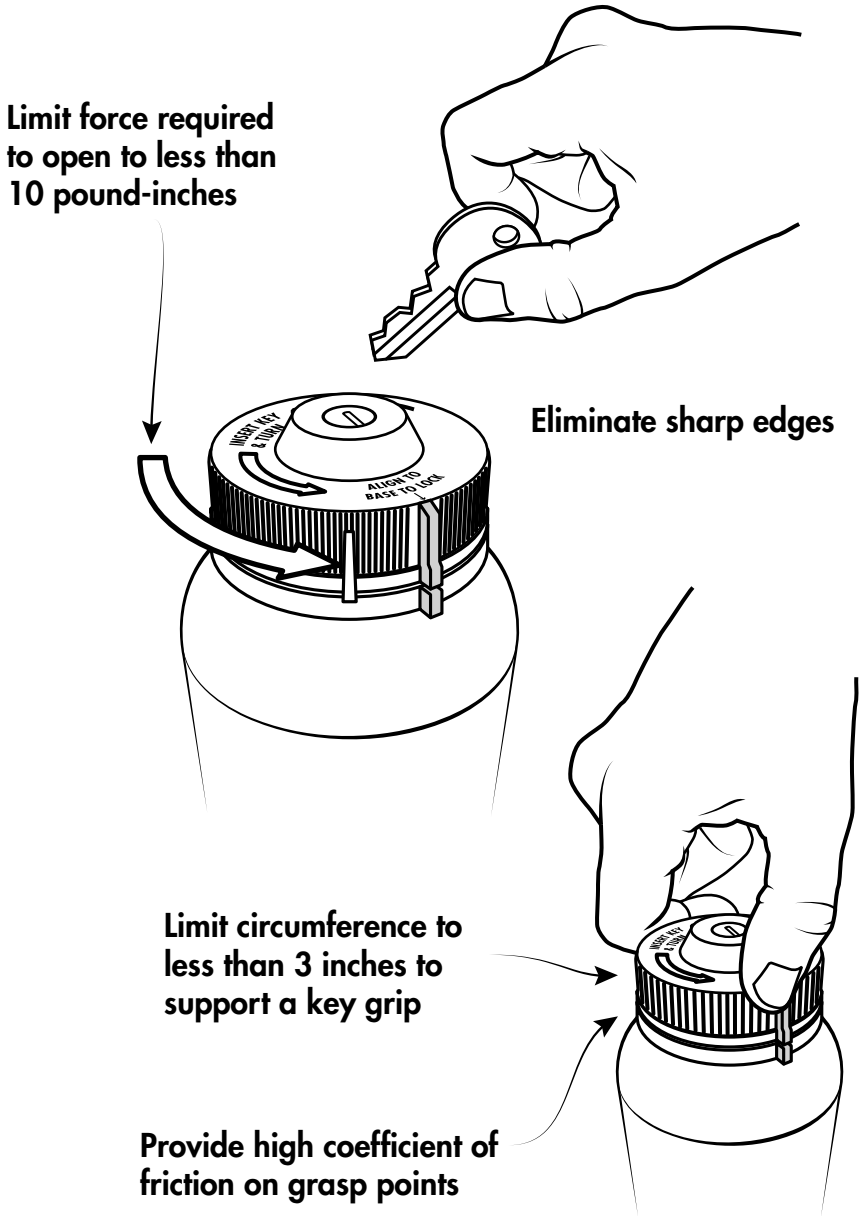
Provide a sufficiently large surface area. A large surface area for applying the pinch force can make it easier for people with arthritis. Support a key-pinch grip if possible.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.

Limit the circumference of the closure. Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the torque required to remove the closure. Excessive torque may make it difficult or impossible for users with arthritis to remove the closure.

Provide a high coefficient of friction closure grip. Consider using a high coefficient of friction material at the grasp point of the closure or using a knurling pattern that maximizes grip.

Provide a knurling pattern or high coefficient of friction grip surface. Consider providing a visible grip surface for removal of the closure.



2.4 The user has difficulty gripping the bottle or container while removing the closure.

Detailed Description: Key-locking closures with excessive linear force and torque requirements may be difficult to remove. Removing the closure requires a firm grip on the bottle or container. The shape of some bottles or containers may make the bottle or container difficult to grip without causing painful pressure points.

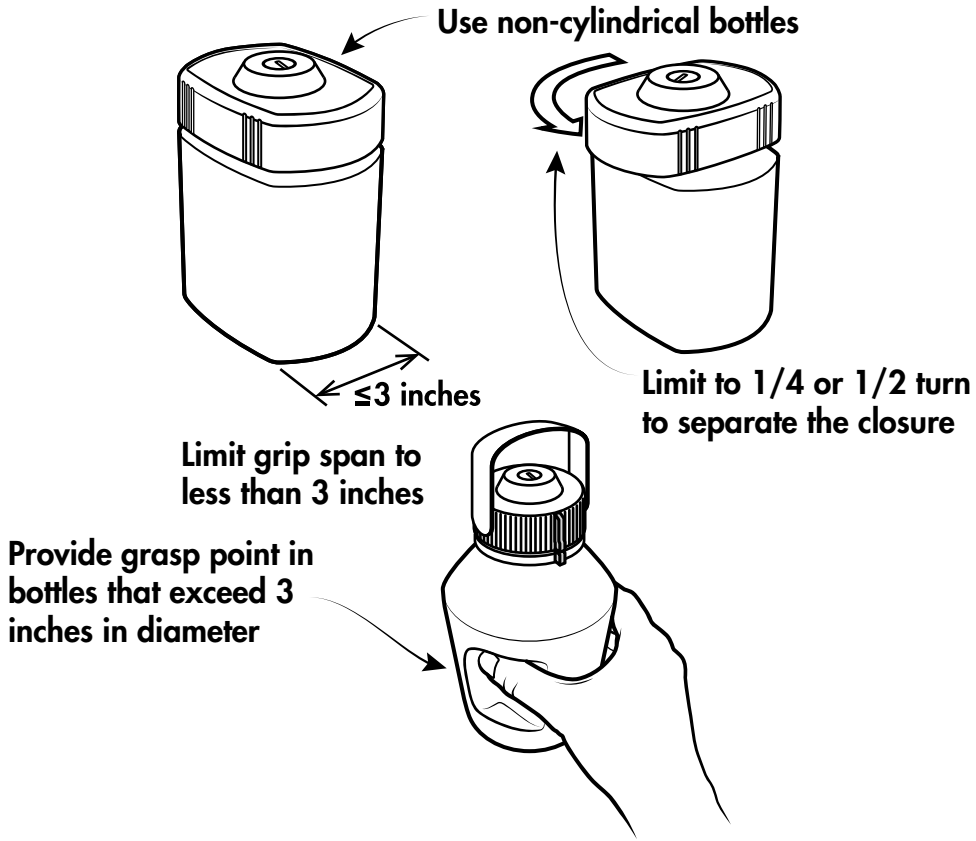
Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the circumference of the bottle or container grasp point.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the diameter of the bottle or container or build a grasp point into the bottle or container that does not require an excessive grip span.

Provide a high coefficient of friction bottle or container surface. Consider using a high coefficient of friction material at the grasp point of the bottle or container.

Use a non-cylindrical bottle or container design. Cylindrical bottles or containers are more likely to slip in the hand as compared to non-cylindrical bottles or containers. Consider using an oval-shaped bottle or container that is less likely to rotate in the hand while the user is removing the closure.

Limit wrist movements. Limit wrist movements to ¼ or ½ turn of the wrist to separate the closure from the bottle or container. Closures requiring extensive turning can cause pain and discomfort for people with arthritis.



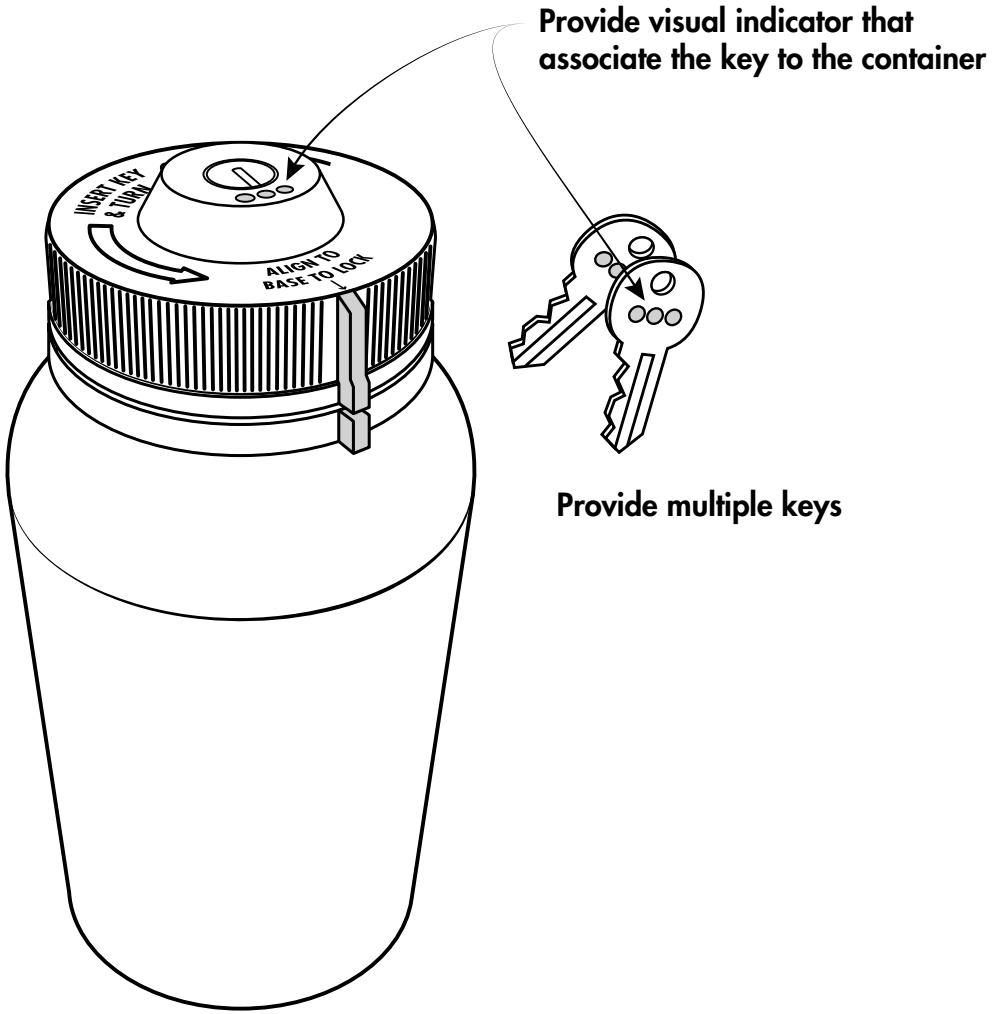
2.5 Keys may be lost.

Detailed Description: Keys can be easily lost or displaced. Keys may not be easily located when access to the container is required. Keys may not be clearly associated with the container.

Populations Impacted: Limited vision

Potential Solutions: *Provide more than one key.* Multiple keys for the same container increases the chances that a key will be available if one is lost or misplaced. Consider providing two or more keys for each locking container so that the user can place one of the keys in a safe place in case one is lost or misplaced.

Clearly associate the key with the container. Provide a visible indicator that the key is associated with the locking container. Use labels, colors and graphical indicators to associate the key with the specific container it is designed to operate.



2.6 Keys are difficult to grasp.

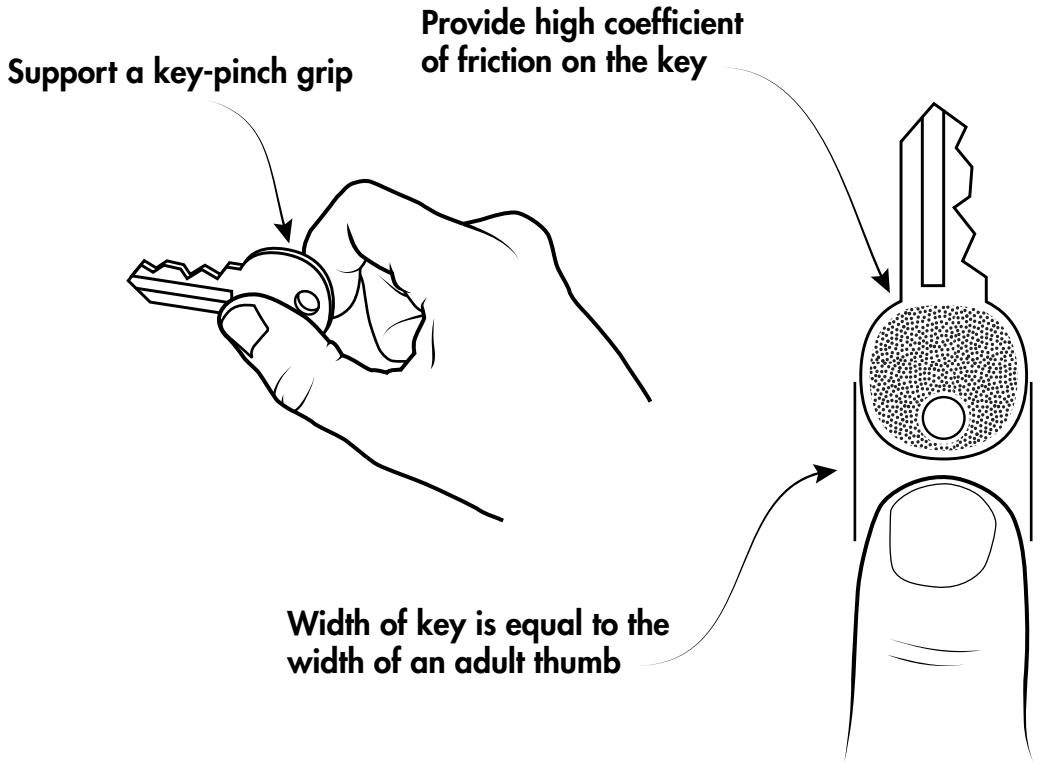
Detailed Description: Keys associated with key-locking closures may be difficult to grasp while inserting and rotating the key. The key should have a comfortable grasp point fully supporting a key-pinch.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide a large grasp point.* The grasp point of the key should fully support a key-pinch. The size of the grasp point should be at least the size of an adult thumb pad.

Avoid sharp edges. Sharp edges can cause discomfort while grasping the key. Consider milling the key to eliminate sharp edges.

Provide a high coefficient of friction key grasp point. Consider using a high coefficient of friction material at the grasp point of the key or using a texture pattern that maximizes grip.



3.1 The closure is difficult to align.

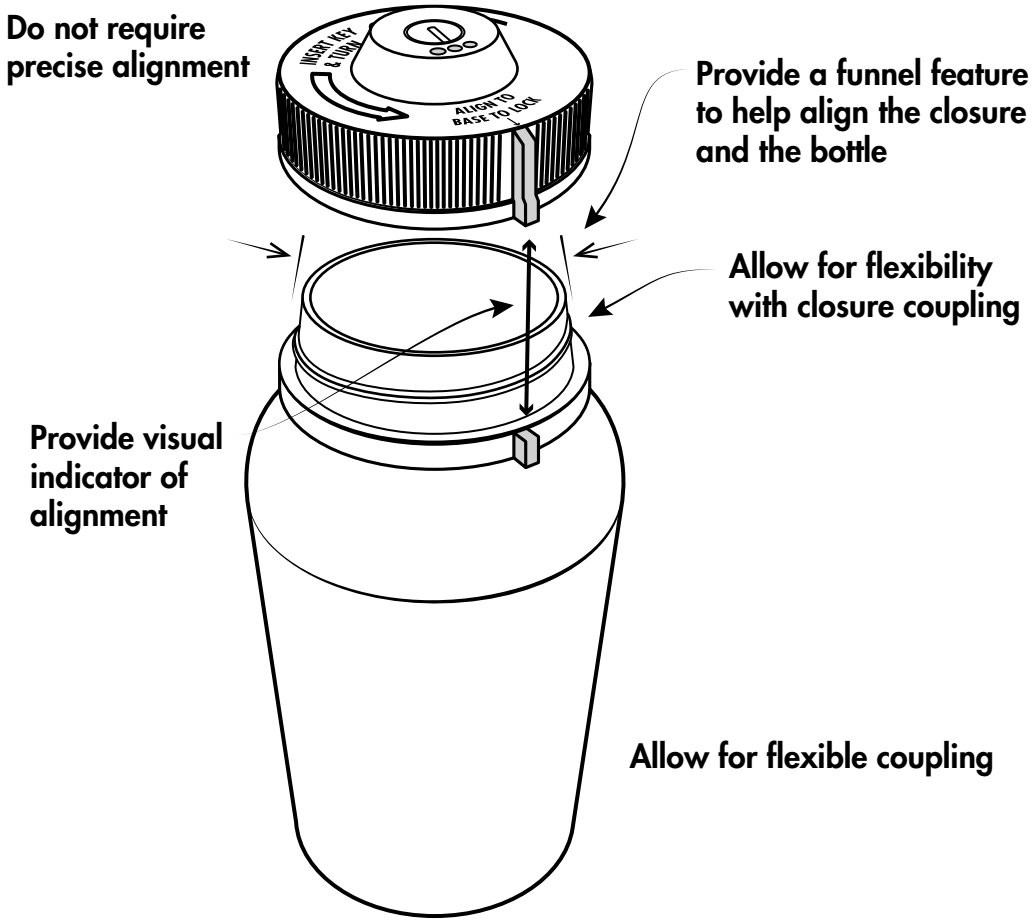
Detailed Description: People with arthritis may lack the fine motor control to successfully align the separated closure with the bottle or container if the closure requires precise alignment to engage.

Populations Impacted: Limited fine motor control

Potential Solutions: *Limit the requirement for precise alignment.* Do not require precise alignment to connect the closure with the bottle or container. Do not require precise alignment to screw the closure onto the bottle or container. Design features into the product to allow flexible coupling of the closure with the bottle or container.

Provide a visual indication of alignment if alignment is required. If a task requires alignment, consider adding a visual indication on the closure and the bottle or container to indicate proper alignment.

Funnel the closure onto the bottle or container. Provide a funnel type feature designed to align the closure with the bottle or container opening if the alignment cannot be achieved visually.



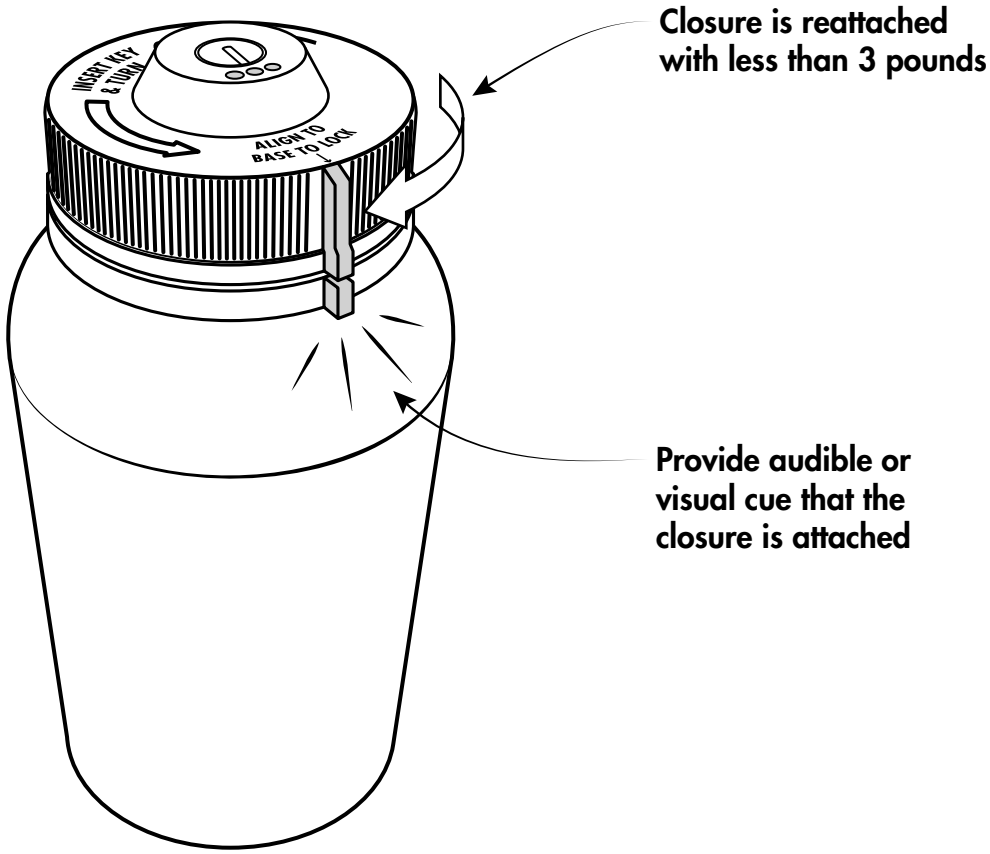
3.2 The closure is difficult to reattach.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty reattaching the closure to the bottle or container or may not know how to reattach the closure.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Provide an indication of closure attachment.* Consider providing an audible click or visual cues to indicate that the closure has been reattached.

Limit the linear force requirement. Linear force requirements exceeding 3.0 pounds may be difficult for people with arthritis. Limit the amount of force required to reattach the closure to 3.0 pounds or less.



Child-Resistant Boxes

Molded plastic materials are widely used for child-resistant designs, but child-resistant designs are emerging as a feature of paper and pulp-based boxes. With these designs, companies can transition to paper and pulp-based materials for sustainability or supply benefits while maintaining child resistance.

PRESS-TO-OPEN BOXES

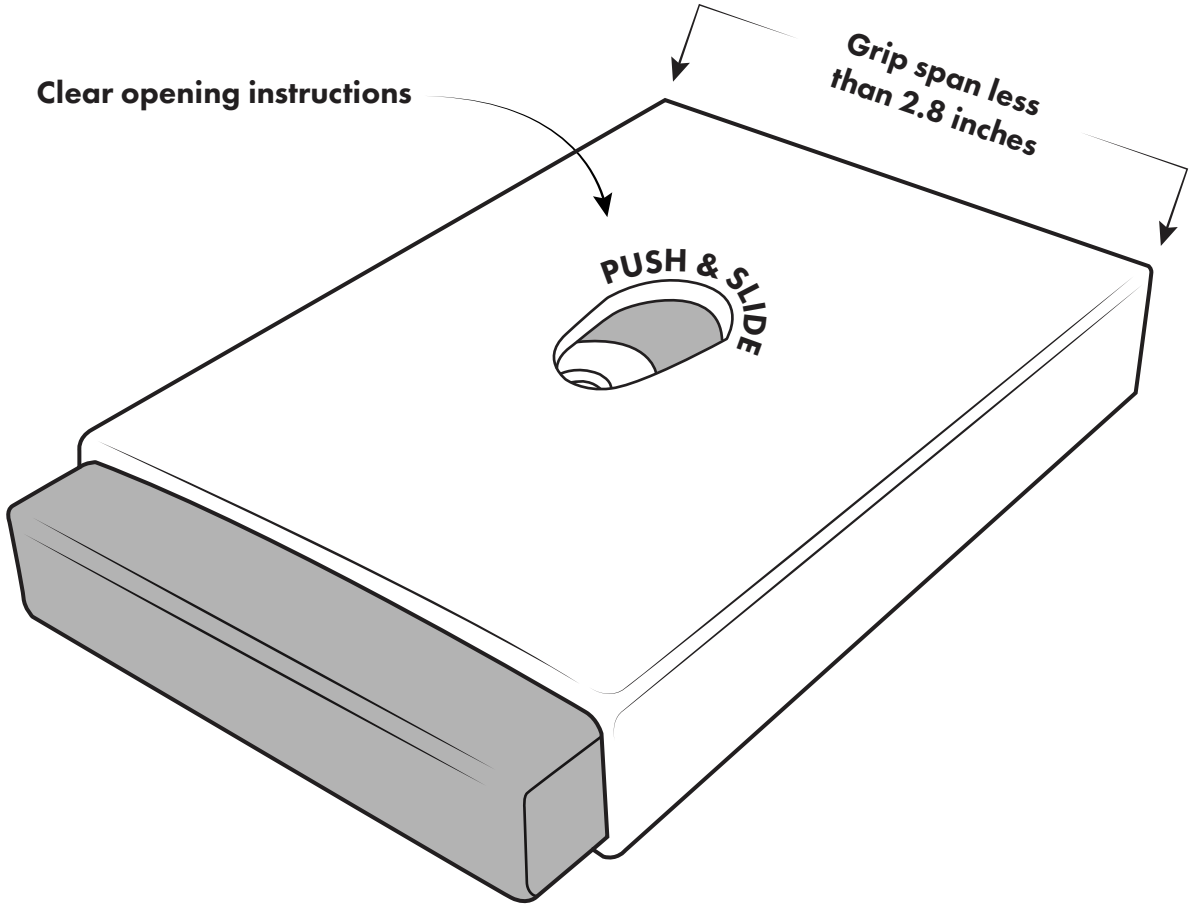
Two emerging formats for child-resistant boxes are squeeze and slide boxes and squeeze and lift boxes. Both designs require a user to press down on a feature to release a locking feature. Typically, these designs use a two-piece box. The exterior box will have activation points that must be squeezed, while the interior box is slid out of the exterior box or the lid is lifted. A common form of this design has a lever on the wall of the interior box that engages into a locking feature on the exterior box.

Example of Press to Open Boxes Boxes

Optimum Press to Open Box Guidelines

Recommendation Highlights

- **Grip span less than 2.8 inches**
- **Clear opening instructions**
- **Squeeze points visually distinct**
- **Squeeze points sufficiently sized**
- **Low squeeze force**
- **Low lift or slide force**
- **Tactile, visual, and/or auditory close indication**
- **Avoid potential pinch points**



PRESS TO OPEN ISSUES

Child-resistant boxes can be difficult to open because of the required grip span necessary to engage the child-resistant mechanism on the boxes. Users may have difficulty applying sufficient force to engage the mechanism while simultaneously lifting or sliding the box open.

1. Transportation and Handling Issues

1.1. The box is too heavy.
1.2. The box does not have a comfortable, graspable area.

2. Opening Issues

2.1. The child-resistant mechanism is difficult to engage.
2.2 The box top is difficult to lift or slide open.
2.3. The contents are difficult to remove.

1.1 The box is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting boxes that exceed 5.0 pounds for long distances. Heavier items that exceed 10.0 pounds may require a two-handed carry.

Populations Impacted: Limited strength

Potential Solutions: *Reduce weight of the box to below 5.0 pounds.* Users may need to use two hands to carry and transport boxes exceeding 5.0 pounds.

Design a second grasp point to facilitate a two-handed carry for boxes that weigh more than 5.0 pounds. Heavy boxes over 5.0 pounds should be designed to be carried using two hands. Multiple grasp points or a grasp point accommodating two hands can be useful when the box needs to be transported as part of the use case.

Design the shape of the grasp point to distribute the load across the inner surface area of the grasp point. Pressure points at the load-bearing portion of the grasp point can cause discomfort across painful finger joints. Consider designing the inner surface of the grasp point to distribute the load across the hand.

1.2 The box does not have a comfortable, graspable area.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the box or may not know where to grasp the box if a clear graspable area is not provided.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Limit the width of the graspable area.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches.

Select a graspable area width that allows the adult hand to grasp the box without exceeding a comfortable grip span.

Design the shape of the graspable area to distribute the load across the inner surface area of the graspable area. Pressure points at the load-bearing portion of the graspable area can cause discomfort across painful finger joints. Consider designing the graspable area to distribute the load across the hand, avoiding ridges, seams and small-radius protrusions.

Eliminate sharp edges. Sharp edges caused by cut edges can cause discomfort while grasping the box. Consider folding the material at the grasp point to reduce or eliminate sharp edges.

Provide hand cutouts. Boxes with built-in cutouts to accommodate hand insertion into the box can be useful for grasping heavy or large boxes. Design the cutouts to accommodate adult-sized hands.

2.1. The child-resistant mechanism is difficult to engage.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty grasping the box and applying pressure to the grasp point in order to disengage the child-resistant mechanism. If a wide grip span is required, the user may not be able to grip the box or apply sufficient force to the child-resistant mechanism while gripping the box. Users may have difficulty simultaneously gripping the box and disengaging the child-resistant mechanism.

Populations Impacted: Limited strength, limited range of motion

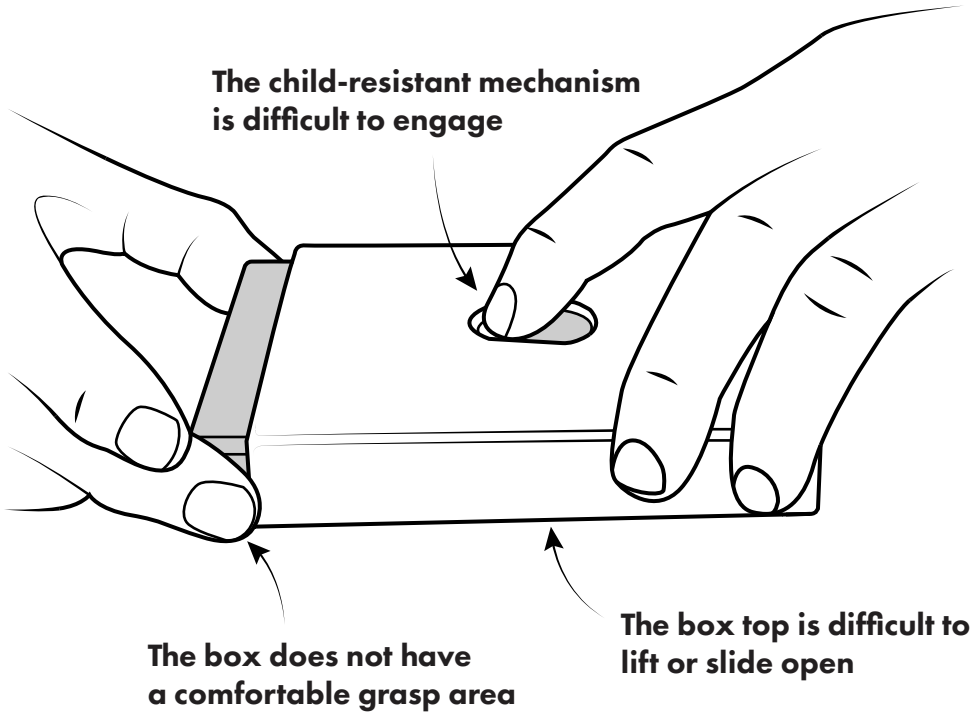
Potential Solutions: *Limit the separation of the grasp points required to disengage the child-resistant mechanism.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches.

Limit the amount of force required to engage the child-resistant mechanism. Minimize the amount of force required to engage the child-resistant mechanism. Require no more than 3.0 pounds of force to engage the child-resistant mechanism.

Provide an adequately sized grasp point. The grasp point for the child-resistant mechanism should be sized to accommodate the size of an adult thumb.

Avoid sharp edges. Sharp edges around the child-resistant mechanism should be avoided.

Avoid potential pinch points. Child-resistant mechanisms that require a user to push a design feature inside an opening may create a potential pinch point between the mechanism and the outer edge of the box. Ensure that fingers are unlikely to be trapped between the surfaces and that the amount of potential pinch force is minimized when both opening and closing the box.



2.2 The box top is difficult to lift or slide open.

Detailed Description: Users may have difficulty lifting the box top due to the amount of force required or the lack of space to grasp the box top lip. Sharp edges on the underside of the box top lip may cause discomfort as the user attempts to lift the top.

Populations Impacted: Limited strength, limited range of motion, limited fine motor control

Potential Solutions: *Provide design elements to assist in lifting the box top.* Rolled or folded grasp points with cutouts can provide lifting points for the box top.

Minimize the amount of force required to lift or slide the box top. The amount of force required to lift or slide the box top should not exceed 3.0 pounds.

Eliminate sharp edges. Sharp edges near where users might insert their fingers while opening the packaging should be avoided.

2.3 The contents are difficult to remove.

Detailed Description: Users may have difficulty safely extracting the contents of the box. Contents designed to be pulled out of the box may not accommodate the size of an adult hand. Heavy items may not be able to be lifted out of the box.

Populations Impacted: Limited range of motion, limited fine motor control

Potential Solutions: *Provide an opening of sufficient size to permit the product to be easily extracted.* When extraction requires reaching into the package to grasp the product, the box opening shall be designed to accommodate adult hand measurements.

Aerosols and Trigger Sprayers

Aerosols and trigger sprayers are used to dispense chemicals in a mist or in a targeted stream. They frequently have a child-resistant feature. Common features include an over cap, a rotation lock and a trigger spray lock.

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OVER CAP

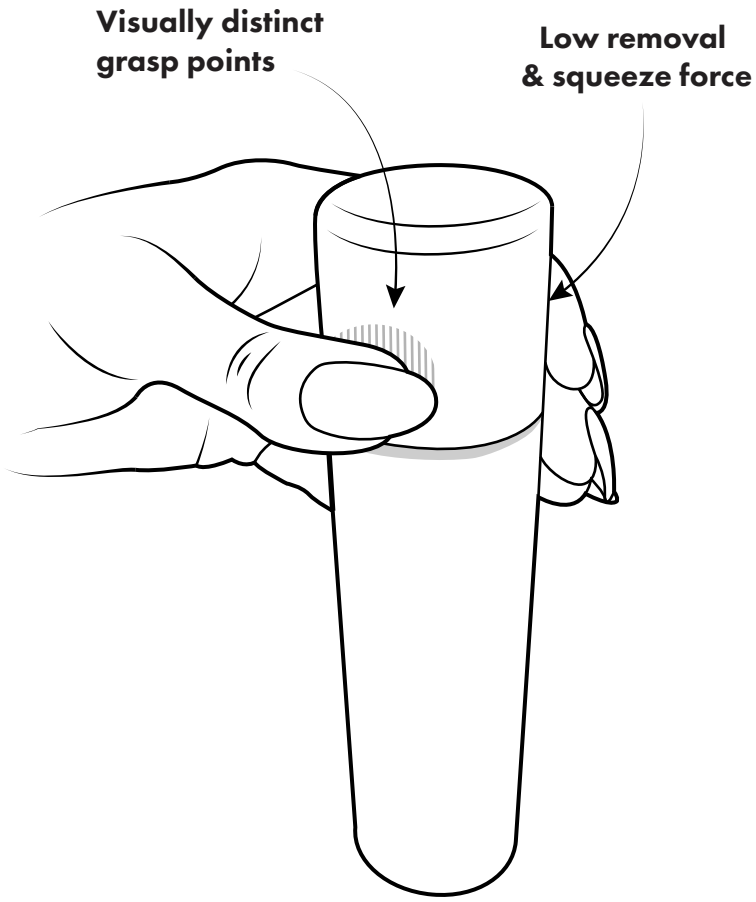
The over cap design is one of the simplest versions of a child-resistant system. This system contains a cap that encloses the aerosol spray mechanism. A user needs to squeeze the cap in a designated spot to deform the cap, then lift the cap off the neck or collar. After removing the cap, the aerosol spray mechanism can be used.

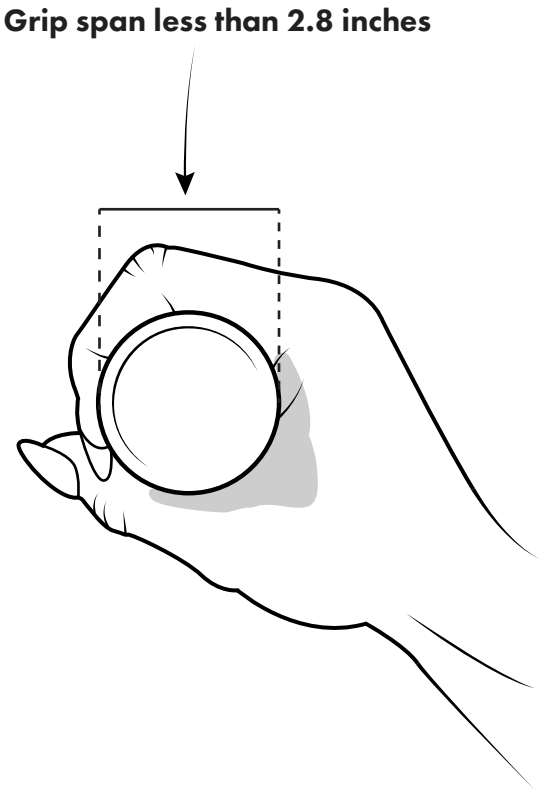
Examples of Over Cap

Over Cap Guidelines

Recommendation Highlights

- **Low removal force**
- **Low squeeze force**
- **Grip span less than 2.8 inches**
- **Visually distinct grasp points**
- **Hi-coefficient of friction grasp points**





OVER CAP ISSUES

Over caps can be difficult to remove because of the amount of force required to pinch the cap during removal. Users may have difficulty locating the pinch points on the cap. Users may find the cap uncomfortable to pinch because of the texture of the cap or the excessive pinch width required.

1. Operation Issues

1.1. The force required to depress the spray nozzle is too high.
1.2. The spray head is uncomfortable to press.
1.3. The cap is difficult to remove.
1.4. Users become fatigued during prolonged operation.
1.5. The spray pressure is inappropriate for the use case.

2. Grip and Weight Issues

2.1. The container is too heavy.
2.2. The container is uncomfortable to hold while spraying.

1.1 The force required to fully depress the spray nozzle is too high.

Detailed Description: The force required to properly depress the spray nozzle may exceed the functional capacity of some users with arthritis. A user's ability to apply sufficient force may be influenced by the shape of the top of the nozzle, the size of the spray nozzle and the distance between the outer diameter of the spray nozzle and the nozzle itself.

Populations Impacted: Limited strength, limited grip span

Potential Solutions: *Reduce the force required to articulate the nozzle to below 3.0 pounds of force.* The amount of force required to squeeze the nozzle should be below 3.0 pounds throughout the nozzle's range of motion.

Design the nozzle touch point to accommodate the entire width of the index finger. Spreading the force load across the surface area of the fingertip may reduce discomfort due to pressure points created by small diameter nozzles.

Design the nozzle touch point to have a slightly concave surface. A wide, slightly curved surface will allow users to apply a directed force to the nozzle efficiently.

1.2 The spray head is uncomfortable to press.

Detailed Description: Depressing the spray nozzle may be uncomfortable for some users with arthritis, particularly if the use case requires depressing the nozzle repeatedly or for long durations. Nozzle activation comfort may be influenced by the shape of the top of the nozzle, the size of the spray nozzle and the distance between the outer diameter of the spray nozzle and the nozzle itself.

Populations Impacted: Limited strength, limited grip span

Potential Solutions: *Reduce the force required to articulate the nozzle to below 3.0 pounds of force.* The amount of force required to squeeze the nozzle should be below 3.0 pounds throughout the nozzle's range of motion.

Design the nozzle touch point to accommodate the entire width of the index finger. Spreading the force load across the surface area of the fingertip may reduce discomfort due to pressure points created by small diameter nozzles.

Design the nozzle touch point to have a slightly concave surface. A wide, slightly curved surface will allow users to apply a directed force to the nozzle efficiently.

Ensure the nozzle touch point is easily reached. If the distance between the edge of the container and the nozzle touch point is too great, users may be required to hold the container in an awkward position or to hyperextend their index finger hyperextend their index finger to reach the touch point. Position the nozzle touch point to be in reach without requiring grip adjustment or hyperextension of the index finger.

1.3 The cap is difficult to remove.

Detailed Description: Some aerosol containers feature a cap that covers the top of the container. The cap may be difficult for people with arthritis to grasp and remove. The cap may feature a child resistant cap design requiring users to squeeze the cap in a designated location to facilitate cap removal. The amount of force required to squeeze the cap could exceed the functional abilities of the user.

Populations Impacted: Limited strength, limited grip span

Potential Solutions: *Limit the circumference of the cap.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the circumference of the cap to avoid excessive grip spans.

Limit the force required to remove the cap. Excessive force requirements may make it difficult or impossible for a user with arthritis to remove the cap. Limit the amount of force required to remove the cap to 5.0 pounds or less. If the cap requires using a single finger to apply pressure to remove the cap, limit the removal force requirement for the cap to no more than 3.0 pounds.

Provide a high coefficient of friction cap grasp surface. Consider using a high coefficient of friction material at the grasp point of the cap or using a knurling pattern that maximizes grip, without requiring grip adjustment or hyperextension of the index finger.

Limit the linear force requirement. Squeeze force requirements exceeding 3.0 pounds may be difficult for people with arthritis. If requirements for achieving child resistance necessitate a squeeze force exceeding 3.0 pounds, select the minimum force required to achieve child resistance.

Facilitate a key pinch. Squeezing the cap with the sides of the index finger and the thumb may be easier for some people with arthritis. Consider designing the closure so that a key-pinch is supported.

Provide a sufficiently large squeeze target surface area. A large surface area for applying the pinch force can make it easier for people with arthritis. Support a key-pinch grip if possible.

Provide a distinctive squeeze target. Provide a visually and tactilely distinct squeeze target with a sufficient coefficient of friction to prevent slippage.

Eliminate sharp edges. Sharp edges caused by incompletely milled seams or excessive flashing from a plastic part line can cause discomfort while grasping the container. Consider minimizing the seam to reduce or eliminate sharp edges.

1.4 Users become fatigued during prolonged operation.

Detailed Description: Some use cases require users to repeatedly activate the spray nozzle within a short amount of time or hold the spray nozzle in the activated position for long durations. Users with arthritis may become fatigued and no longer able to operate the mechanism. If the use case includes repeated activation or long-duration activations, take steps to minimize user fatigue.

Populations Impacted: Limited strength, limited grip span

Potential Solutions: *Reduce the force required to articulate the nozzle to below 3.0 pounds of force.* The amount of force required to squeeze the nozzle should be below 3.0 pounds throughout the nozzle's range of motion.

Design the nozzle touch point to accommodate the entire width of the index finger. Spreading the force load across the surface area of the fingertip may reduce discomfort due to pressure points created by small-diameter nozzles.

Design the nozzle touch point to have a slightly concave surface. A wide, slightly curved surface will allow users to apply a directed force to the nozzle efficiently.

Design a nozzle activation lock-assist design element. If the use case includes prolonged nozzle activation, consider adding a design element that allows the user to enter the activated state with a single user action, followed by a separate action to deactivate the nozzle.

1.5 The spray pressure is inappropriate for the use case.

Detailed Description: Some products, such as products designed to mitigate wasps or stinging insect nests, are designed to be applied from a distance. If the spray stream is insufficient, users may need to raise their arm above shoulder height to apply the product. Users with arthritis may lack the ability, or experience substantial pain, when required to raise their arm above shoulder height

Populations Impacted: Limited range of motion

Potential Solutions: *Design the device to be operated without requiring an arm extension above shoulder height.* Users with arthritis may lack the range of motion the range of motion required to extend their arm above the shoulder. Consider providing adequate stream pressure that does not require arm extension.

2.1 The container is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting containers that exceed 5.0 pounds for long distances.

Populations Impacted: Limited strength

Potential Solutions: *Reduce the weight of the container to below 5.0 pounds.* Users may need to use two hands to utilize and transport containers exceeding 5.0 pounds. If the use case requires the container to be used above shoulder height, limit the weight of the container to below 3.0 pounds.

Design a second grasp point to facilitate a two-handed carry for containers that weigh more than 5.0 pounds. Heavy containers over 5.0 pounds should be designed to be carried using two hands. A grasp point built into the container, in addition to the handle, can be useful when the container needs to be transported as part of the use case.

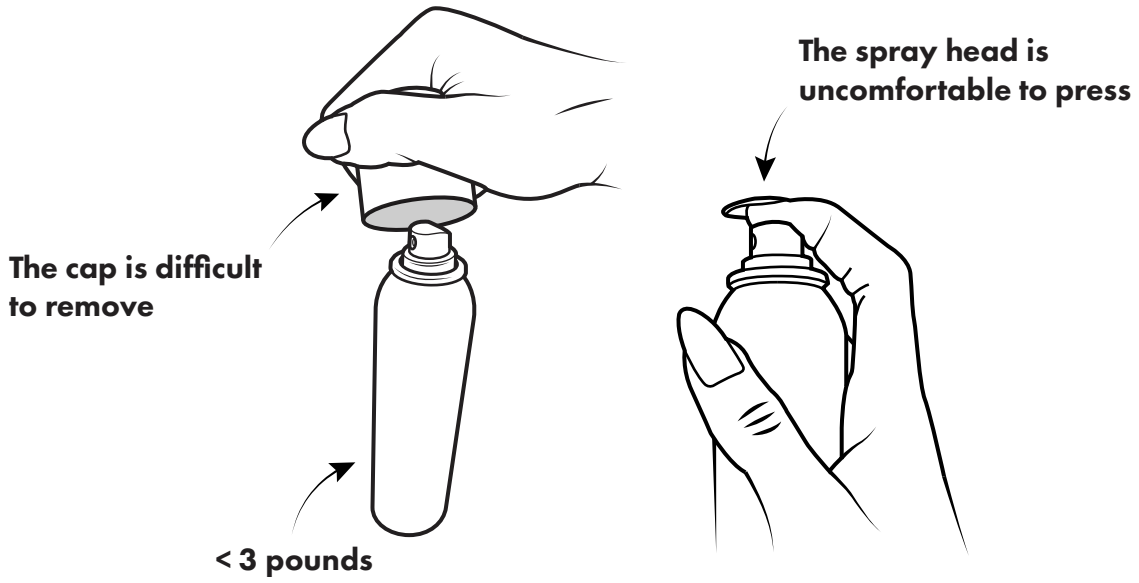
2.2 The container is uncomfortable to hold while spraying.

Detailed Description: The ability to hold the container in a comfortable position while using the product is critical to overall ease of use. The user may have difficulty comfortably holding a container and applying sufficient pressure to the nozzle to accurately dispense the contents.

Populations Impacted: Limited strength, limited grip, limited range of motion, prone to fatigue

Potential Solutions: *Reduce the weight of the container.* A heavy container may be difficult to hold in position while the container is in use. Consider reducing the container's weight, particularly when the container must be dispensed precisely.

Provide a sufficient grasp point for hand placement. The container should provide an adequate grasp point to prevent container slippage while the container is being carried or held during the dispensing process. Consider providing a high coefficient of friction grasp point requiring no greater than 2.5 to 3.0 inches in grip span when the container is a larger diameter.



ROTATIONAL LOCK

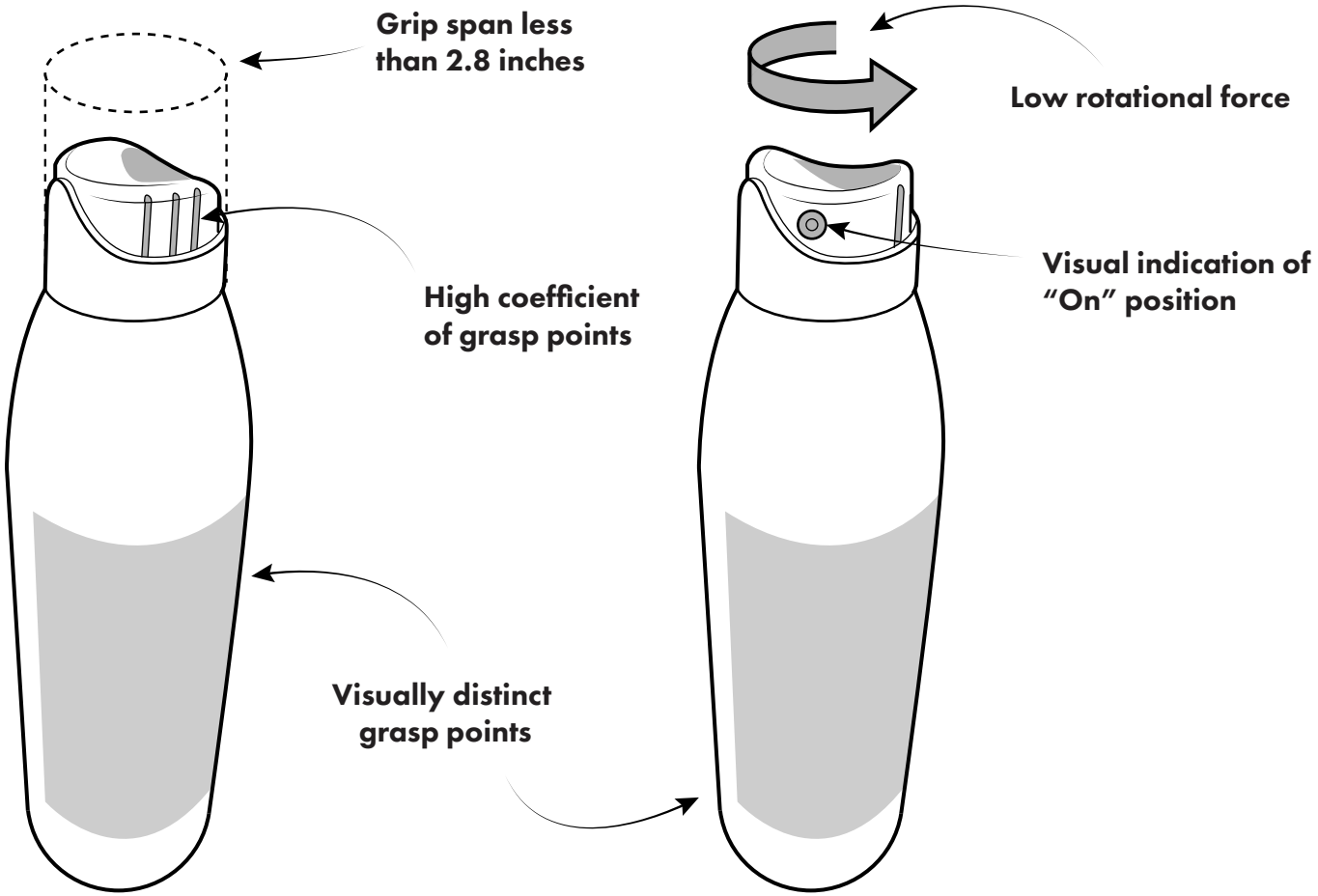
The rotational lock aerosol spray system features an over cap concealing the spray valve. When the over cap is rotated, the spray valve is exposed through a hole in the over cap. Some rotational locks will prevent activation of the aerosol spray trigger when the over cap is not oriented to the "On" position.

Examples of Rotational Lock

Optimum Rotational Guidelines

Recommendation Highlights

- **Low rotational force**
- **Grip span less than 2.8 inches**
- **Visually distinct grasp points**
- **Hi-coefficient of friction grasp points**
- **Visual indication of "On" position**
- **Labeled opening instructions**



ROTATIONAL LOCK ISSUES

Users may have difficulty grasping the rotational lock or applying sufficient force to the rotational lock to transition the lock from the locked to the unlocked position. Users may have difficulty understanding the lock operation if the provided instructions are not clear and easy to read.

1. Operation Issues

1.1. The force required to depress the spray nozzle is too high.
1.2. The spray head is uncomfortable to press.
1.3. The spray lock is difficult to rotate.
1.4. The spray lock label is difficult to read.
1.5. Users become fatigued during prolonged operation.
1.6. The spray pressure is inappropriate for the use case.

2. Grip and Weight Issues

2.1. The container is too heavy.
2.2. The container is uncomfortable to hold while spraying.

1.1 The force required to fully depress the spray nozzle may be too high.

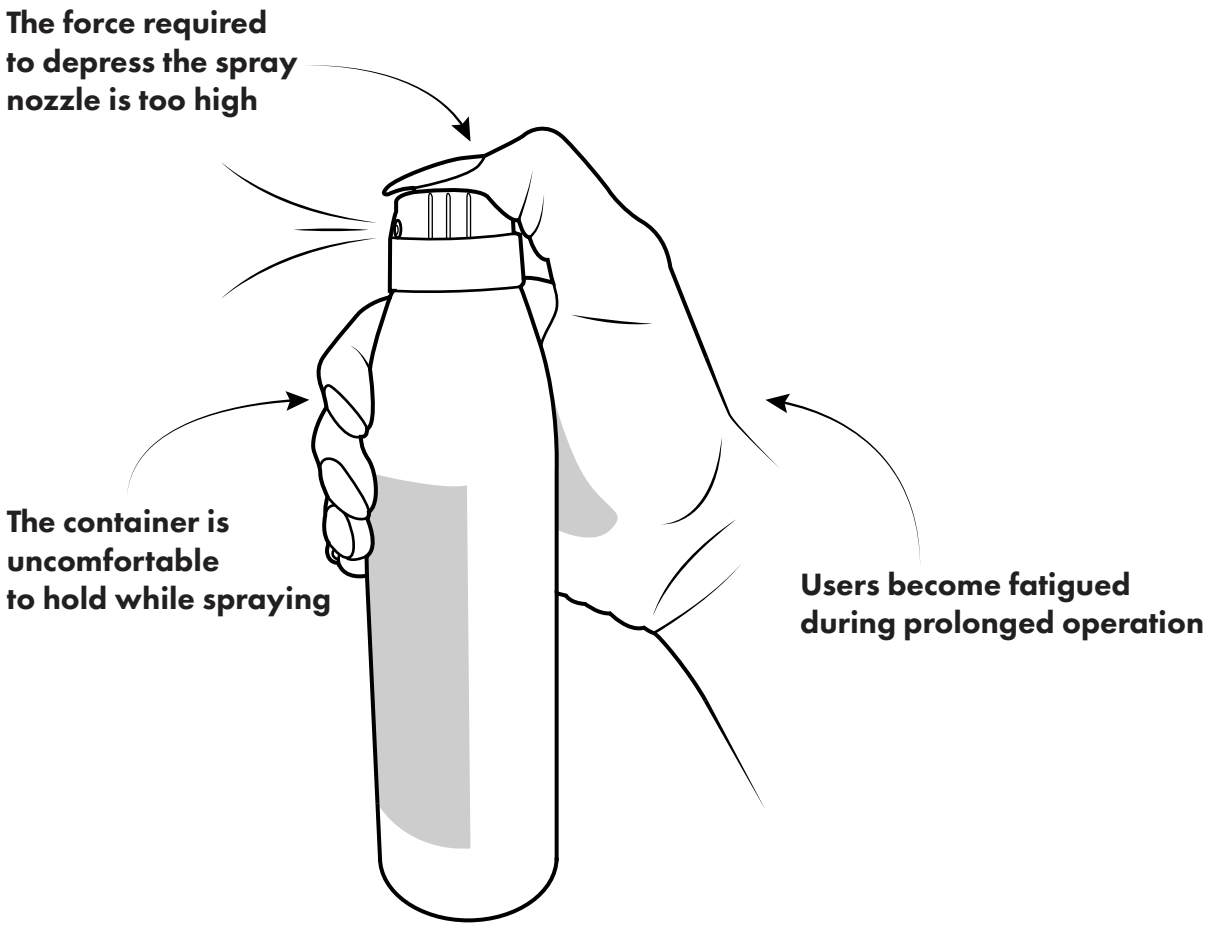
Detailed Description: The force required to properly depress the spray nozzle may exceed the functional capacity of some users with arthritis. A user's ability to apply sufficient force may be influenced by the shape of the top of the nozzle, the size of the spray nozzle and the distance between the outer diameter of the spray nozzle and the nozzle itself.

Populations Impacted: Limited strength, limited grip span

Potential Solutions: *Reduce the force required to articulate the nozzle to below 3.0 pounds of force.* The amount of force required to squeeze the nozzle should be below 3.0 pounds throughout the nozzle's range of motion.

Design the nozzle touch point to accommodate the entire width of the index finger. Spreading the force load across the surface area of the fingertip may reduce discomfort due to pressure points created by small diameter nozzles.

Design the nozzle touch point to have a slightly concave surface. A wide, slightly curved surface will allow users to apply a directed force to the nozzle efficiently.



1.2 The spray head is uncomfortable to press.

Detailed Description: Depressing the spray nozzle may be uncomfortable for some users with arthritis, particularly if the use case requires depressing the nozzle repeatedly or for long durations. Nozzle activation comfort may be influenced by the shape of the top of the nozzle, the size of the spray nozzle and the distance between the outer diameter of the spray nozzle and the nozzle itself.

Populations Impacted: Limited strength, limited grip span

Potential Solutions: *Reduce the force required to articulate the nozzle to below 3.0 pounds of force.* The amount of force required to squeeze the nozzle should be below 3.0 pounds throughout the nozzle's range of motion.

Design the nozzle touch point to accommodate the entire width of the index finger. Spreading the force load across the surface area of the fingertip may reduce discomfort due to pressure points created by small diameter nozzles.

Design the nozzle touch point to have a slightly concave surface. A wide, slightly curved surface will allow users to apply a directed force to the nozzle efficiently.

Ensure the nozzle touch point is easily reached. If the distance between the edge of the container and the nozzle touch point is too great, users may be required to hold the container in an awkward position or to hyperextend their index finger to reach the touch point. Position the nozzle touch point to be within reach without requiring grip adjustment or hyperextension of the index finger.

1.3 The spray lock is difficult to rotate.

Detailed Description: Some aerosol containers feature a locking mechanism that prevents inadvertent activation of the nozzle. Typically, users must rotate a design element located below the nozzle to a locked or unlocked position. Users may have difficulty identifying the current state of the locking mechanism and applying sufficient force to transition the mechanism from one state to another.

Populations Impacted: Limited strength, limited grip span

Potential Solutions: *Limit the circumference of the nozzle lock.* Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches. Limit the circumference of the nozzle lock to avoid excessive grip spans.

Limit the torque required to adjust the nozzle lock. Excessive torque may make it difficult or impossible for users with arthritis to rotate the nozzle lock.

Provide a high coefficient of friction nozzle lock grip. Consider using a high coefficient of friction material at the grasp point of the nozzle lock or using a knurling pattern that maximizes grip.

Provide a clear indication of nozzle lock state transition. Tactile and visual cues should indicate the status of the nozzle lock. The user should be given a clear indication of when the desired nozzle lock position has been achieved. Provide a high coefficient of friction grasp surface.

Ensure the nozzle lock grasp point is easily reached. Ensure there is sufficient space surrounding the nozzle lock to allow the user to grasp the nozzle lock with a key-pinch. Design elements directly above or below the nozzle lock can unnecessarily limit how a user might grasp the nozzle lock.

1.4 The spray lock label is difficult to read.

Detailed Description: Graphical or textual labels indicating the presence, current state and direction of travel of the nozzle lock can be difficult to read. Graphical elements or textual labels may be too small or have poor contrast, creating readability issues. Lighting conditions can exacerbate readability issues.

Populations Impacted: Limited vision

Potential Solutions: *Increase the size of critical labels or graphical elements.* Critical information should be sized in a 10-point font or equivalent to accommodate individuals with poor visual acuity.

Increase the visual contrast between the label and the nozzle background. A contrast ratio of at least 10 to 1 would increase the readability of the nozzle label under all lighting conditions.

1.5 Users become fatigued during prolonged operation.

Detailed Description: Some use cases require users to repeatedly activate the spray nozzle within a short amount of time or hold the spray nozzle in the activated position for long durations. Users with arthritis may become fatigued and no longer able to operate the mechanism. If the use case includes repeated activation or long-duration activations, design the device to minimize user fatigue.

Populations Impacted: Limited strength, limited grip span

Potential Solutions: *Reduce the force required to articulate the nozzle to below 3.0 pounds of force.* The amount of force required to squeeze the nozzle should be below 3.0 pounds throughout the nozzle's range of motion.

Design the nozzle touch point to accommodate the entire width of the index finger. Spreading the force load across the surface area of the fingertip may reduce discomfort due to pressure points created by small diameter nozzles.

Design the nozzle touch point to have a slightly concave surface. A wide, slightly curved surface will allow users to apply a directed force to the nozzle efficiently.

Design a nozzle activation lock-assist design element. If the use case includes prolonged nozzle activation, consider adding a design element that allows the user to enter the activated state with a single user action, followed by a separate action to deactivate the nozzle.

1.6 The spray pressure is inappropriate for the use case.

Detailed Description: Some products, such as products designed to mitigate wasps or stinging insect nests, are designed to be applied from a distance. If the spray stream is insufficient, users may need to extend their arm above their shoulders to apply the product. Users with arthritis are often unable to do so or experience significant pain if they are required to extend their reach above shoulder height.

Populations Impacted: Limited range of motion

Potential Solutions: *Design the device to be operated without requiring an arm extension above the shoulder.* Users with arthritis may not have the range of motion required to extend their arm above the shoulder. Consider providing an adequate stream pressure that does not require arm extension.

2.1 The container is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting containers that exceed 5.0 pounds for long distances.

Populations Impacted: Limited strength

Potential Solutions: *Reduce the weight of the container to below 5.0 pounds.* Users may need to use two hands to utilize and transport containers exceeding 5.0 pounds. If the use case requires the container to be raised above shoulder height, limit the weight of the container to below 3.0 pounds.

Design a second grasp point to facilitate a two-handed carry for containers that weigh more than 5.0 pounds. Heavy containers over 5.0 pounds should be designed to be carried using two hands. A grasp point built into the container, in addition to the handle, can be useful when the container needs to be transported as part of the use case.

2.2 The container is uncomfortable to hold while spraying.

Detailed Description: The ability to hold the container in a comfortable position while using the product is critical to overall ease of use. The user may have difficulty comfortably holding a container and applying sufficient pressure to the nozzle to accurately dispense the contents.

Populations Impacted: Limited strength, limited grip, limited range of motion, prone to fatigue

Potential Solutions: *Reduce the weight of the container.* A heavy container may be difficult to hold in position while the container is in use. Consider reducing the container's weight, particularly when the container must be dispensed precisely.

Provide a sufficient grasp point for hand placement. The container should provide an adequate grasp point to prevent container slippage while the container is being carried or held during the dispensing process. Consider providing a high coefficient of friction grasp point requiring no greater than 2.5 to 3.0 inches in grip span when the container is of a larger diameter.

TRIGGER SPRAYER LOCK

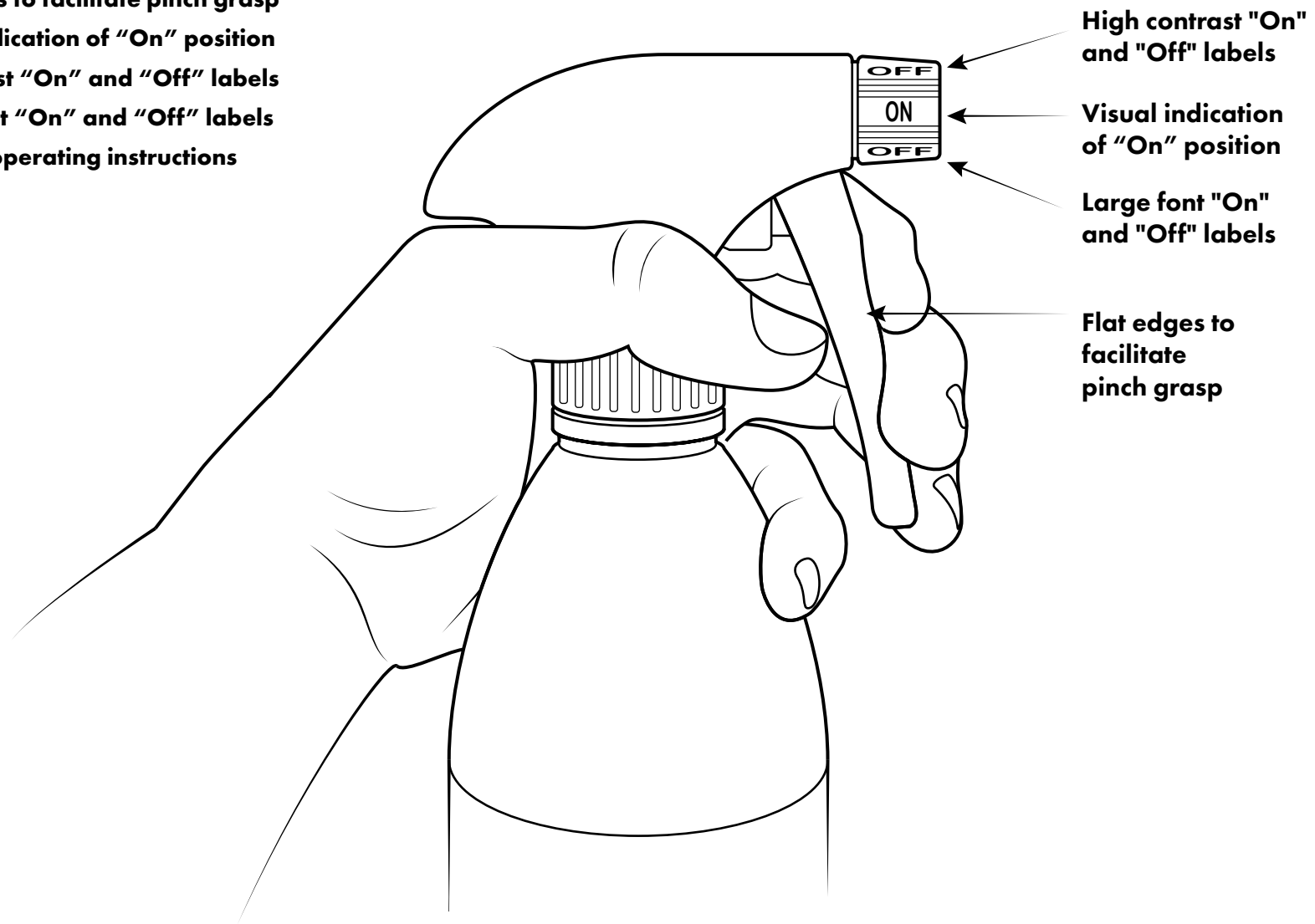
Trigger-sprayer locks prevent accidental activation of a trigger. A common version of a trigger sprayer lock has a rotating locking mechanism near the nozzle of the trigger sprayer. When the user rotates the trigger to the "On" or "Spray" position, the trigger sprayer can be activated.

Examples of Trigger Sprayer Lock

Optimum Trigger Sprayer Guidelines

Recommendation Highlights

- **Low rotational force**
- **Flat edges to facilitate pinch grasp**
- **Visual indication of “On” position**
- **Hi contrast “On” and “Off” labels**
- **Large font “On” and “Off” labels**
- **Labeled operating instructions**



TRIGGER SPRAYER LOCK ISSUES

Ease of use issues associated with the trigger sprayer lock are issues associated with locating and understanding the operation of the locking mechanism and transitioning the locking mechanism from its locked to its unlocked state. Users may have difficulty locating the locking mechanism labels and may have difficulty reading the labels if the size of the label is too small or if the label has poor contrast. The force required to transition the locking mechanism from the locked to the unlocked state may exceed the functional abilities of some people with arthritis.

1. Spray Trigger Operation Issues

1.1. The force required to actuate the spray trigger is too high.
1.2. The shape of the spray trigger is uncomfortable.
1.3. The length of the spray trigger is too short.
1.4. The spray trigger requires excessive grip span.
1.5. The trigger creates a pinch point.
1.6. Users may become fatigued or experience pain after extended operation of the spray trigger.
1.7. The stream pressure is inappropriate for the use case.

2. Nozzle Operation Issues

2.1. The adjustable nozzle is difficult to turn.
2.2. The labels on the nozzle are difficult to read.

3. Grip and Weight Issues

3.1. The spray bottle is not comfortable to hold.
3.2. Operation places the wrist in an uncomfortable position.
3.3. The spray bottle is too heavy.
3.4. Spray bottle is not operable from either hand.

1.1 The force required to fully actuate the spray trigger is too high.

Detailed Description: The force required to properly squeeze the spray trigger may exceed the functional capacity of some users with arthritis. A user's ability to apply sufficient force may be influenced by the shape of the trigger, the length of the trigger, the distance between the neck and the trigger and the profile of the force required as a function of trigger position. For example, some devices may require additional force at the beginning of the trigger squeeze, as opposed to the force required to squeeze the trigger at the midpoint position. Users with limited grip span will have much less strength at the beginning of the trigger squeeze.

Populations Impacted: Limited strength, limited grip span

Potential Solutions: *Reduce the force required to articulate the trigger to below 3.0 pounds of force.* The amount of force required to squeeze the trigger should be below 3.0 pounds throughout the trigger's range of motion.

Design the trigger to accommodate at least three fingers. Longer triggers allow the users to apply additional muscle groups to the actuation of the trigger. Some forms of degenerative arthritis may impact the commonly used joints in the middle and index fingers disproportionately. Spreading the load across three fingers can reduce the pressure on impacted joints.

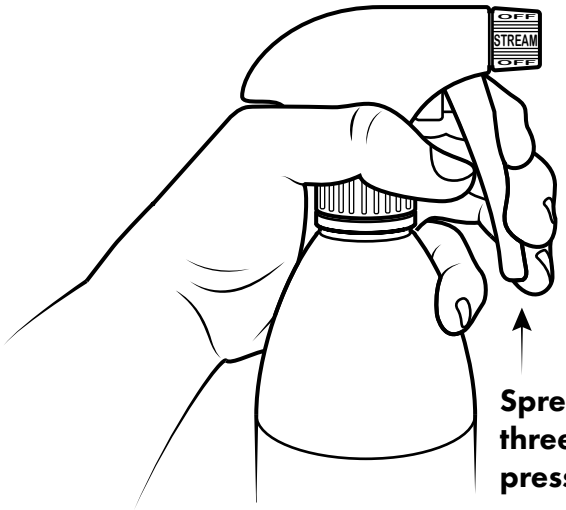
Limit distance between the back of the neck and the initial placement of the trigger. Users with arthritis may experience limited strength with excessive grip spans. Some users experience reductions in strength when grip spans exceed 2.5 to 3.0 inches.

1.2 The shape of the spray trigger is uncomfortable.

Detailed Description: The shape of the trigger can cause excessive pressure across painful finger joints. Users may experience significant pain before sufficient force is applied to acuate the trigger. Rounded triggers, or triggers with sharp edges, are particularly problematic.

Populations Impacted: Limited strength

Potential Solutions: *Design the trigger to reduce pressure points.* Rounded triggers, or triggers with sharp edges, may cause increased pressure across painful finger joints. Design the trigger to spread the load to the fingers across a wide area. Use flat surfaces or surfaces that conform to a slightly curved finger grasp in the neutral grip posture.



Spreading the load across three fingers can reduce the pressure on impacted joints

1.3 The length of the spray trigger is too short.

Detailed Description: Users with arthritis are more likely to experience symptoms of arthritis in the index and middle fingers. Some triggers are sized such that only one or two fingers can comfortably be applied to the trigger. Limited trigger size may severely limit the amount of force that users can apply to the trigger without experiencing pain.

Populations Impacted: Limited strength, limited grip span, prone to fatigue

Potential Solutions: *Design the trigger to accommodate at least three fingers.* Longer triggers allow the users to apply additional muscle groups to the actuation of the trigger. Some forms of degenerative arthritis may impact the commonly used joints in the middle and index fingers disproportionately. Spreading the load across three fingers can reduce the pressure on impacted joints.

1.4 The spray trigger requires excessive grip span.

Detailed Description: The grip strength of someone with moderate to severe arthritis in their hands is increasingly diminished after the grip span exceeds 2.5 to 3.0 inches. If the distance between the back of the neck and the front of the trigger exceeds the recommended grip span, the user may not be able to apply sufficient force to the trigger. In severe cases, some users may not be able to extend their fingers adequately to grasp the trigger.

Populations Impacted: Limited reach, limited strength

Potential Solutions: *Reduce the force required to articulate the trigger to below 3.0 pounds of force.* The amount of force required to squeeze the trigger should be below 3.0 pounds throughout the trigger's range of motion.

Limit the required trigger grip span. Users should not be required to use a grip span exceeding 2.5 to 3.0 inches to grasp the spray trigger. Adjust the trigger range of motion or the neck indentation to reduce the grip span accordingly.

1.5 The trigger creates a pinch point.

Detailed Description: Users may accidentally trap a finger beneath the trigger. Squeezing the trigger with a finger underneath the trigger may cause pain or damage to finger joints with arthritis.

Populations Impacted: Limited fine motor control

Potential Solutions: *Design the trigger to accommodate at least three fingers.* Longer triggers allow the users to apply additional muscle groups to the actuation of the trigger. Some forms of degenerative arthritis may impact the commonly used joints in the middle and index fingers disproportionately. Spreading the load across three fingers can reduce the pressure on impacted joints. Longer triggers reduce the possibility of trapping a finger under the trigger when the trigger is squeezed.

Design the nozzle to prevent inadvertent dispensing. Design the nozzle aperture to precisely dispense the product with a slight squeeze. Products that dispense without force being applied can be difficult to control.

Limit the required grip span. Users should not be required to use a grip span exceeding 2.5 to 3.0 inches to grasp the container while dispensing.

1.6 Users may become fatigued or experience pain after extended operation of the spray trigger.

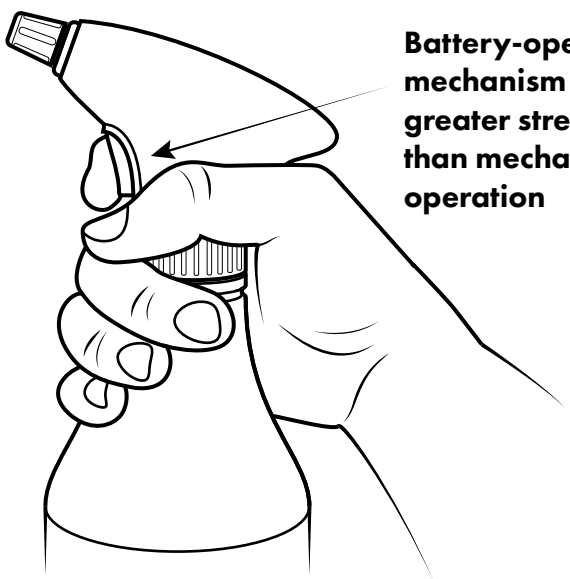
Detailed Description: Extended use of a spray trigger can cause pain or fatigue. The pain may be experienced immediately or result in increased sensitivity or reduced range of motion the next day.

Populations Impacted: Limited strength, limited range of motion, prone to fatigue

Potential Solutions: *Reduce the force required to articulate the trigger to below 3.0 pounds of force.* The amount of force required to squeeze the trigger should be below 3.0 pounds throughout the trigger's range of motion.

Design the trigger to accommodate at least three fingers. Longer triggers allow the users to apply additional muscle groups to the actuation of the trigger. Some forms of degenerative arthritis may impact the commonly used joints in the middle and index fingers disproportionately. Spreading the load across three fingers can reduce the pressure on impacted joints.

Automate the spray trigger. Adding a battery-operated mechanism to control the spray would reduce repetitive motions that might be problematic for people with arthritis.



Battery-operated spray mechanism may afford greater stream pressure than mechanical trigger operation

1.7 The stream pressure is inappropriate for the use case.

Detailed Description: Some products, such as products designed to mitigate wasps or stinging insect nests, are designed to be applied from a distance. If the spray stream is insufficient, users may need to raise their arm above shoulder height to apply the product. Users with arthritis may lack the ability, or experience substantial pain, when needed to raise their arm above shoulder height.

Populations Impacted: Limited range of motion

Potential Solutions: *Design the device to be operated without requiring an arm extension above the shoulder.* Users with arthritis may lack the range of motion required to extend their arm above the shoulder. Consider providing adequate stream pressure that does not require arm extension.

Automate the spray trigger. Adding a battery-operated mechanism to control the spray would reduce repetitive motions that might be problematic for people with arthritis.

Use of a battery-operated spray mechanism may afford greater stream pressure than could be afforded by mechanical trigger operation.

2.1 The adjustable nozzle is difficult to turn.

Detailed Description: The adjustable nozzle can be difficult to turn because of the small grasp point and the amount of torque required to rotate the nozzle into the desired position. The user may have difficulty rotating the nozzle from the locked to the unlocked position.

Populations Impacted: Limited strength, limited fine motor control, limited grip

Potential Solutions: *Reduce the amount of torque required to rotate the nozzle to and from the locked position.* The amount of torque required to rotate the nozzle may exceed the functional capabilities of some users with arthritis. The problem is exacerbated when the nozzle has a small diameter and low coefficient of friction.

Increase the coefficient of friction of the nozzle. Users with limited pinch strength may have difficulty applying sufficient pressure against the nozzle to facilitate nozzle rotation. Nozzles that tend to slip in the user's grip are particularly problematic. Consider using a non-slip material or a non-slip knurling pattern to enhance the user's ability to grip the nozzle during rotation.

Avoid rounded nozzles. Rounded nozzles are more likely to slip while the user is rotating the nozzle. Consider using a squared nozzle or a nozzle with an asymmetric shape to facilitate grasping.

Increase the size of the nozzle. Larger nozzles are easier to grip. In general, users can apply more rotational torque using a key-pinch grip than a tip-pinch grip. Larger nozzles that can be grasped between the thumb and side of the index finger during rotation will be easier to rotate than nozzles that require the user to use the pads of the thumb and index fingers.

2.2 The labels on the nozzle are difficult to read.

Detailed Description: Labels found on nozzles indicating the nozzle position or lock status are often embossed and have poor contrast. Some labels may be too small. Older adults with poor visual acuity and contrast sensitivity may have difficulty interpreting the label and associated symbology. The problem may be made worse under poor lighting conditions.

Populations Impacted: Limited vision

Potential Solutions: *Increase the size of critical labels or graphical elements.* Critical information should be sized in a 10-point font or equivalent to accommodate individuals with poor visual acuity.

Increase the contrast between the label and the nozzle background. A contrast ratio of at least 10:1 would increase the readability of the nozzle label under all lighting conditions.

3.1 The spray bottle is not comfortable to hold.

Detailed Description: The ability to hold the bottle in a comfortable position while transporting or using the product is critical to overall ease of use. Some bottles force the wrist into an uncomfortable position due to the geometry of the intended grasp point. Heavy bottles may be too heavy for extended use and can become more uncomfortable over time.

Populations Impacted: Limited strength, limited grip, limited range of motion, prone to fatigue

Potential Solutions: *Reduce the weight of the bottle.* A heavy bottle may be difficult to hold in position while the bottle is in use. Consider reducing the bottle's weight, particularly when it is expected to be used for a longer-duration task.

Provide sufficient neck space for hand placement. The space between the bottom of the back of the trigger and the top of the bottle should be wide enough to accommodate the width of a hand. Ideally, the design of the bottle should accommodate a neutral wrist posture while holding the product.

Provide a space above the neck for resting the head of the trigger on the hand. The back of the trigger should overlap the hand when the bottle is grasped for usage. A significant component of the bottle's weight should rest on the top of the palm between the thumb and index finger to minimize fatigue.

3.2 Operation places the wrist in an uncomfortable position.

Detailed Description: Products designed to be applied to a surface above the user's shoulder height or below the height of the user's waist can cause the user to hold the device in an uncomfortable position. The weight of the bottle can put stress on the wrist joint when the wrist is moved out of the neutral position.

Populations Impacted: Limited range of motion

Potential Solutions: *Reduce the weight of the bottle.* A heavy bottle may be difficult to hold in position while the bottle is in use. Consider reducing the bottle's weight, particularly when it is expected to be used for a longer-duration task.

3.3 The spray bottle is too heavy.

Detailed Description: Bottles over 3.0 pounds may be difficult to hold in a use position over extended periods. Heavy bottles can be impossible to use if the use case requires the user to hold the bottle above shoulder height.

Populations Impacted: Limited strength, limited range of motion, limited grip, prone to fatigue

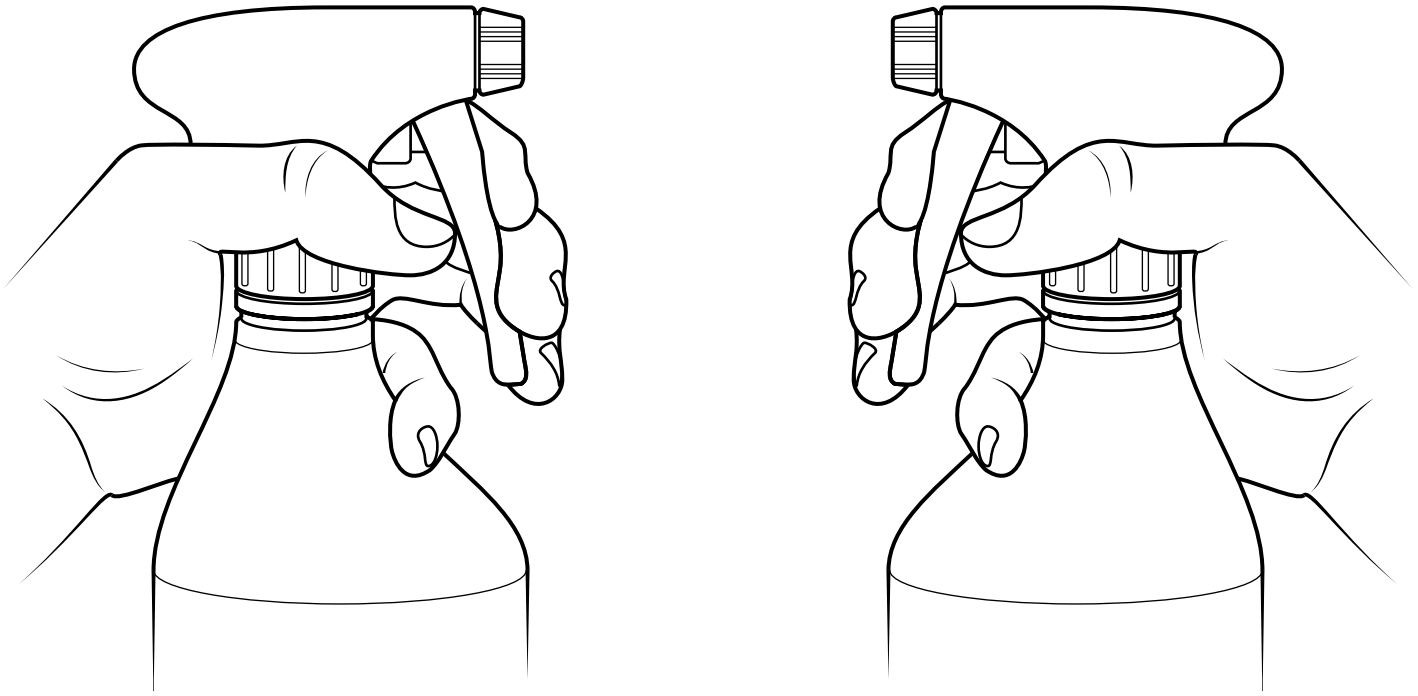
Potential Solutions: *Reduce the weight of the bottle.* A heavy bottle may be difficult to hold in position while the bottle is in use. Consider reducing the bottle's weight, particularly when it is expected to be used for a longer-duration task.

3.4 Spray bottle is not operable from either hand.

Detailed Description: In many cases, arthritis may present asymmetrically. For example, a user's right hand may experience more pain and reduced range of motion than their left hand. Users with an arthritis flare-up (a period of time with a sudden increase in their joint pain) may need to use their non-dominant hand to operate the squeeze trigger. Fatigue may cause users to switch hands as needed for comfort. Transient symptoms may cause users to switch hands if a flare-up causes temporary pain. The spray trigger's design should accommodate the use of either the right or left hand equally.

Populations Impacted: Limited strength, prone to fatigue

Potential Solutions: *Design the spray trigger to be operated by either hand.* The device should be operable from either hand without requiring adjustments or reconfigurations. Users should be able to freely switch between hands during usage.



Blister Packs

Blister packs consist of a plastic or metal sheet that is thermoformed or pressure formed to make a cavity or "blister" to hold the product. This sheet is attached to a rigid or semi-rigid sheet to seal the cavity. The rigid or semi-rigid sheet can be a thin layer of metal, plastic or paper. The rigid or semi-rigid sheet will often contain product information and opening instructions. There are different types of child-resistant blister packs requiring the user to perform different actions to remove the product. Oftentimes, actions can be combined for additional security. This guide will cover common blister pack actions such as folding, tearing and peeling back a material as well as pushing out a product.

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SEPARATE, FOLD, BREAK OFF AND TEAR

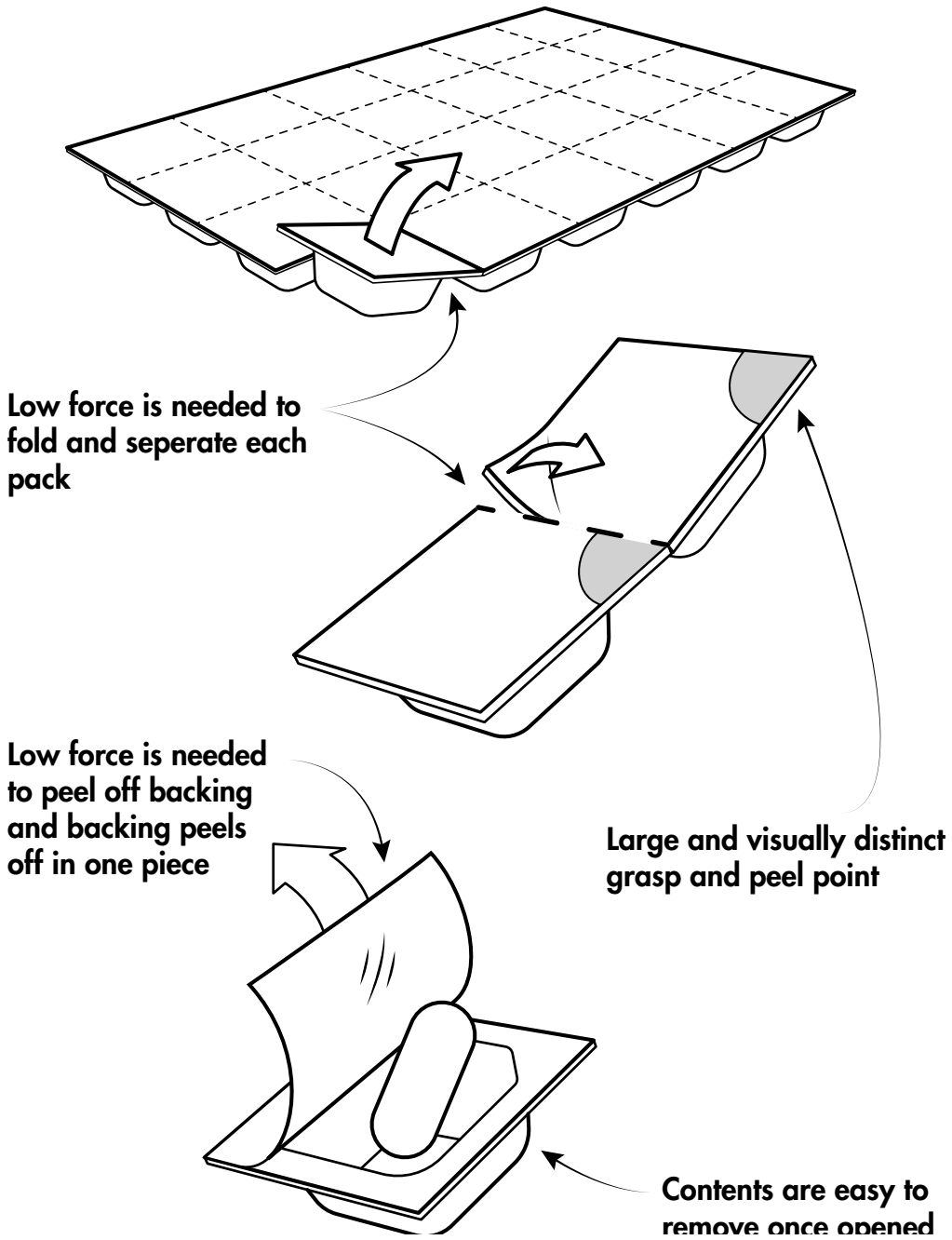
The Separate, Fold, Break Off and Tear system is commonly made from a plastic blister sheet and a covering made of a layer of foil, paper, plastic or a combination of materials. Individual unit doses are perforated into smaller packages. A user separates the unit dose from the larger sheet by folding at a perforation line and tearing off the unit dose. After the unit dose is separated, the user folds back a small notch in the corner of the unit dose package, which is attached to the top layer covering the blister pack, and breaks this notched corner off the package. Next, the user grasps the notched corner attached to the cover layer and pulls it back to tear the package open exposing the product.

Example of Separate, Fold, Break Off and Tear

Optimum Separate, Fold, Break Off and Tear Guidelines

Recommendation Highlights

- **Low fold force**
- **Low separation force perforations**
- **Large peel grasp points**
- **Visually distinct grasp points**
- **Low peel force**
- **Foil peels off in one piece**
- **Contents easy to remove once foil is peeled**



SEPARATE, FOLD, BREAK OFF AND TEAR ISSUES

Ease of use issues associated with the Separate, Fold, Break Off and Tear are complex and multi-faceted. Users with arthritis may have difficulty performing all or some of the individual tasks associated with accessing the contents of individual-dose packaging. Users may have difficulty separating single dose from a multiple-dose card due to the amount of force required or lack of clear instructions about how to safely separate the individual dose. Users may have difficulty accessing the contents of the single dose because of the lack of clear instructions, the inability to manipulate small components of the packaging or the inability to apply adequate strength to open the packaging.

1. The single dose is not easy to separate from the card.

1.1. The method of separating the single-dose packaging from the multiple-dose card is not clear.
1.2. Separating the single-dose packaging from the multiple-dose card requires a tool.
1.3. The force required to separate the single-dose packaging from the multiple-dose card is too high.

2. The single dose is not easily opened.

2.1. The method of opening the single-dose packaging is not clear.
2.2. Opening the single-dose packaging requires the use of a tool.
2.3. Critical instructions are discarded, damaged or obscured after opening.

3. The pill(s) are not easily removed from the single-dose packaging.

3.1. The force required to remove the pills from the single-dose packaging is too high.
3.2. Pill(s) fall out of the packaging during opening.
3.3. The opened single-dose packaging has sharp edges.

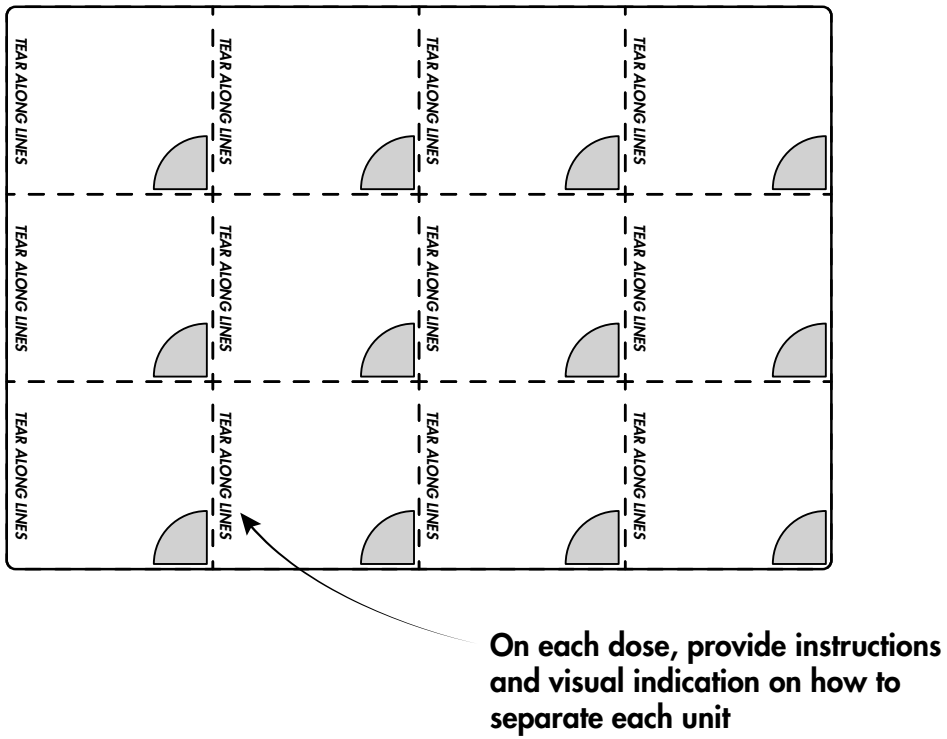
1.1 The method of separating the single-dose packaging from the multiple-dose card is not clear.

Detailed Description: Individual doses packaged in a multi-dose card may need to be separated before the individual dose can be accessed. The multi-dose card may be designed in such a way as to make it difficult to understand how individual doses should be removed from the multi-dose card.

Populations Impacted: Limited vision

Potential Solutions: *Provide a visual indication of the location of the perforations.* Users may have difficulty identifying perforations used to separate individual doses from a multi-dose card. Make sure that the perforations are clearly visible.

Provide instructions for separating an individual dose. If separation of an individual dose is required to access a single dose, provide clear instruction on how individual doses are separated from the multi-dose pack.



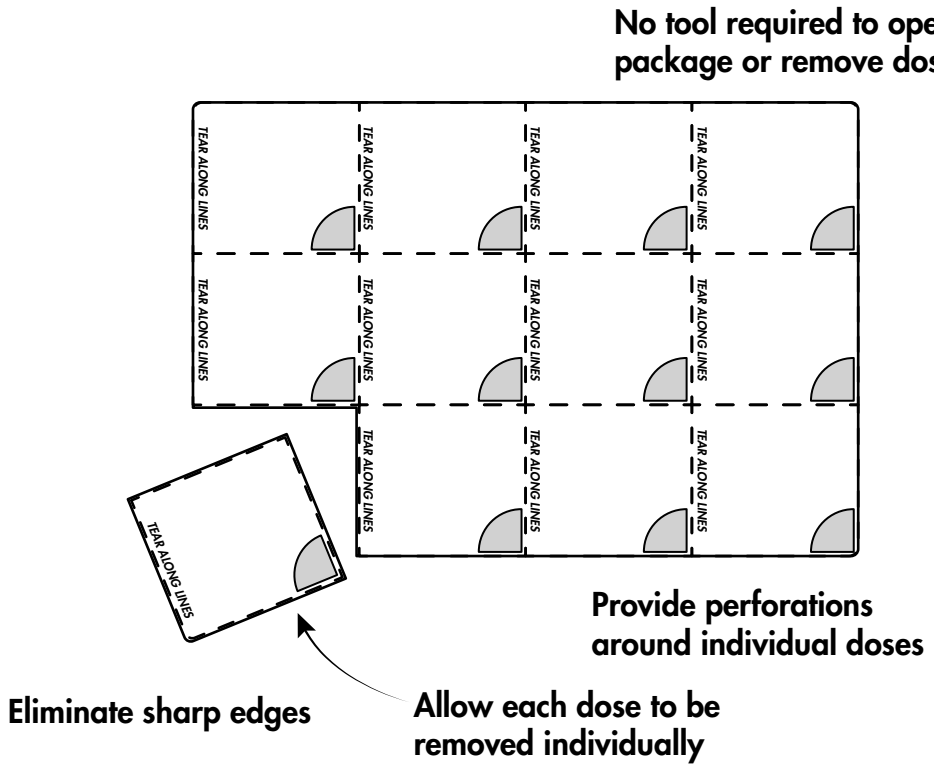
1.2 Separating the single-dose packaging from the multiple-dose card requires a tool.

Detailed Description: *Avoid requiring the use of any tool (scissors, knife) to open the packaging.* Users with arthritis may have difficulty using sharp instruments such as scissors or knives safely. Users may slip and injure themselves while using tools. Do not require the use of a tool to separate an individual dose from a multi-dose card.

Provide perforations between individual doses. Provide perforations as an alternative to requiring tool usage. Provide perforations around individual doses so that individual doses can be removed from a multi-dose card easily.

Ensure that a single dose can be removed without removing additional doses. Users may accidentally remove additional doses when trying to remove a single dose from a multi-dose card. Design the multi-dose card in such a way as to allow for the removal of a single dose without accidentally separating additional doses from the multi-dose card.

Eliminate sharp edges. Sharp edges can cause discomfort while grasping the packaging. Select a method of facilitating the separation of an individual dose from a multi-dose card that does not cause formation of sharp edges.

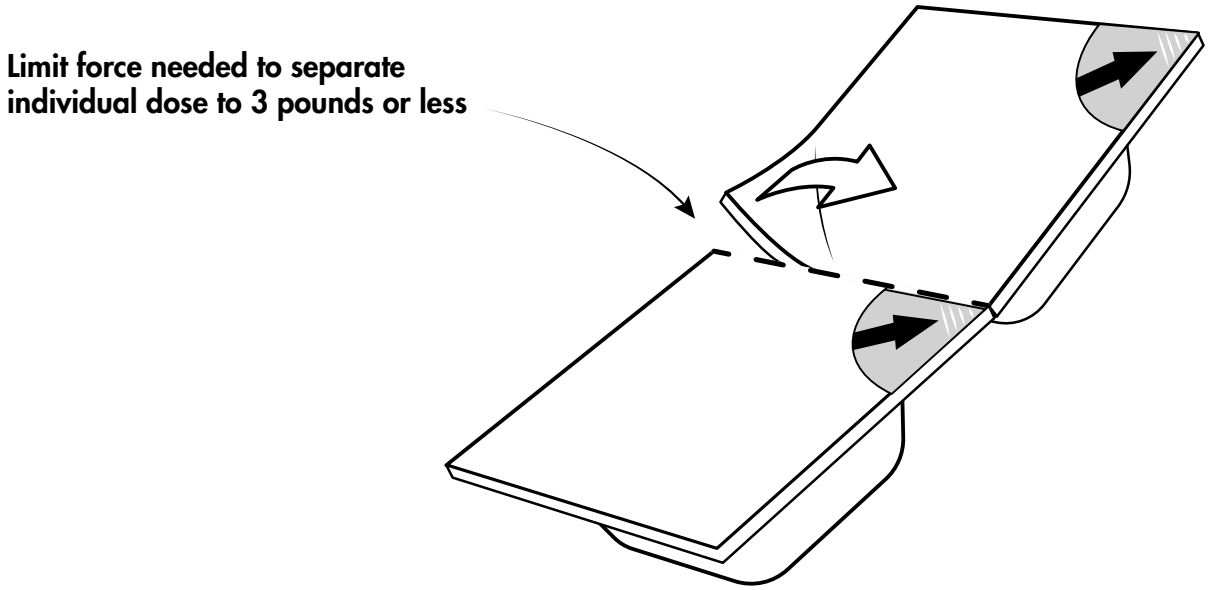


1.3 The force required to separate the single-dose packaging from the multi-dose card is too high.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty separating a single dose from a multi-dose card. Often, the single dose must be separated to remove the contents from the individual-dose packaging. Users may lack the strength or the fine motor control necessary to separate the single dose from the packaging.

Populations Impacted: Limited strength, limited fine motor control

Potential Solutions: *Minimize the amount of force required to separate an individual dose.* Users with limited strength may have difficulty pulling apart or tearing along perforations. Limit the amount of force required to separate an individual dose from a multiple-dose card to 3.0 pounds or less.



2.1 The method of opening the single-dose packaging is not clear.

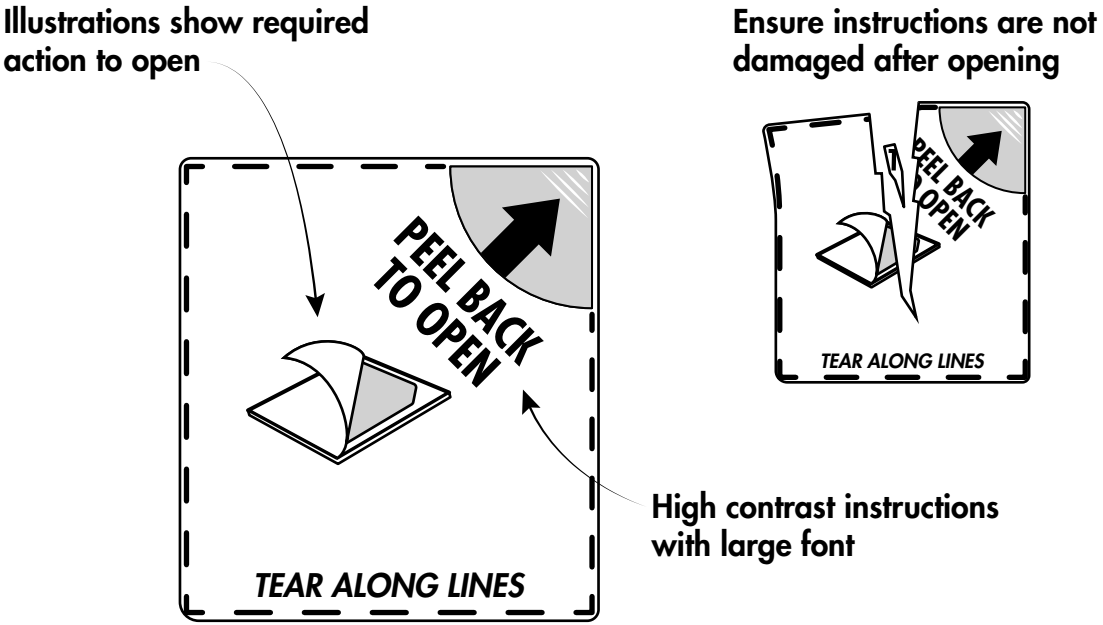
Detailed Description: Individual-dose packaging may require multiple steps to extract the package contents. The individual steps or the order in which the steps must be completed may not be clear. Clear instructions should be provided when the method of removing the package contents is not immediately obvious to the user.

Populations Impacted: Limited vision

Potential Solutions: *Provide clear opening instructions directly on the packaging in high-contrast, easy-to-read font.* Instructions for how to remove the contents from the individual-dose packaging should be provided directly on the individual-dose packaging. The instructions should be provided in a large, high-contrast font with a contrast ratio of 10-to-1 or better. Graphical instructions should be large and clear.

Place instructions near the point of interaction. Instructions for opening individual-dose packaging should be placed near the point of interaction. For example, if a grasp point is designed to be folded and broken off, the grasp point should be highlighted and the necessary action should be illustrated. If the detached grasp point is to be used to peel off a seal covering the dose, the instructions should illustrate the required action and direction of travel necessary for removal of the seal.

Ensure critical instructions are readable and not damaged after opening. If critical instructions need to be referenced after the removal of the seal from the individual dose, ensure the instructions are not damaged during opening.



2.2 Opening the single-dose packaging requires the use of a tool.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty accessing the contents of an individual-dose package. Using a tool to access the contents of the individual dose may be dangerous.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Avoid requiring the use of any tool (scissors, knife) to open the packaging.* Users with arthritis may have difficulty using sharp instruments such as scissors or knives safely. Users may slip and injure themselves while using tools. Do not require the use of a tool to access the contents of an individual-dose package.

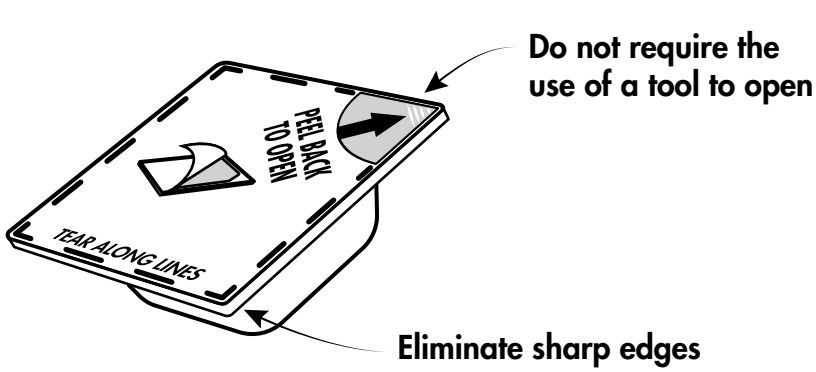
Eliminate sharp edges. Sharp edges can cause discomfort while grasping the packaging. Select a method of opening the individual-dose packaging that does not cause sharp edges.

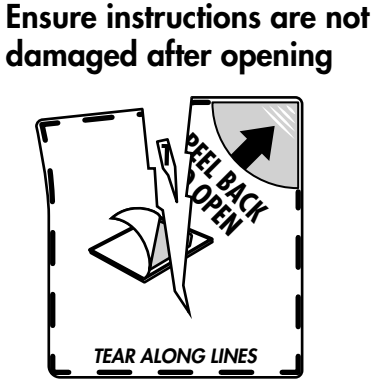
2.3 Critical instructions are discarded, damaged or obscured after opening.

Detailed Description: Individual-dose packaging may require multiple steps to extract the package contents. Accessing the contents of the individual-dose packaging may result in damage to the packaging that eliminates or obscures critical instructions.

Populations Impacted: Limited vision

Potential Solutions: *Ensure critical instructions are readable after opening and not damaged during opening.* If critical instructions are necessary to be referenced after the removal of the seal from the individual dose, ensure the instructions are not damaged during opening.





3.1 The force required to remove the pills from the single-dose packaging is too high.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty accessing the contents of an individual-dose package. Requiring the user to apply a linear force that exceeds their functional limitations may make it difficult or impossible to open the packaging without the use of a tool.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Avoid requiring the use of any tool (scissors, knife) to open the packaging.* Users with arthritis may have difficulty using sharp instruments such as scissors or knives safely. Users may slip and injure themselves while using tools. Do not require the use of a tool to access the contents of an individual-dose package.

Eliminate sharp edges. Sharp edges can cause discomfort while grasping the packaging. Select a method of opening the individual-dose packaging that does not cause sharp edges.

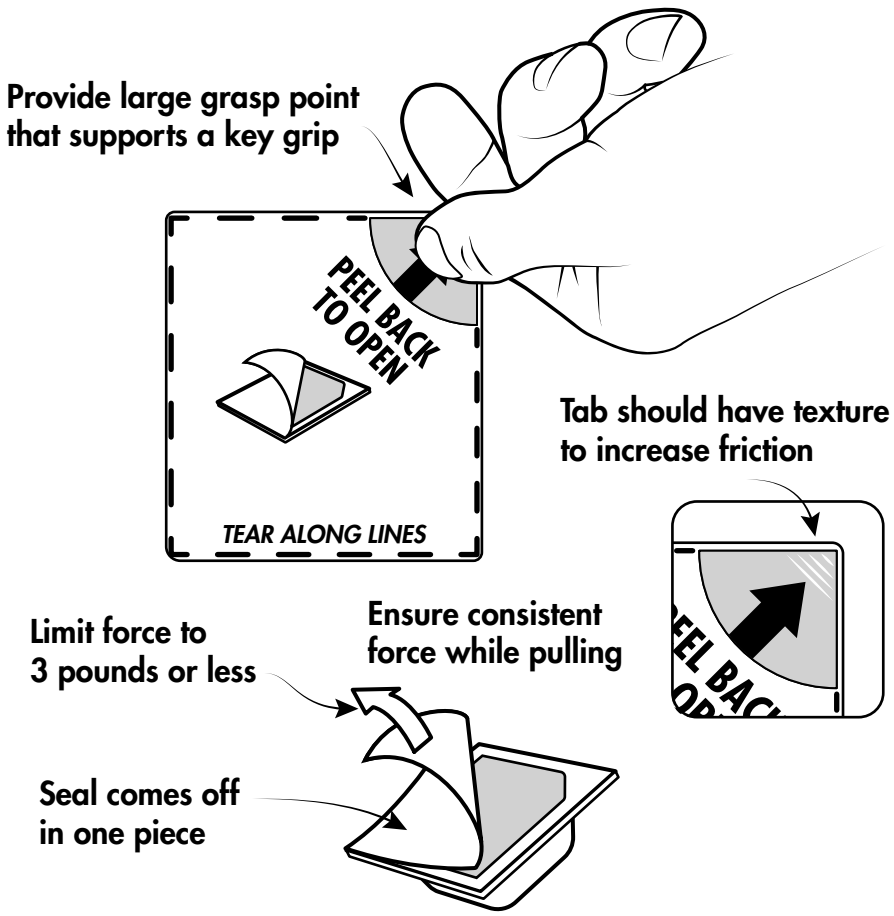
Provide a sufficiently sized pull tab or grasp point that supports a key-pinch grip. The grasp point should be clearly labeled and adequately sized to support both bending and peeling tasks. The grasp point should be at least the size of an adult thumb.

Provide a textured or high coefficient of friction surface on grasp points to reduce slippage. Adding texture or a high coefficient of friction surface to the grasp point reduces the amount of pinch force required to hold onto the grasp point while bending or pulling on the grasp point.

Limit the force required to bend or pull the grasp point. The amount of force required to be applied to the grasp point to separate the grasp point from the packaging or to peel the seal attached to the grasp point should be limited to 3.0 pounds or less.

Ensure consistent force is required throughout the entire pulling motion. During the peeling task, ensure that a consistent force is required, and the amount of force required doesn't significantly vary throughout the duration of the task. Peaks in the amount of force required should be avoided.

Ensure that the seal attached to the grasp point does not tear or separate from the grasp point. The seal should remain attached to the grasp point and should be removed completely during the seal removal task. No part of the seal should remain that might cause difficulty in removing the individual dose from the packaging.



3.2 Pill(s) fall out of the packaging during opening.

Detailed Description: If removal of the seal requires excessive force or effort, the contents of the individual-dose packaging may spill out during removal. Small items may be lost or difficult to retrieve.

Populations Impacted: Limited strength, limited fine motor control

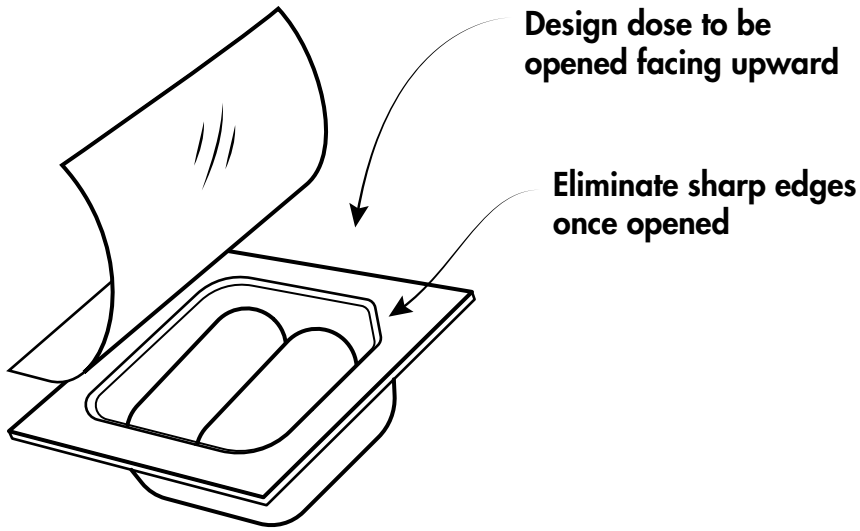
Potential Solutions: *Design the package to easily open in the proper orientation to prevent spillage.* The individual packaging should be designed to open with the tray facing upward so that the contents of the packaging do not fall out inadvertently during opening.

3.3 The opened single-dose packaging has sharp edges.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty accessing the contents of a single-dose package. Ensure that sharp edges are eliminated to minimize hazards to individuals removing the contents of an opened individual package.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Eliminate sharp edges.* Sharp edges can cause discomfort while grasping the packaging or while removing the contents from the package. Select a method of opening the individual-dose packaging that does not cause sharp edges.



SEPARATE, BREAK OFF, PEEL BACK AND PUSH THROUGH

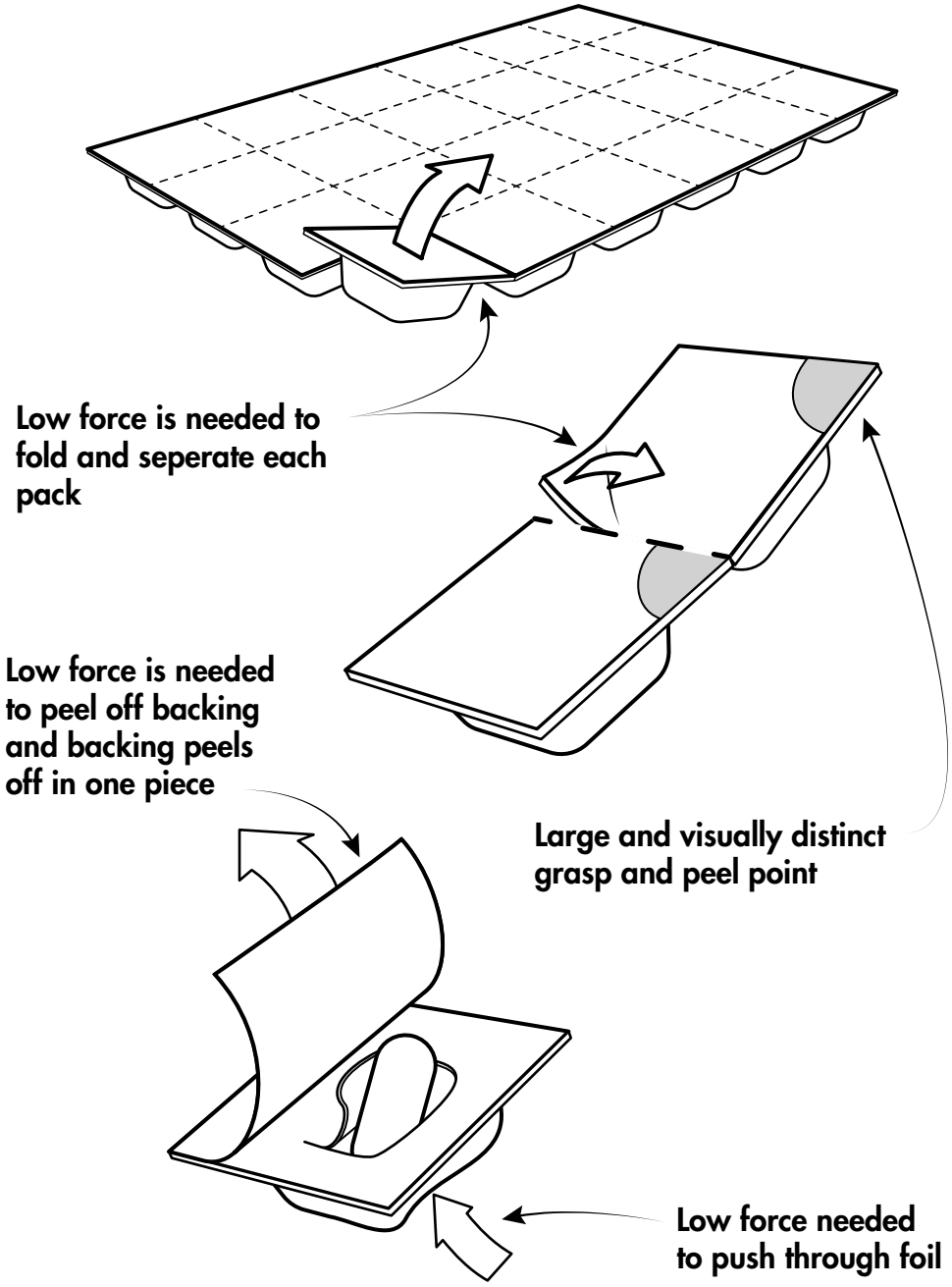
To open this package, a user separates the unit dose from the larger sheet by folding at a perforation point and tearing off the unit dose. Next, using a fingernail or tool, the user peels back the top layer. Sometimes this fully exposes the product, but many times, the user will still need to push the product through a thin layer of foil or plastic. Many users will open the package with scissors instead of peeling and pushing. Some manufacturers include instructions to open the package with scissors as well as hand-opening instructions.

Example of Separate, Break Off, Peel Back and Push Through

Optimum Separate, Break Off, Peel Back and Push Through Guidelines

Recommendation Highlights

- **Low separation force perforations**
- **Easy to separate peel grasp points**
- **Large peel grasp points**
- **Visually distinct grasp points**
- **Low peel force**
- **Backing peels off in one piece**
- **Low push-through force**



SEPARATE, BREAK OFF, PEEL BACK, PUSH THROUGH ISSUES

Ease of use issues associated with the Separate, Break Off, Peel Back, and Push Through are complex and multi-faceted. Users with arthritis may have difficulty performing all or some of the individual tasks associated with accessing the contents of an individual-dose package. Users may have difficulty separating an individual dose from a multi-dose card because of the amount of force required to separate the individual dose package or the lack of clear instructions about how to go about safely separating the individual dosage. Users may have difficulty accessing the contents of the individual dosage because of the lack of clear instructions, the inability to manipulate small components of the packaging or the inability to apply adequate strength to open the package.

1. The single dose is not easy to separate from the card.

1.1. The method of separating the single-dose packaging from the multi-dose card is not clear.
1.2. Separating the single-dose packaging from the multi-dose card requires a tool.
1.3. The force required to separate the single-dose packaging from the multi-dose card is too high.

2. The single-dose package is not easily opened.

2.1. The method of opening the single-dose packaging is not clear.
2.2. Opening the single-dose packaging requires the use of a tool.
2.3. Critical instructions are discarded, damaged or obscured after opening.

3. The pill(s) are not easily removed from the single-dose packaging.

3.1. The force required to remove the pills from the single-dose packaging is too high.
3.2. Pill(s) fall out of the packaging during opening.
3.3. The opened single-dose packaging has sharp edges.

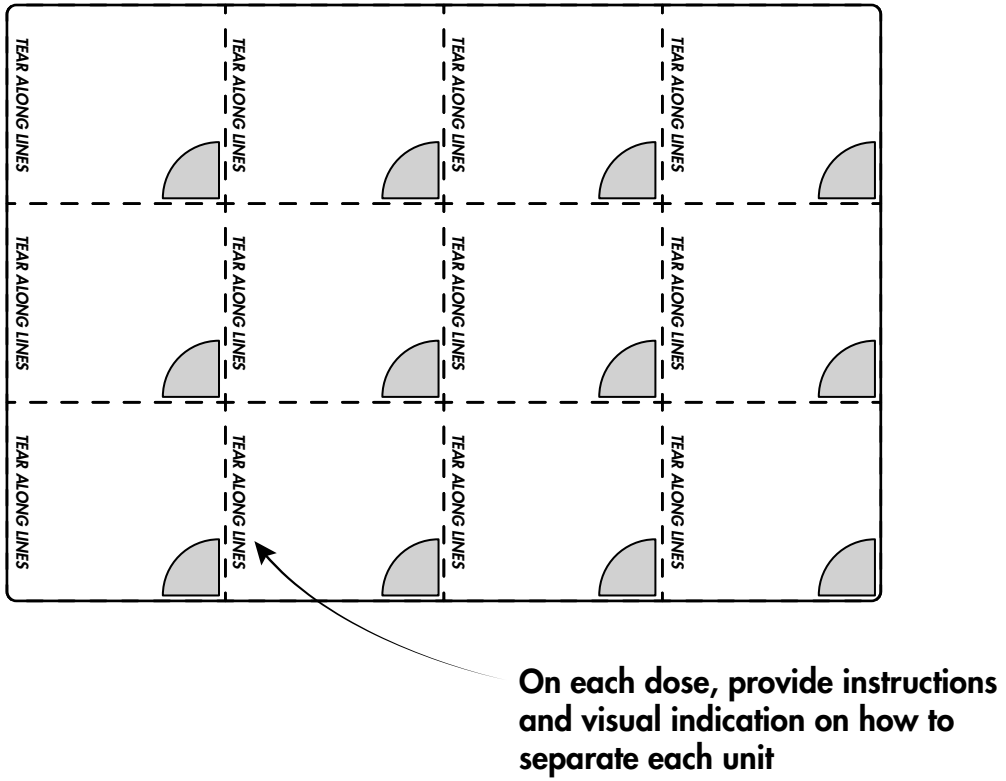
1.1 The method of separating the single-dose packaging from the multi-dose card is not clear.

Detailed Description: Individual doses packaged in a multi-dose card may need to be separated before the individual dose can be accessed. The multi-dose card may be designed in such a way as to make it difficult to understand how individual dose should be removed from the multi-dose card.

Populations Impacted: Limited vision

Potential Solutions: *Provide a visual indication of the location of the perforations.* Users may have difficulty identifying perforations used to separate individual doses from a multi-dose card. Make sure that the perforations are clearly visible.

Provide instructions to separate an individual dose. If separation of an individual dose is required to access a single dose, provide a clear instruction on how individual doses are separated from the multi-dose card.



1.2 Separating the single-dose packaging from the multi-dose card requires a tool.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty separating a single dose from a multi-dose card. Often, the single dose must be separated to remove the contents from the package. Using a tool to separate the individual dose from a multi-dose card may be dangerous.

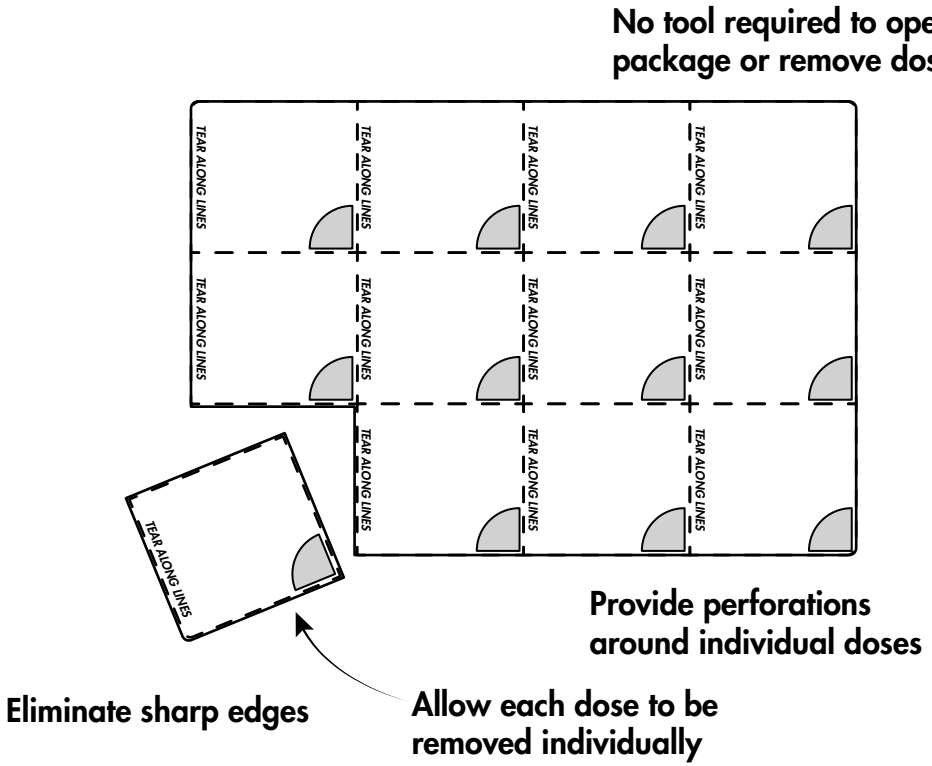
Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Avoid requiring the use of any tool (scissors, knife) to open the packaging.* Users with arthritis may have difficulty using sharp instruments such as scissors or knives safely. Users may slip and injure themselves while using tools. Do not require the use of a tool to separate an individual dose from a multi-dose card.

Provide perforations between individual doses. Provide perforations as an alternative to requiring tool usage. Provide perforations around individual doses so that individual doses can be removed from a multiple-dose package easily.

Ensure that a single dose can be removed without removing additional doses. Users may accidentally remove additional doses when trying to remove a single dose from a multi-dose card. Design the multi-dose card in such a way as to allow for the removal of a single dose without accidentally separating additional doses from the multi-dose card.

Eliminate sharp edges. Sharp edges can cause discomfort while grasping the packaging. Select a method of facilitating the separation of an individual dose from a multi-dose card that does not cause sharp edges.

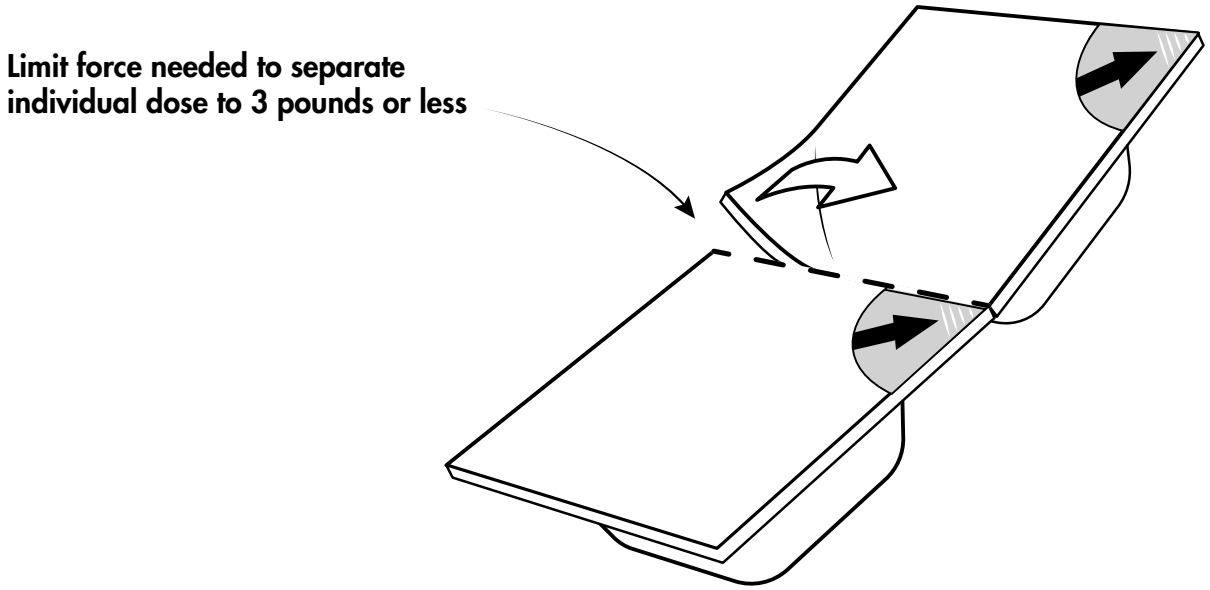


1.3 The force required to separate the single-dose packaging from the multi-dose card is too high.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty separating a single dose from a multi-dose card. Often, the single dose must be separated to remove the contents from the dose package. Users may lack the strength or the fine motor control necessary to separate the single dose from the package.

Populations Impacted: Limited strength, limited fine motor control

Potential Solutions: *Minimize the amount of force required to separate an individual dose.* Users with limited strength may have difficulty pulling apart or tearing along perforations. Limit the amount of force required to separate an individual dose from a multi-dose card to 3.0 pounds or less.



2.1 The method of opening the single-dose packaging is not clear.

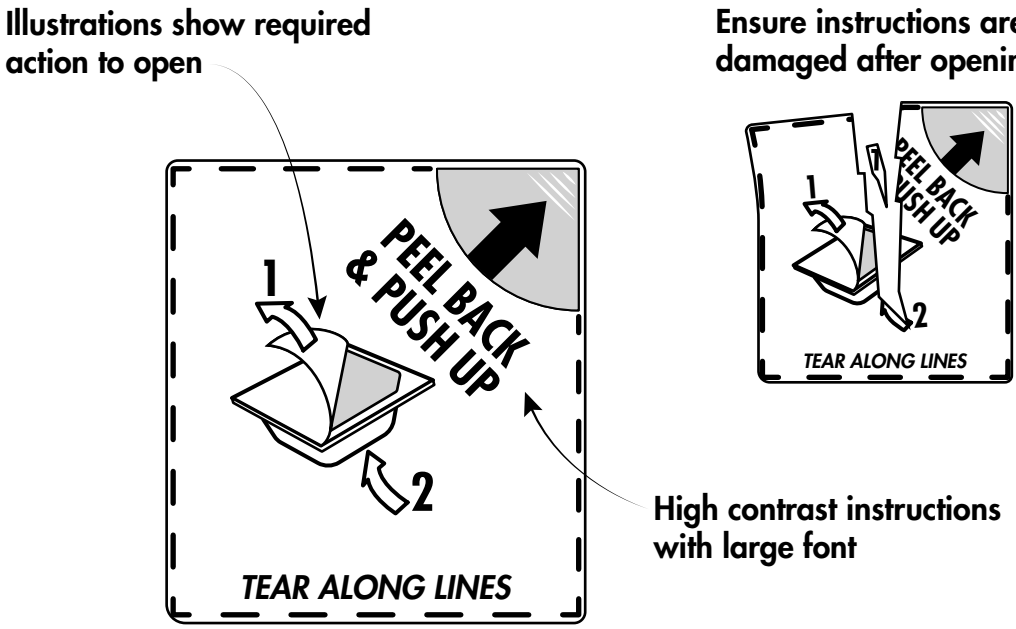
Detailed Description: Individual-dose packaging may require multiple steps to extract the package contents. The individual steps or the order in which the steps must be completed may not be clear. Clear instructions should be provided when the method of removing the package contents is not immediately obvious to the user.

Populations Impacted: Limited vision

Potential Solutions: *Provide clear opening instructions directly on the packaging in high-contrast, easy-to-read font.* Instructions for how to remove the contents from the individual-dose packaging should be provided directly on the individual-dose packaging. The instructions should be provided in a large, high-contrast font with a contrast ratio of 10-to-1 or better. Graphical instructions should be large and clear.

Place instructions near the point of interaction. Instructions for opening individual-dose packaging should be placed near the point of interaction. For example, if a grasp point is designed to be folded and broken off, the grasp point should be highlighted and the necessary action should be illustrated. If the detached grasp point is to be used to peel off a seal covering the dose, the instructions should illustrate the required action and direction of travel necessary for removal of the seal.

Ensure critical instructions are readable after opening and not damaged during opening. If critical instructions need to be referenced after the removal of the seal from the individual dose, ensure the instructions are not damaged during opening.



2.2 Opening the single-dose packaging requires the use of a tool.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty accessing the contents of an individual-dose package. Using a tool to access the contents of the individual dose may be dangerous.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Avoid requiring the use of any tool (scissors, knife) to open the packaging.* Users with arthritis may have difficulty using sharp instruments such as scissors or knives safely. Users may slip and injure themselves while using tools. Do not require the use of a tool to access the contents of an individual-dose package.

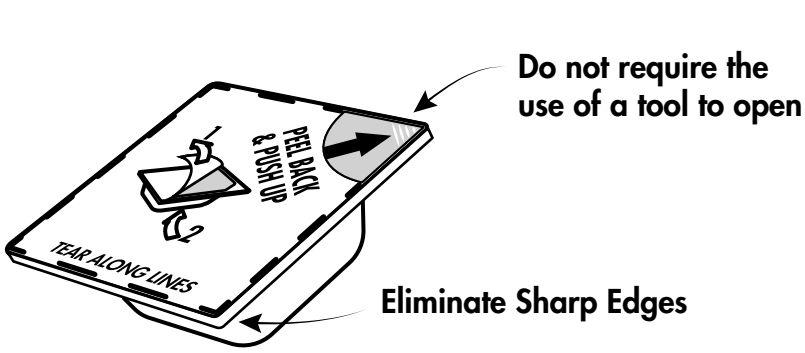
Eliminate sharp edges. Sharp edges can cause discomfort while grasping the packaging. Select a method of opening the individual-dose packaging that does not cause sharp edges.

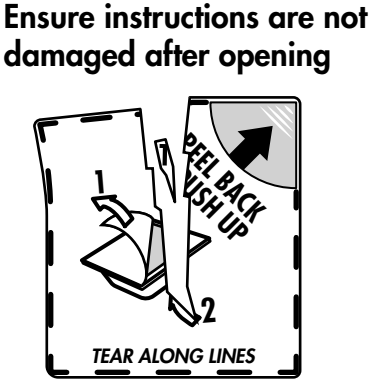
2.3 Critical instructions are discarded, damaged or obscured after opening.

Detailed Description: Individual-dose packaging may require multiple steps to extract the package contents. Accessing the contents of the individual-dose packaging may result in damage to the packaging that eliminates or obscures critical instructions.

Populations Impacted: Limited vision

Potential Solutions: *Ensure critical instructions are readable after opening and not damaged during opening.* If critical instructions need to be referenced after the removal of the seal from the individual dose, ensure the instructions are not damaged during opening.





3.1 The force required to remove the pills from the single-dose packaging is too high.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty accessing the contents of an individual-dose package. Requiring the user apply a linear force that exceeds their functional limitations may make it difficult or impossible to open the packaging without the use of a tool.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Avoid requiring the use of any tool (scissors, knife) to open the packaging.* Users with arthritis may have difficulty using sharp instruments such as scissors or knives safely. Users may slip and injure themselves while using tools. Do not require the use of a tool to access the contents of an individual-dose package.

Eliminate sharp edges. Sharp edges can cause discomfort while grasping the packaging. Select a method of opening the individual dose packaging that does not cause sharp edges.

Provide a sufficiently sized pull-tab or grasp point that supports a key-pinch grip. The grasp point should be clearly labeled and adequately sized to support both bending and peeling tasks. The grasp point should be at least the size of an adult thumb.

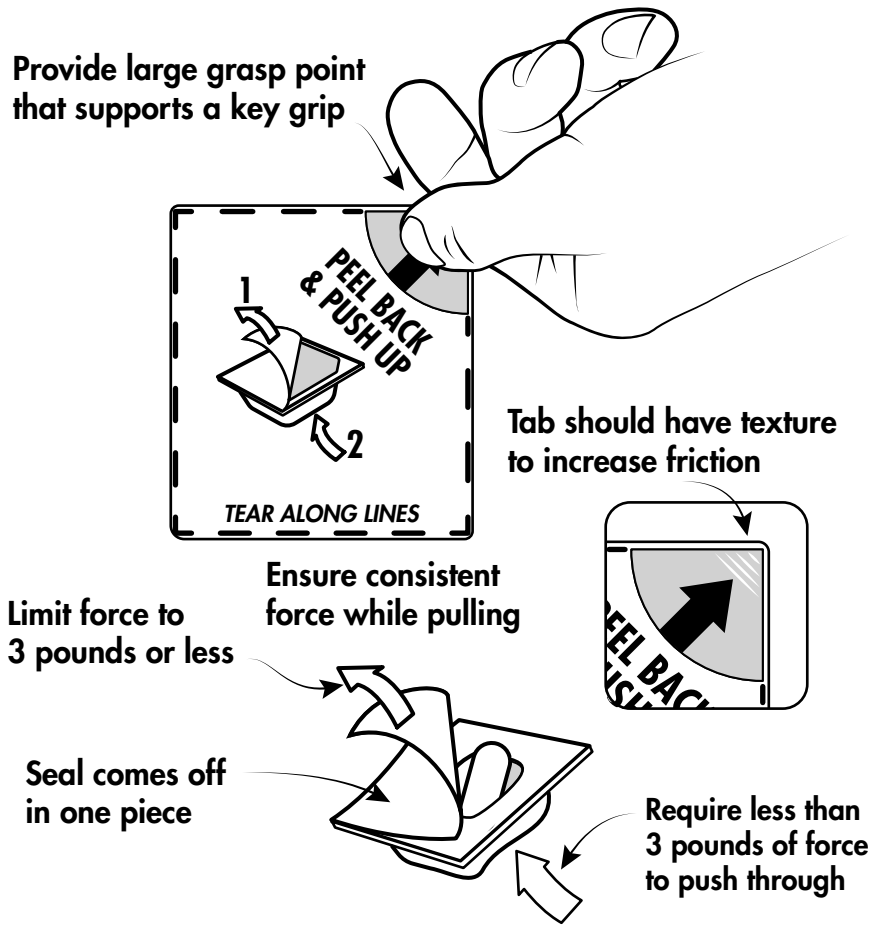
Provide a textured or high coefficient of friction surface on grasp points to reduce slippage. Adding texture or a high coefficient of friction surface to the grasp point reduces the amount of pinch force required to hold onto the grasp point while bending or pulling on the grasp point.

Limit the force required to bend or pull the grasp point. The amount of force required to be applied to the grasp point to separate the grasp point from the packaging or to peel the seal attached to the grasp point should be limited to 3.0 pounds or less.

Ensure consistent force is required throughout the entire pulling motion. During the peeling task, ensure that a consistent force is required and the amount of force required does not significantly vary throughout the duration of the task. Peaks in the amount of force required should be avoided.

Ensure that the seal attached to the grasp point does not tear or separate from the grasp point. The seal should remain attached to the grasp point and be removed completely during the seal removal task. No part of the seal should remain that might cause difficulty in removing the individual dose from the packaging.

Ensure that the force required to push the pills through the final seal is minimized. The amount of force required to push the pills through the final seal should be limited to 3.0 pounds or less.



3.2 Pill(s) fall out of the packaging during opening.

Detailed Description: If pushing the pills through the final seal requires excessive force or effort, the contents of the individual-dose packaging may spill out during removal. Small items may be lost or difficult to retrieve.

Populations Impacted: Limited strength, limited fine motor control

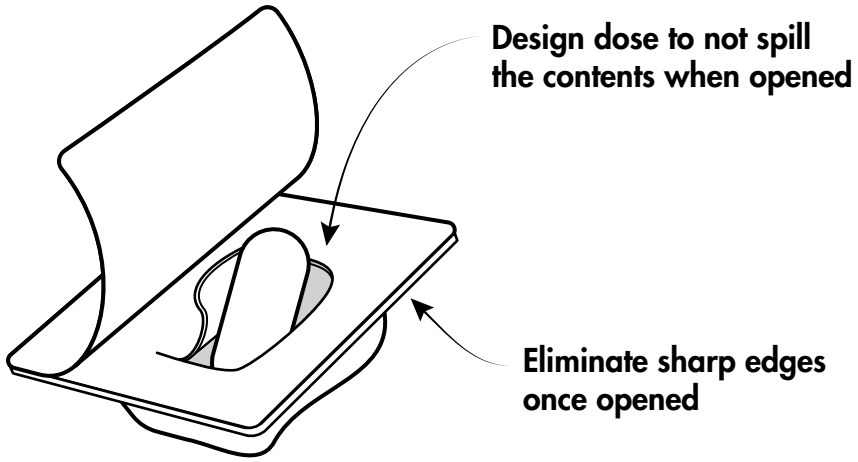
Potential Solutions: *Design the package to be easily opened in the proper orientation to prevent spillage.* The individual packaging should be designed to be opened with the tray facing upward so that the contents of the packaging do not fall out inadvertently during opening or alternatively, the packaging should be designed so that the pills can be easily pushed into the palm of the hand by applying pressure to an upturned tray resting in the palm.

3.3 The opened single-dose packaging has sharp edges.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty accessing the contents of an individual-dose package. Ensure that sharp edges are eliminated to minimize hazards to individuals removing the contents of an opened individual package.

Populations Impacted: Limited strength, limited range of motion

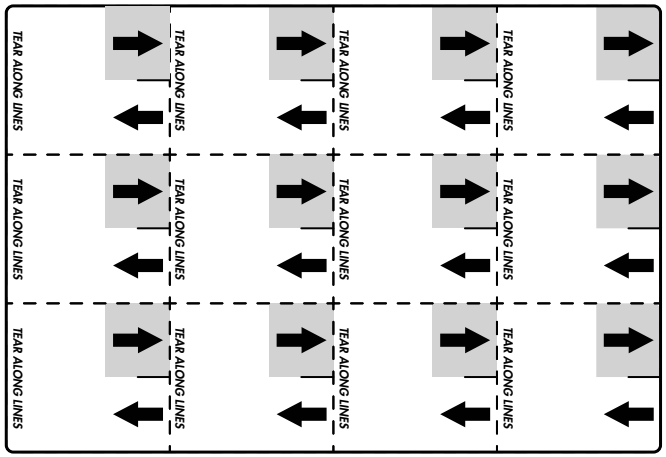
Potential Solutions: *Eliminate sharp edges.* Sharp edges can cause discomfort while grasping the packaging or while removing the contents from the package. Select a method of opening the individual-dose packaging that does not cause sharp edges.



SEPARATE AND TEAR

The Separate and Tear system is commonly made from a bottom layer of foil or plastic formed into a blister sheet and a top layer of foil, paper or plastic sheet or a combination of those materials. To open this package, a user first folds the unit dose at a perforation point. Then, the user locates a small perforation point or slit, usually in the top center of the unit dose. The user grasps the unit dose with two hands using a key-pinch grip with both hands and tears the top layer and bottom layer simultaneously. With this system, there is no top layer to peel back; the entire package is ripped at once.

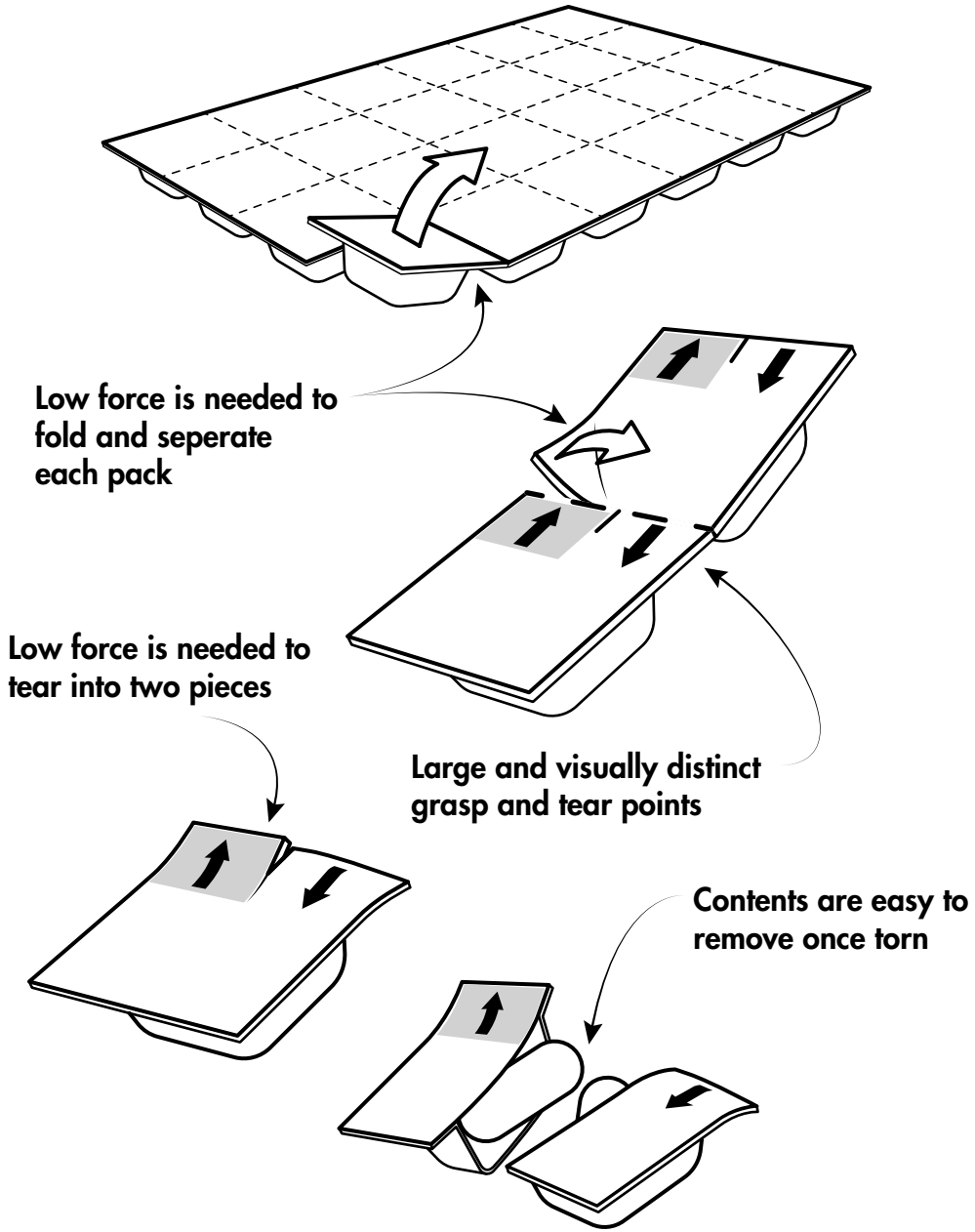
Example of Separate and Tear



Optimum Separate and Tear Guidelines

Recommendation Highlights

- **Low fold force**
- **Low separation force perforations**
- **Large grasp points**
- **Visually distinct grasp points**
- **Visually distinct tear point**
- **Low tear force**
- **Contents easy to remove once blister is torn**



SEPARATE AND TEAR ISSUES

Ease of use issues associated with the Separate and Tear packaging are complex and multi-faceted. Separate and Tear packaging tends to be more difficult for users with arthritis to open as compared to other similar packaging styles and should be avoided when possible. Users may have difficulty separating an individual dose from a multi-dose card because of the amount of force required to separate the individual-dose package or the lack of clear instructions about how to go about safely separating the individual dose. Users may have difficulty accessing the contents of the individual dose because of the lack of clear instructions, the inability to manipulate small components of the packaging or the inability to apply adequate strength to open the packaging.

1. The single-dose is not easy to separate from the card.

1.1. The method of separating the single-dose packaging from the multi-dose card is not clear.
1.2. Separating the single-dose packaging from the multi-dose card requires a tool.
1.3. The force required to separate the single-dose packaging from the multi-dose card is too high.

2. The single-dose is not easily opened.

2.1. The method of opening the single-dose packaging is not clear.
2.2. Opening the single-dose packaging requires the use of a tool.
2.3. Critical instructions are discarded, damaged or obscured after opening.

3. The pill(s) are not easily removed from the single-dose packaging.

3.1. The force required to remove the pills from the single-dose packaging is too high.
3.2. Pill(s) fall out of the packaging during opening.
3.3. The opened single-dose packaging has sharp edges.

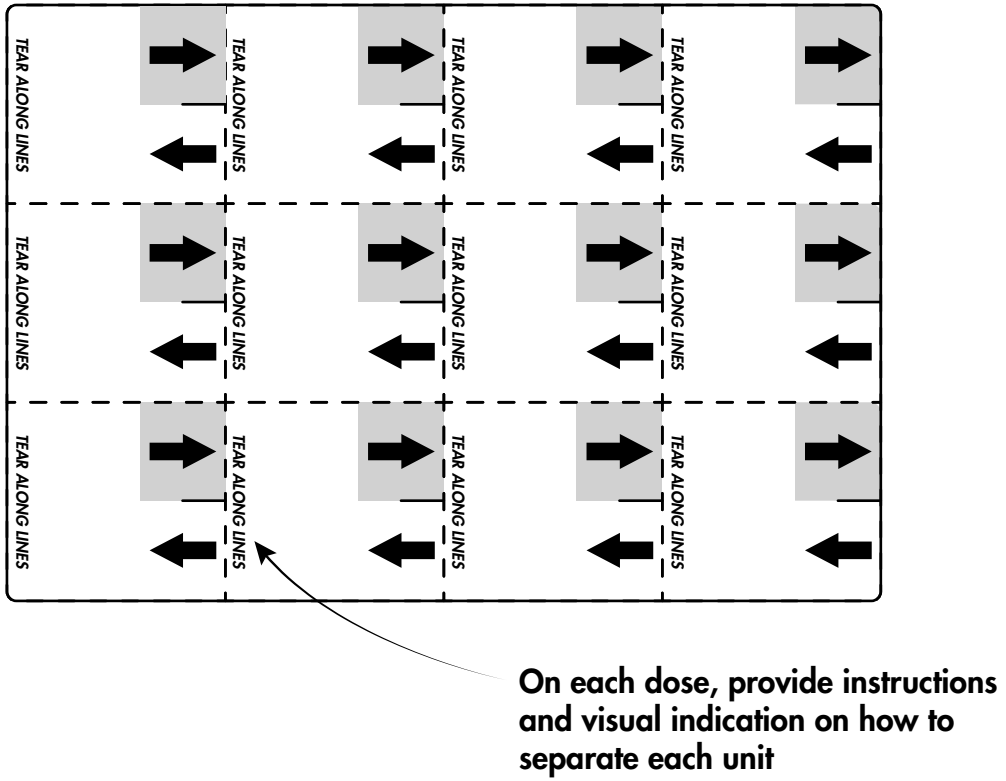
1.1 The method of separating the single-dose packaging from the multi-dose card is not clear.

Detailed Description: Individual doses packaged in a multi-dose card may need to be separated before the individual dose can be accessed. The multi-dose card may be designed in such a way as to make it difficult to understand how individual doses should be removed from the multi-dose card.

Populations Impacted: Limited vision

Potential Solutions: *Provide a visual indication of the location of the perforations.* Users may have difficulty identifying perforations used to separate individual doses from a multi-dose card. Make sure that the perforations are clearly visible.

Provide instructions to separate an individual dose. If separation of an individual dose is required to access a single dose, provide clear instruction on how individual doses are separated from the multi-dose pack.



1.2 Separating the single-dose packaging from the multi-dose card requires a tool.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty separating a single dose from a multi-dose card. Often, the single dose must be separated to remove the contents from the dose package. Using a tool to separate the individual dose from a multi-dose card may be dangerous.

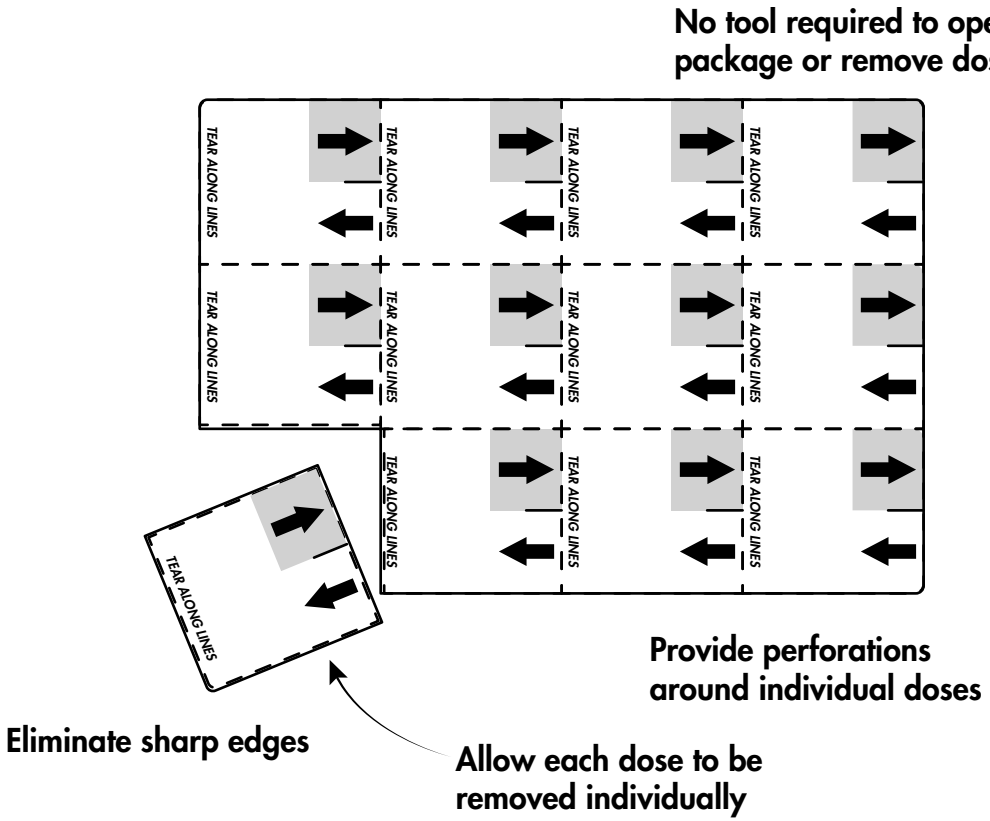
Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Avoid requiring the use of any tool (scissors, knife) to open the packaging.* Users with arthritis may have difficulty using sharp instruments such as scissors or knives safely. Users may slip and injure themselves while using tools. Do not require the use of a tool to separate an individual dose from a multi-dose card.

Provide perforations between individual doses. Provide perforations as an alternative to requiring tool usage. Provide perforations around individual doses so that individual doses can be removed from a multi-dose package easily.

Ensure that a single dose can be removed without removing additional doses. Users may accidentally remove additional doses when trying to remove a single dose from a multi-dose card. Design the multi-dose card in such a way as to allow for the removal of a single dose without accidentally separating additional doses from the multi-dose card.

Eliminate sharp edges. Sharp edges can cause discomfort while grasping the packaging. Select a method of facilitating the separation of an individual dose from a multi-dose card that does not cause sharp edges.

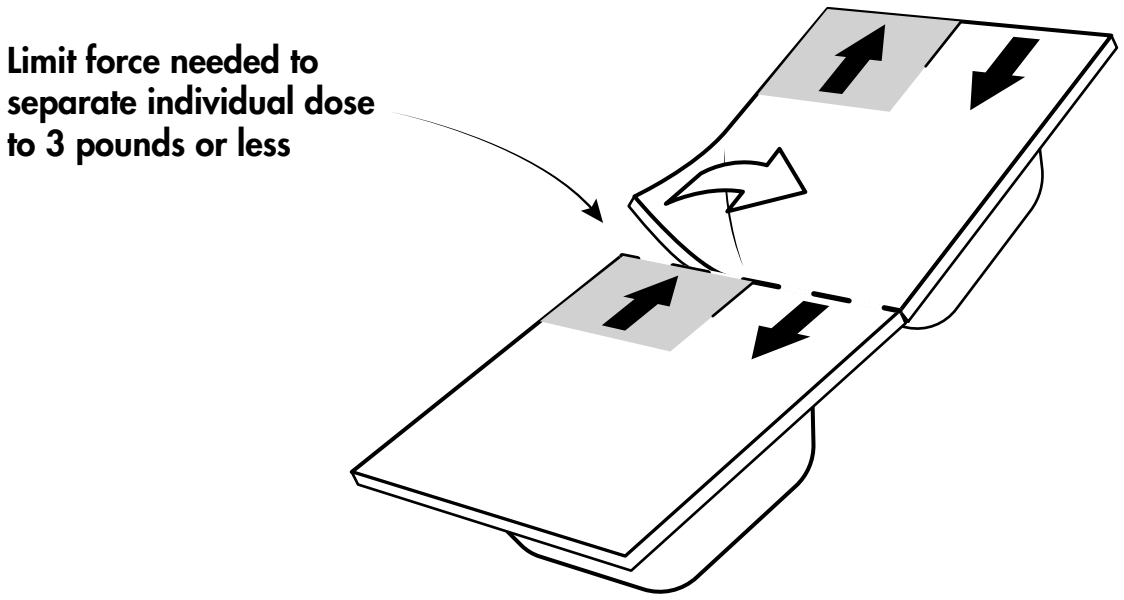


1.3 The force required to separate the single-dose packaging from the multi-dose card is too high.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty separating a single dose from a multi-dose card. Often, the single dose must be separated to remove the contents from the dose card. Users may lack the strength or the fine motor control necessary to separate the single dose from the card.

Populations Impacted: Limited strength, limited fine motor control

Potential Solutions: *Minimize the amount of force required to separate an individual dose.* Users with limited strength may have difficulty pulling apart or tearing along perforations. Limit the amount of force required to separate an individual dose from a multi-dose card to 3.0 pounds or less.



2.1 The method of opening the single-dose packaging is not clear.

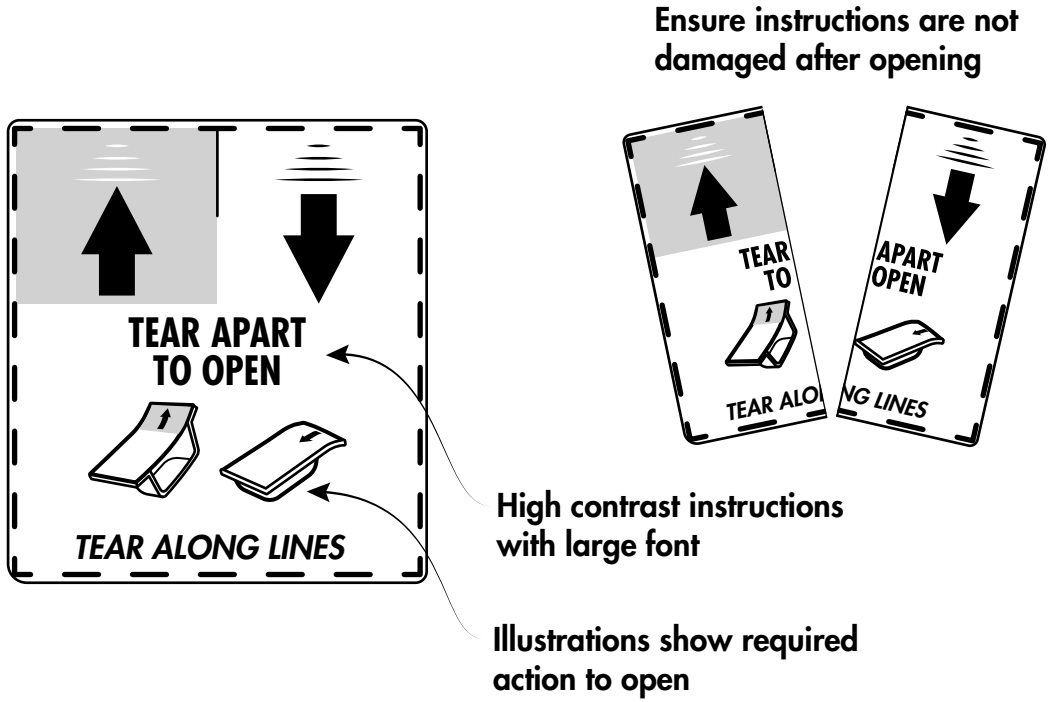
Detailed Description: Provide clear opening instructions directly on the packaging in high-contrast, easy-to-read font. Instructions for how to remove the contents from the individual-dose packaging should be provided directly on the individual-dose packaging. The instructions should be provided in a large, high-contrast font with a contrast ratio of 10-to-1 or better. Font sizes of at least 10-point should be used when possible for critical instructions. Graphical instructions should be large and clear.

Populations Impacted: Limited vision

Potential Solutions: *Provide clear opening instructions directly on the packaging in high-contrast, easy-to-read font.* Instructions for how to remove the contents from the individual dose packaging should be provided directly on the individual dose packaging. The instructions should be provided in a large, high-contrast font with a contrast ratio of 10-to-1 or better. Graphical instructions should be large and clear.

Place instructions near the point of interaction. Instructions for opening individual dose packaging should be placed near the point of interaction. For example, if a grasp point is designed to be folded and broken off the grasp point should be highlighted, and the necessary action should be illustrated. If the detached grasp point is to be used to peel off a seal covering the dose, the instructions should illustrate the required action and direction of travel necessary for removal of the seal.

Ensure critical instructions are readable after opening and not damaged during opening. If critical instructions are necessary to be referenced after the removal of the seal from the individual dose, ensure the instructions are not damaged during opening.



2.2 Opening the single-dose packaging requires the use of a tool.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty accessing the contents of an individual-dose package. Using a tool to access the contents of the individual dose may be dangerous.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Avoid requiring the use of any tool (scissors, knife) to open the packaging.* Users with arthritis may have difficulty using sharp instruments such as scissors or knives safely. Users may slip and injure themselves while using tools. Do not require the use of a tool to access the contents of an individual-dose package.

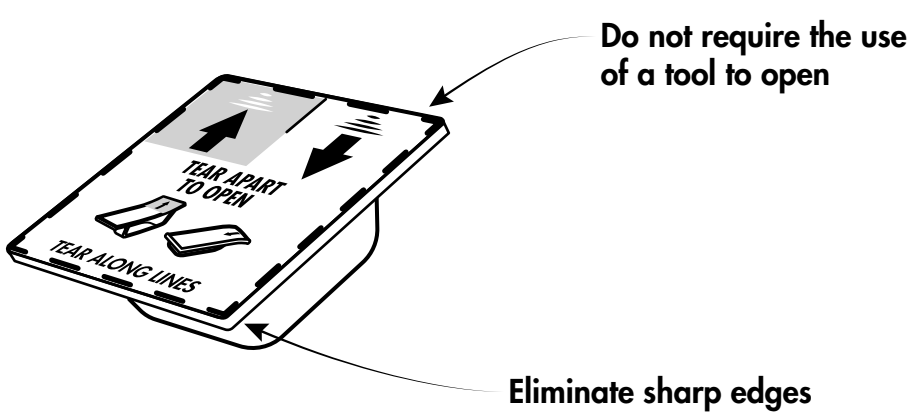
Eliminate sharp edges. Sharp edges can cause discomfort while grasping the packaging. Select a method of opening the individual-dose packaging that does not cause sharp edges.

2.3 Critical instructions are discarded, damaged or obscured after opening.

Detailed Description: Individual-dose packaging may require multiple steps to extract the package contents. Accessing the contents of the individual-dose packaging may result in damage to the packaging that eliminates or obscures critical instructions.

Populations Impacted: Limited vision

Potential Solutions: *Ensure critical instructions are readable after opening and not damaged during opening.* If critical instructions are necessary to be referenced after the removal of the seal from the individual dose, ensure the instructions are not damaged during opening.



3.1 The force required to remove the pills from the single-dose packaging is too high.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty accessing the contents of an individual-dose package. Requiring the user apply a linear force that exceeds their functional limitations may make it difficult or impossible to open the packaging without the use of a tool.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Avoid requiring the use of any tool (scissors, knife) to open the packaging.* Users with arthritis may have difficulty using sharp instruments such as scissors or knives safely. Users may slip and injure themselves while using tools. Do not require the use of a tool to access the contents of an individual-dose package.

Eliminate sharp edges. Sharp edges can cause discomfort while grasping the packaging. Select a method of opening the individual-dose packaging that does not cause sharp edges.

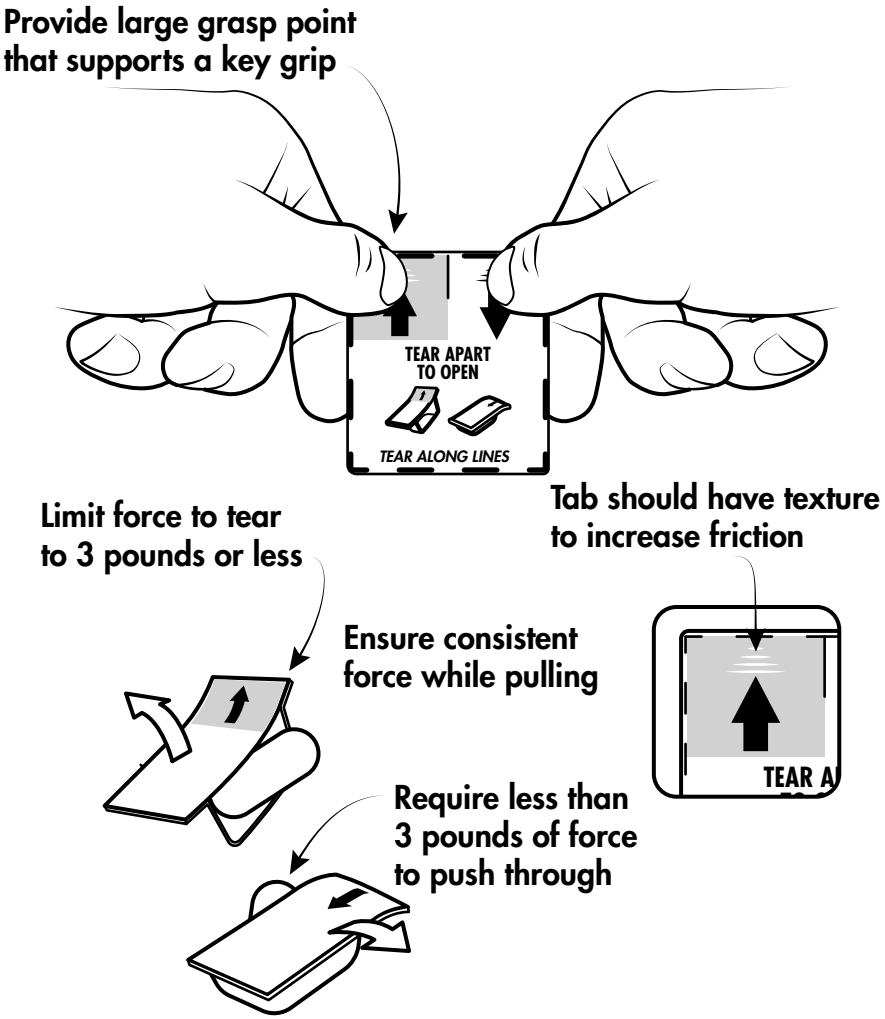
Provide a sufficiently sized pull tab or grasp point that supports a key-pinch grip. The grasp points should be clearly labeled and adequately sized to support the tearing task. The grasp points should be at least the size of an adult thumb.

Provide a textured or high coefficient of friction surface on grasp points to reduce slippage. Adding texture or a high coefficient of friction to the grasp point reduces the amount of pinch force required to hold onto the grasp point while bending or pulling on the grasp point.

Limit the force required to tear the packaging open. The amount of force required to tear the packaging open should be limited to 3.0 pounds or less.

Ensure consistent force is required throughout the entire tearing motion. During the tearing task, ensure that consistent force is required, and the amount of force required does not significantly vary throughout the duration of the task. Peaks in the amount of force required should be avoided.

Ensure that the force required to push the pills out of the torn packaging is minimized. The amount of force required to push the pills through the torn packaging should be limited to 3.0 pounds or less.



3.2 Pill(s) fall out of the packaging during opening.

Detailed Description: If pushing the pills through the torn packaging requires excessive force or effort, the contents of the individual-dose packaging may spill out during removal. Small items may be lost or difficult to retrieve. The act of tearing the packaging may cause package contents to spill.

Populations Impacted: Limited strength, limited fine motor control

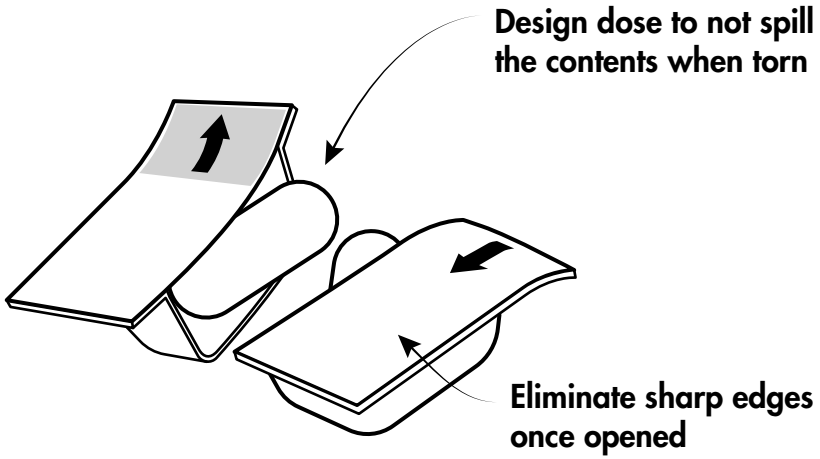
Potential Solutions: *Design the package so the tearing task does not cause inadvertent spillage.* The individual packaging should be designed to be torn so that the contents of the package do not fall out inadvertently during opening.

3.3 The opened single dose packaging has sharp edges.

Detailed Description: People with arthritis who experience painful finger joints may have difficulty accessing the contents of an individual-dose package. Ensure that sharp edges are eliminated to minimize hazards to individuals removing the contents of an opened individual package.

Populations Impacted: Limited strength, limited range of motion

Potential Solutions: *Eliminate sharp edges.* Sharp edges can cause discomfort while grasping the packaging or while removing the contents from the package. Select a method of opening the individual-dose packaging that does not cause sharp edges.



Pouches

Pouches are a widely used type of packaging consisting of two or more sheets of flexible material bonded together to form a bag-like structure. Pouches can be resealable with a zipper, adhesive or other sealing features, or they can be designed for single use with no additional features. This packaging format is popular because it is lightweight, relatively low cost and more resistant to damage as it can flex during transit and display. Companies have also developed methods for making this popular format child resistant. Most of these designs utilize a resealable mechanism, but some are developed for single use.

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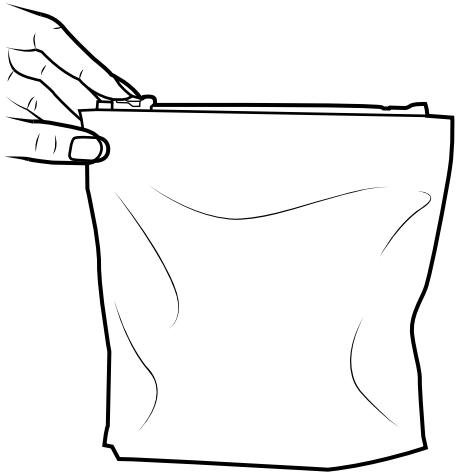
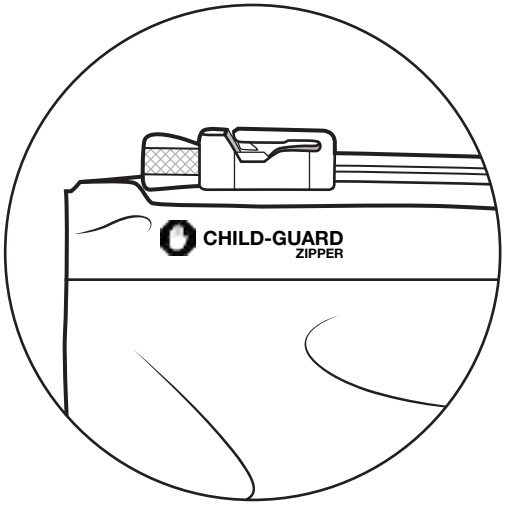
LOCKING ZIPPER POUCH

The locking-zipper pouch is made from two or more sheets of plastic, metal, paper or some combination of those materials formed into a bag-like structure. The top of the pouch features a locking channel applied to both sides of the interior walls of the pouch. A plastic zipper uses a wedge to separate and unlock the channels. The zipper is locked in place using a latch mechanism. To unlock the zipper, a user must press down or squeeze the zipper, releasing a small latch from a notch. Then the user slides the zipper across the pouch, separating the channels and opening the pouch.

Examples of Locking Zipper Pouch

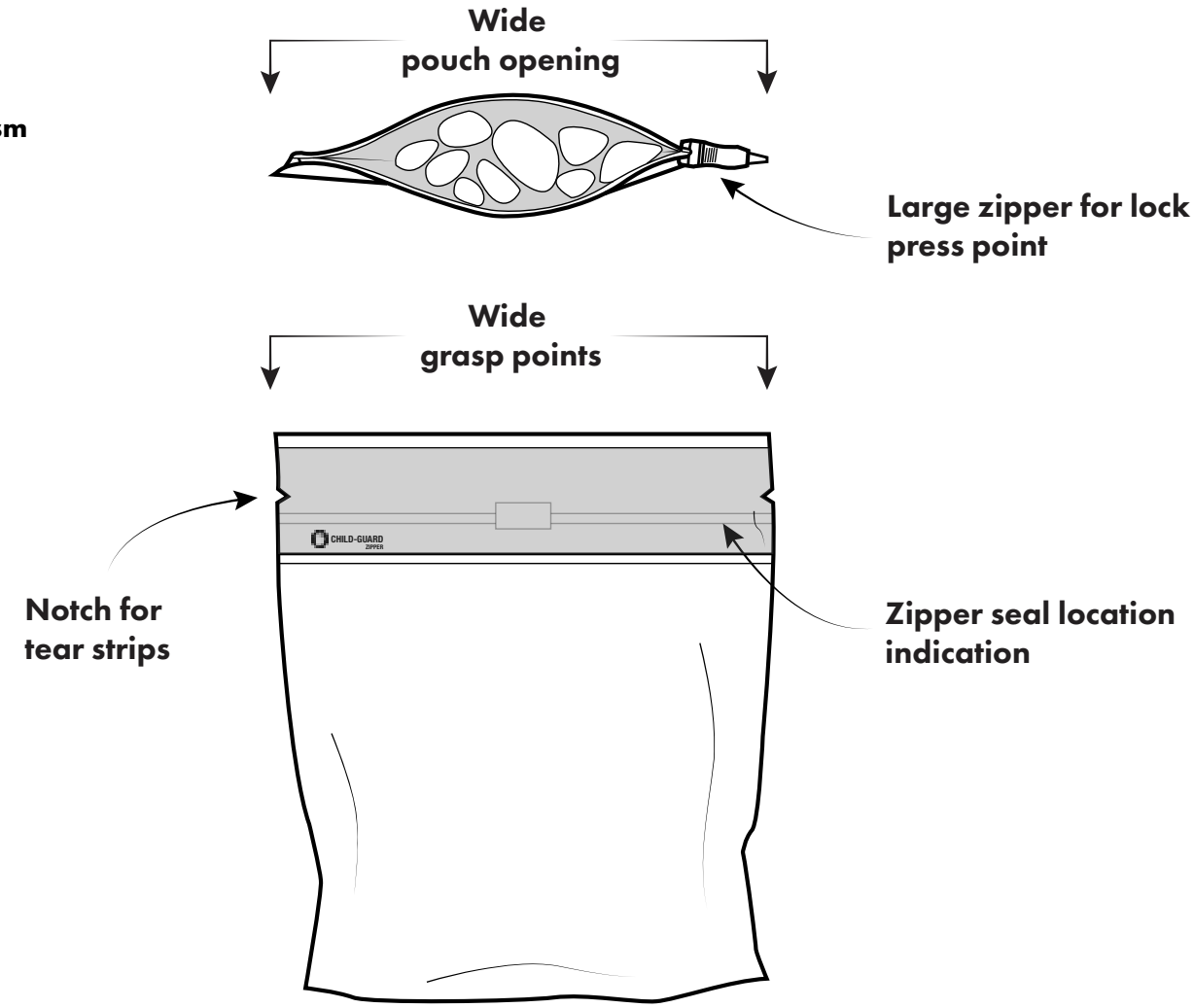




Optimum Locking Zipper Guidelines

Recommendation Highlights

- **Wide grasp points**
- **Notch for tear strips**
- **Opening instructions**
- **Zipper seal location indication**
- **Low zipper-lock force**
- **Large zipper-lock press point**
- **Wide pouch opening**
- **Incorporate a zipper-closing mechanism**



LOCKING ZIPPER ISSUES

Users with arthritis may have difficulty opening zipper lock pouches, resealing pouches, transporting pouches or dispensing products from pouches. Pouches that require tearing or using a tool may be difficult for people with arthritis to open. Zipper locks that are difficult to engage may exceed the functional limitations of some people with arthritis. Some design issues, such as pouches that tear incompletely or pouches that tear in a way that damages the integrity of the pouch, can be exceptionally difficult for people with arthritis to use. The following pages have detailed descriptions, population impact considerations and potential solutions for each issue.

1. Opening Issues.

- 1.1. Opening the pouch requires the use of a tool.
- 1.2. The method of opening the pouch is not clear.
- 1.3. The force required to tear a tear strip is too high.
- 1.4. The force required to separate a seam is too high.
- 1.5. The package only opens partially or requires multiple attempts.
- 1.6. The tear strip is difficult to grasp.
- 1.7. The sides of a seam seal are difficult to grasp.
- 1.8. Zipper channels are difficult to separate after being resealed.

2. Resealing Issues.

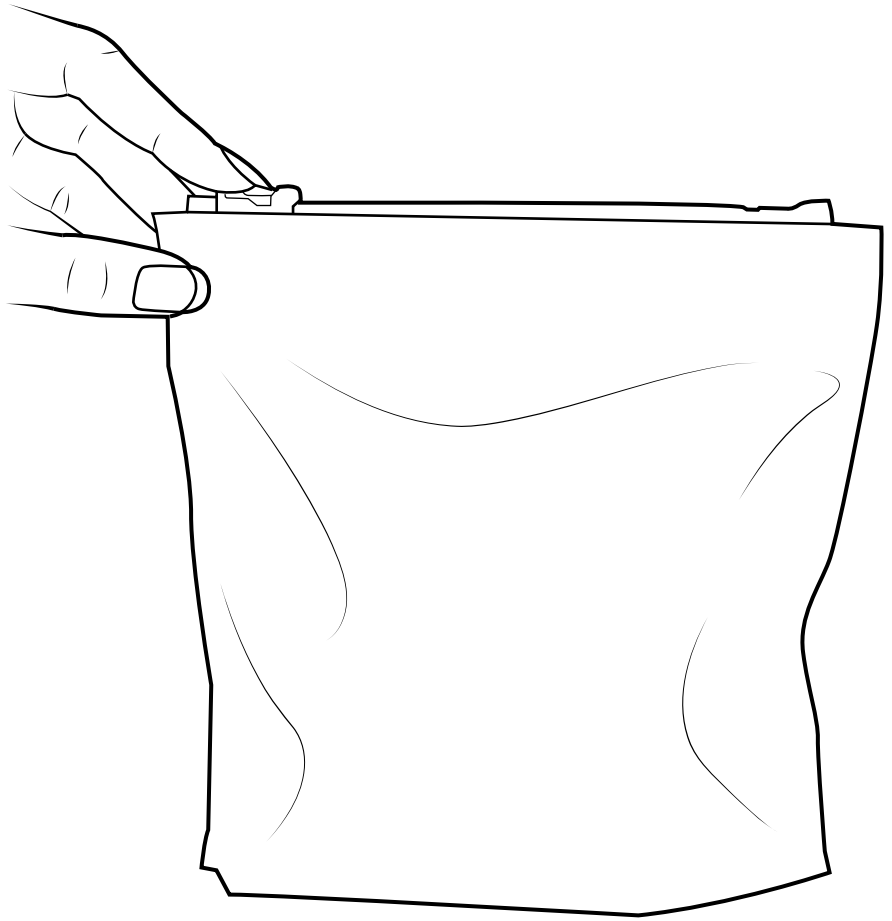
- 2.1. The pouch is damaged during opening and cannot be resealed.
- 2.2. Zipper channels are not easily located.
- 2.3. Zipper channels require too much force to close.
- 2.4. Zipper channels can become contaminated and difficult to close.

3. Transportation Issues.

- 3.1. The pouch is too heavy.
- 3.2. The built-in handle is too small.

4. Dispensing Issues.

- 4.1. The pouch opening is too small.
- 4.2. The product is difficult to pour.



1.1 Opening the pouch requires the use of a tool.

Detailed Description: Some pouches are designed to be opened with scissors by cutting below the heat-sealed band. The pouch may feature a resealable zipper channel requiring a more precise cut. People with arthritis may have difficulty accurately using scissors to open the packaging. Use of a tool, such as a knife or scissors, should not be required to access the pouch contents.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Do not require the use of a tool.* Pouches that require cutting with a tool can pose a potential hazard for users with arthritis. Do not require a knife or scissors to open a pouch.

Provide an adequate graspable area on the side of the pouch, above and below the tear path. Wide grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on the side of the pouch, above and below the tear path. High coefficient of friction grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Provide a tear strip or tear channel to guide the pouch tear. Unsuccessful or incomplete tears may require the use of a tool to complete the opening of the pouch. Design features used to guide the tear along the intended path of the tear can assist users in successfully completing the tear.

Provide a notch or cutout to initiate opening. A notch or a triangle-shaped cutout on the side of the packaging can assist with the initiation of the tear and reduce the need for the use of a tool.

Limit the amount of force required to initiate and sustain the pouch tear. The pouch material may be difficult to tear and may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to initiate and sustain the tear across the full length of the tear path.

Limit the amount of force required to separate a seam. Seams that are difficult to pull apart may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to separate the seam.

Avoid placing a hole, fold or other obstruction in the tear path. If the user encounters an obstruction in the tear path while opening the pouch, the tear could be deflected, causing an incomplete opening of the pouch. A tool may be required to finish opening the package. Avoid obstructions in the tear path that might disrupt the tear.

1.2 The method of opening the pouch is not clear.

Detailed Description: Some packages lack labeling or physical affordances indicating the proper opening of the packaging. Users might open the package inappropriately, rendering the resealable features of the package ineffective. Clear indications of proper opening of the pouch should be present.

Populations Impacted: Limited vision

Potential Solutions: *Provide clear opening instructions.* Opening instructions should be printed directly on the packaging near the location where the user interacts with the packaging to open the pouch. The instructions should be printed in a large font with high contrast.

Provide visual and tactile opening cues. Opening cues, such as grasp points, notches or tear channels, should be easily identifiable via touch or sight. Slits or cuts designed to facilitate opening may be hard to detect and may be overlooked by the user.

1.3 The force required to tear a tear strip is too high.

Detailed Description: Some pouches require the user to tear off the topmost strip of the pouch to access the contents of the pouch. The force required to initiate and maintain the tear may be too high for some users.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the amount of force required to initiate and sustain the pouch tear.* The pouch material may be difficult to tear and may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to initiate and sustain the tear across the full length of the tear path.

Provide an adequate graspable area on the side of the pouch above and below the tear path. Wide grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on the side of the pouch above and below the tear path. High coefficient of friction grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Provide a notch or cutout to initiate opening. A notch or a triangle-shaped cutout on the side of the packaging can assist with the initiation of the tear and reduce the need for the use of a tool.

Avoid placing a hole, fold or other obstruction in the tear path. If the user encounters an obstruction in the tear path while opening the pouch, the tear could be deflected, causing an incomplete opening of the pouch. A tool may be required to finish opening the package. Avoid obstructions in the tear path that might disrupt the tear.

1.4 The force required to separate a seam is too high.

Detailed Description: Some pouches require the user to grasp both sides of the pouch and apply force to the seam to separate the sides of the pouch. The force required to open the pouch may exceed the functional capacity of the user.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the amount of force required to separate a seam.* Seams that are difficult to pull apart may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to separate the seam.

Provide an adequate graspable area on both sides of the seam. Wide grasp points on either side of the seam reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on both sides of the seam. High coefficient of friction grasp points on both sides of the seam reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

1.5 The package only opens partially or requires multiple attempts.

Detailed Description: Some pouches that require the user to tear the topmost strip of the pouch may fail to open on the first attempt. In some cases, the tear does not go completely across the top of the pouch, and only a portion of the top of the pouch is removed. Since the tear notch or other opening aids are removed with the initial tear, the pouch can become exceedingly difficult to open. Partially opened pouches may require a tool to complete opening the pouch.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide a tear strip or tear channel to guide the pouch tear.* Unsuccessful or incomplete tears may require the use of a tool to complete opening the pouch. Design features used to guide the tear along the intended path of the tear can assist users in successfully completing the tear.

Provide a notch or cutout to initiate opening on both sides of the pouch. A notch or a triangle-shaped cutout on both sides of the packaging can assist users if the packaging fails to tear completely on the first attempt.

Avoid placing a hole, fold or other obstruction in the tear path. If the user encounters an obstruction in the tear path while opening the pouch, the tear could be deflected, causing an incomplete opening. A tool may be required to finish opening the package. Avoid obstructions in the tear path that might disrupt the tear.

1.6 The tear strip is difficult to grasp.

Detailed Description: Lack of texture, inadequate size and a low coefficient of friction can make it difficult to securely grasp the tear strip during removal. Users may not be able to apply sufficient force to be able to open the pouch due to lack of grip.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide an adequate graspable area on the side of the pouch above and below the tear path.* Wide grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on the side of the pouch above and below the tear path. High coefficient of friction grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Limit the amount of force required to initiate and sustain the pouch tear. The pouch material may be difficult to tear and may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to initiate and sustain the tear across the full length of the tear path.

1.7 The sides of a seam seal are difficult to grasp.

Detailed Description: Lack of texture, inadequate-sized grasp points or a low coefficient of friction can make it difficult to securely grasp the sides of the pouch while opening. Users may not be able to apply sufficient force to be able to open the pouch due to lack of grip.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide an adequate graspable area on both sides of the seam.* Wide grasp points on either side of the seam reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on both sides of the seam. High coefficient of friction grasp points on both sides of the seam reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Limit the amount of force required to separate a seam. Seams that are difficult to pull apart may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to separate the seam.

1.8 Zipper channels are difficult to separate after being resealed.

Detailed Description: The force required to separate the zipper channel may be too high once the zipper channel has been sealed. The pouch may lack adequate grasp points on the pouch to enable separation of the zipper channel.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide an adequate graspable area on both sides of the zipper channel.* Wide grasp points on either side of the zipper channel reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on both sides of the zipper channel. High coefficient of friction grasp points on both sides of the zipper channel reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Limit the amount of force required to separate a zipper channel. Seams that are difficult to pull apart may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to separate the zipper channel.

1.9 Zipper locks require too much force.

Detailed Description: The force required to engage the zipper lock may be too high. Users with painful finger joints or limited strength may not be able to apply sufficient force to engage the zipper lock mechanism.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide an adequate graspable area on both sides of the zipper lock.* Wide grasp points on either side of the zipper lock make it easier to apply sufficient force. The grasp points should be at least the size of an adult thumb.

Limit the amount of force required to engage the zipper lock. Zipper locks that are difficult to engage may be difficult or impossible for people with arthritis to operate. Consider requiring no more than 3.0 pounds of force to engage the zipper lock.

2.1 The pouch is damaged during opening and cannot be resealed.

Detailed Description: Users may damage the zipper seal while opening the pouch. Zipper seals that pull apart from the packaging or pouch or that are torn below the level of the zipper seal cannot be resealed as intended. Take steps to prevent damage to the zipper seal and reduce the likelihood that the zipper seal will be damaged during opening.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide a tear strip or tear channel to guide the pouch tear.* Unsuccessful or incomplete tears may require the use of a tool to complete opening of the pouch. Design features used to guide the tear along the intended path of the tear can assist users in successfully completing the tear.

Provide a notch or cutout to initiate opening. A notch or a triangle-shaped cutout on the side of the packaging can assist with the initiation of the tear and reduce the need for the use of a tool.

Limit the amount of force required to initiate and sustain the pouch tear. The pouch material may be difficult to tear and may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to initiate and sustain the tear across the full length of the tear path.

Avoid placing a hole, fold or other obstruction in the tear path. If the user encounters an obstruction in the tear path while opening the pouch, the tear could be deflected, causing an incomplete opening of the pouch. A tool may have to be used to complete the opening. Avoid obstructions in the tear path that might disrupt the tear.

2.2 Zipper channels are not easily located.

Detailed Description: The force required to properly engage and disengage the zipper seal may exceed the functional capabilities of some users with arthritis. Limit the amount of force required and provide design features that enable users to securely grasp the packaging to facilitate the operation of the zipper seal.

Populations Impacted: Limited strength

Potential Solutions: *Provide a visual indication of the location of the zipper channel.* Consider adding a visual indicator, such as a label or a graphical cue, to indicate the location of the zipper channel.

2.3 Zipper channels require too much force to close.

Detailed Description: The location of the zipper seal may not be evident from outside the pouch. A visual or tactile indication of the zipper seal's location would help users know how to reseal the pouch appropriately.

Populations Impacted: Limited vision

Potential Solutions: *Limit the amount of force required to seal a zipper channel.* If the amount of force required to pinch the zipper closed is too high, users may fail to properly seal the pouch. Consider limiting the required zipper force to 3.0 pounds or less.

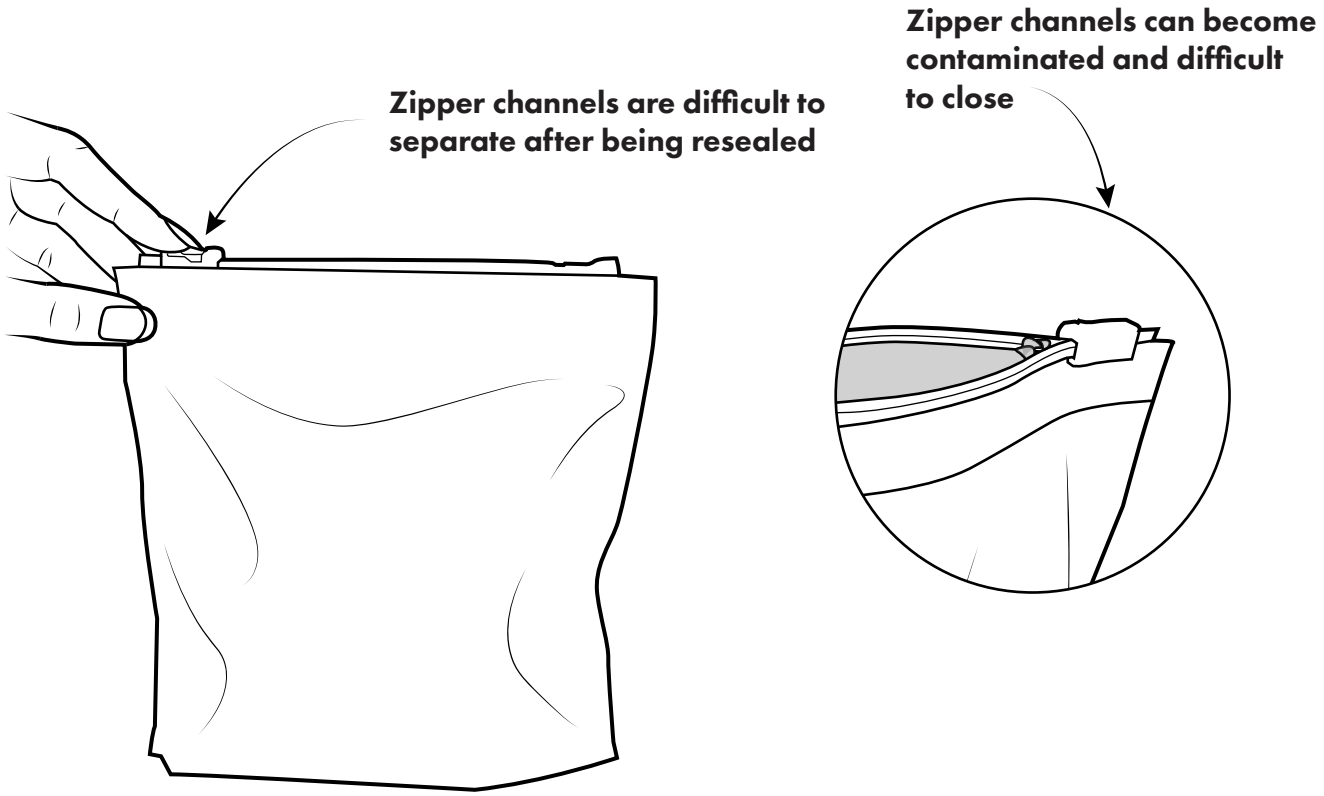
Provide an auditory or tactile cue for zipper closure. Users may continue to exert unnecessary force if they are unsure if the zipper is properly sealed. Consider providing an auditory or tactile cue to indicate when a zipper channel is sealed properly.

2.4 Zipper channels can become contaminated and difficult to close.

Detailed Description: The pouch contents can become lodged in the zipper channel tracks. Clogged zipper channels can cause the zipper seal to become difficult to operate or impossible to completely seal.

Populations Impacted: Limited strength

Potential Solutions: *Protect zipper channels from debris.* Zipper channels that are clogged may become difficult or impossible to close. Protect zipper channels from filling with debris, especially if the product in the pouch is granular or has granular components.



3.1 The pouch is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting pouches that exceed 5.0 pounds for long distances. Heavier items that exceed 10.0 pounds may require a two-handed carry.

Populations Impacted: Limited strength

Potential Solutions: *Reduce the weight of the pouch to below 5.0 pounds.* Users may need to use two hands to carry and transport pouches exceeding 5.0 pounds. It is recommended that the packaging not exceed 10.0 pounds, even if it is designed for a two-handed carry.

3.2 The built-in handle is too small.

Detailed Description: Pouches that utilize a handle to assist in transportation of the pouch should be adequately sized to accommodate complete insertion of an adult hand. Handles that are too small can be ineffective or painful to use if they place pressure across finger joints.

Populations Impacted: Limited grip

Potential Solutions: *Avoid handle openings that are too narrow.* Handle openings that are too narrow may prevent users from fully inserting their hand into the opening.

Avoid handle openings that are not sufficiently wide. Handle openings that are not sufficiently wide may prevent users from fully inserting their hand into the opening.

4.1 The pouch opening is too small.

Detailed Description: If the product is designed to be dispensed by reaching into the pouch to remove an item, the opening of the pouch should be appropriately sized to accommodate the adult hand, or the adult hand and a dispensing aid, such as a utensil or measuring vessel. Small openings may make it difficult to remove the product from the pouch effectively without spilling.

Populations Impacted: Limited grip

Potential Solutions: *Provide a pouch opening designed for the insertion of an adult hand, or the adult hand with a dispensing tool.* Ensure that the opening of the pouch is sufficient for proper dispensing of the product. The pouch, when fully opened, should accommodate the insertion of the human hand if the product is designed to be removed by reaching into the pouch.

4.2 The product is difficult to pour.

Detailed Description: Pouches containing contents that are intended to be poured directly from the pouch may be difficult to pour due to the design of the pouch. The pouch may not have obvious grasp points necessary for tilting the pouch, or the flow rate of the contents may be difficult to control because of the shape of the pouch opening. The method of dispensing pourable contents should be considered in the design of the pouch.

Populations Impacted: Limited grip

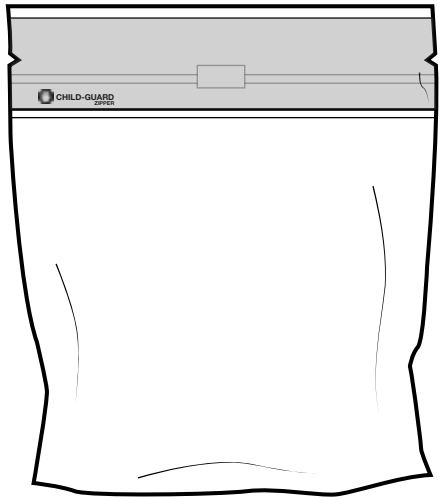
Potential Solutions: *Add grasp points to facilitate pouring.* Visually and tactilely indicate grasp points are useful when pouring the contents from the pouch.

Design the pouch to facilitate pouring while standing. If the pouch is heavy, consider adding design elements to the pouch that would enable the pouch to be tilted while standing on a flat surface to facilitate pouring without needing to lift the pouch.

HIDDEN POCKET

The hidden pocket design is a press and seal closure mechanism with a small, hidden pocket near the press and seal closure. The user inserts their thumb into the pocket and pulls at the location of the pocket rather than at the top of pouch. At this location, the pouch will open with moderate force. However, if a user grasps the top of the pouch in the common way a user would open a pouch, the pouch will resist opening.

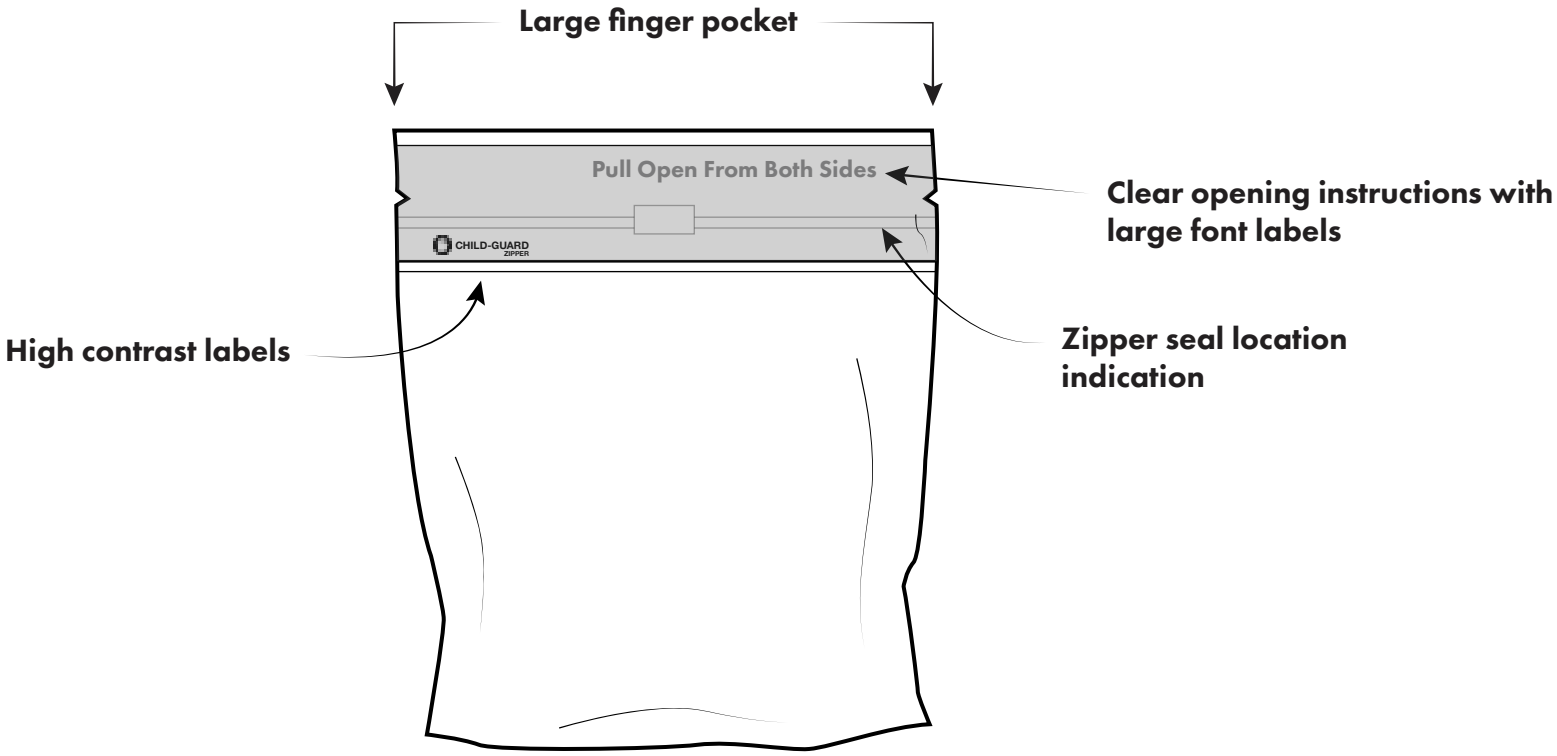
Example of Hidden Pocket



Optimum Hidden Pocket Guidelines

Recommendation Highlights

- **Clear opening instructions**
- **Large font labels**
- **High contrast labels**
- **Large finger pocket**
- **Finger pocket gap to facilitate insertion**
- **Low separation force**
- **Low reseal force**
- **Zipper opening size appropriate to task**



HIDDEN POCKET ISSUES

Users with arthritis may have difficulty opening hidden pocket pouches, resealing pouches, transporting pouches or dispensing products from pouches. Pouches that require tearing or using a tool may be difficult for people with arthritis to open. Hidden pockets that are difficult to locate or separate may exceed the functional limitations of some people with arthritis. Some design issues, such as pouches that tear incompletely or pouches that tear in a way that damages the integrity of the pouch, can be exceptionally difficult for people with arthritis to use. The following pages have detailed descriptions, population impact considerations and potential solutions for each issue.

1. Opening Issues.

1.1. Opening the pouch requires the use of a tool.
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1.3. The force required to tear a tear strip is too high.
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1.6. The tear strip is difficult to grasp.
1.7. The sides of a seam seal are difficult to grasp.
1.8. Zipper channels are difficult to separate after being resealed.

2. Resealing Issues.

2.1. The pouch is damaged during opening and cannot be resealed.
2.2. Zipper channels are not easily located.
2.3. Zipper channels require too much force to close.
2.4. Zipper channels can become contaminated and difficult to close.

3. Transportation Issues.

3.1. The pouch is too heavy.
3.2. The built-in handle is too small.

4. Dispensing Issues.

4.1. The pouch opening is too small.
4.2. The product is difficult to pour.

1.1 Opening the pouch requires the use of a tool.

Detailed Description: Some pouches are designed to be opened with scissors by cutting below the heat-sealed band. The pouch may feature a resealable zipper channel requiring a more precise cut. People with arthritis may have difficulty accurately using scissors to open the packaging. Use of a tool, such as a knife or scissors, should not be required to access the pouch contents.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Do not require the use of a tool.* Pouches that require cutting with a tool can pose a potential hazard for users with arthritis. Do not require a knife or scissors to open a pouch.

Provide an adequate graspable area on the side of the pouch above and below the tear path. Wide grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on the side of the pouch, above and below the tear path. High coefficient of friction grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

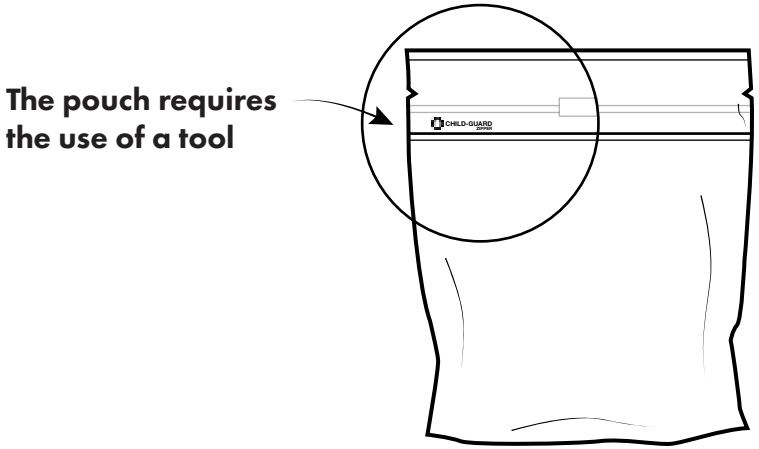
Provide a tear strip or tear channel to guide the pouch tear. Unsuccessful or incomplete tears may require the use of a tool to complete the opening of the pouch. Design features used to guide the tear along the intended path of the tear can assist users in successfully completing the tear.

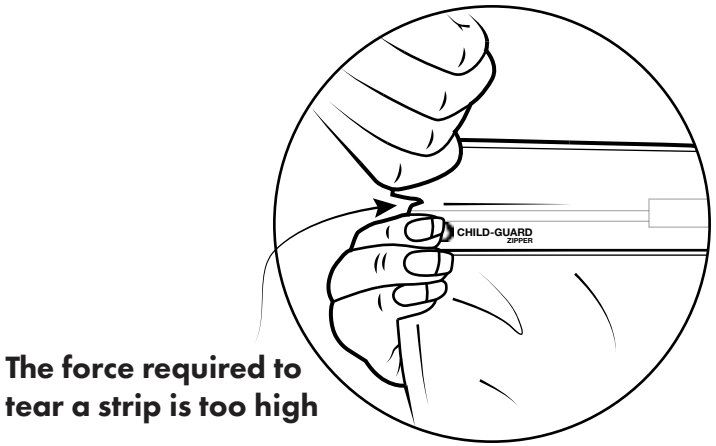
Provide a notch or cutout to initiate opening. A notch or a triangle-shaped cutout on the side of the packaging can assist with the initiation of the tear and reduce the need for the use of a tool.

Limit the amount of force required to initiate and sustain the pouch tear. The pouch material may be difficult to tear and may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to initiate and sustain the tear across the full length of the tear path.

Limit the amount of force required to separate a seam. Seams that are difficult to pull apart may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to separate the seam.

Avoid placing a hole, fold or other obstruction in the tear path. If the user encounters an obstruction in the tear path while opening the pouch, the tear could be deflected, causing an incomplete opening. A tool may be required to finish opening the package. Avoid obstructions in the tear path that might disrupt the tear.





1.2 The method of opening the pouch is not clear.

Detailed Description: Some packages lack labeling or physical affordances indicating the proper opening of the packaging. Users might open the package inappropriately, rendering the resealable features of the package ineffective. Clear indications of proper opening of the pouch should be present.

Populations Impacted: Limited vision

Potential Solutions: *Provide clear opening instructions.* Opening instructions should be printed directly on the packaging near the location where the user interacts with the packaging to open the pouch. The instructions should be printed in a large font with high contrast.

Provide visual and tactile opening cues. Opening cues, such as grasp points, notches or tear channels, should be easily identifiable via touch or sight. Slits or cuts designed to facilitate opening may be hard to detect and may be overlooked by the user.

Provide a visual indication of the location of the hidden pocket. Users may have difficulty locating the hidden pocket. Visually highlighting the location of the hidden pocket can help users find the pocket. However, users may still have difficulty finding the hidden pocket if it blends in with the pouch. Consider producing the pocket in a contrasting color to facilitate awareness of the pocket location.

1.3 The force required to tear a tear strip is too high.

Detailed Description: Some pouches require the user to tear off the topmost strip of the pouch to access the pouch's contents. The force required to initiate and maintain the tear may be too high for some users.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the amount of force required to initiate and sustain the pouch tear.* The pouch material may be difficult to tear and may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to initiate and sustain the tear across the full length of the tear path.

Provide an adequate graspable area on the side of the pouch above and below the tear path. Wide grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on the side of the pouch above and below the tear path. High-coefficient-of-friction grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Provide a notch or cutout to initiate opening. A notch or a triangle-shaped cutout on the side of the packaging can assist with the initiation of the tear and reduce the need for the use of a tool.

Avoid placing a hole, fold or other obstruction in the tear path. If the user encounters an obstruction in the tear path while opening the pouch, the tear could be deflected, causing an incomplete opening. A tool may have to be used to complete the opening. Avoid obstructions in the tear path that might disrupt the tear.

1.4 The force required to separate a seam is too high.

Detailed Description: Some pouches require the user to grasp both sides of the pouch and apply force to the seam to separate the sides of the pouch. Hidden-pocket pouches require the user to apply force after inserting a finger into the hidden-pocket feature. The force required to open the pouch may exceed the functional capacity of the user.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the amount of force required to separate a seam.* Seams that are difficult to pull apart may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to separate the seam.

Provide an adequate graspable area on both sides of the seam. Wide grasp points on either side of the seam reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on both sides of the seam. High coefficient of friction grasp points on both sides of the seam reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Design the hidden pocket to facilitate a key-pinch. Hidden-pocket designs should be wide enough to facilitate a key-pinch when possible.

1.5 The package only opens partially or requires multiple attempts.

Detailed Description: Some pouches that require the user to tear the topmost strip of the pouch may fail to open on the first attempt. In some cases, the tear does not go completely across the top of the pouch, and only a portion of the top of the pouch is removed. Since the tear notch or other opening aids are removed with the initial tear, the pouch can become exceedingly difficult to open. Partially opened pouches may require a tool to complete the pouch opening.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide a tear strip or tear channel to guide the pouch tear.* Unsuccessful or incomplete tears may require the use of a tool to complete opening the pouch. Design features used to guide the tear along the intended path of the tear can assist users in successfully completing the tear.

Provide a notch or cutout to initiate opening on both sides of the pouch. A notch or a triangle-shaped cutout on both sides of the packaging can assist users if the packaging fails to tear completely on the first attempt.

Avoid placing a hole, fold or other obstruction in the tear path. If the user encounters an obstruction in the tear path while opening the pouch, the tear could be deflected, causing an incomplete opening. A tool may be required to finish opening the package. Avoid obstructions in the tear path that might disrupt the tear.

1.6 The tear strip is difficult to grasp.

Detailed Description: Lack of texture, inadequate size and a low coefficient of friction can make it difficult to securely grasp the tear strip during removal. Users may not be able to apply sufficient force to open the pouch due to lack of grip.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide an adequate graspable area on the side of the pouch above and below the tear path.* Wide grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on the side of the pouch above and below the tear path. High coefficient of friction grasp points above and below the tear path reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Limit the amount of force required to initiate and sustain the pouch tear. The pouch material may be difficult to tear and may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to initiate and sustain the tear across the full length of the tear path.

1.7 The sides of a seam seal are difficult to grasp.

Detailed Description: Lack of texture, inadequate sized grasp points or a low coefficient of friction can make it difficult to securely grasp the sides of the pouch while opening. Users may not be able to apply sufficient force to be able to open the pouch due to lack of grip.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide an adequate graspable area on both sides of the seam.* Wide grasp points on either side of the seam reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on both sides of the seam. High coefficient of friction grasp points on both sides of the seam, including inside the hidden pocket, reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Limit the amount of force required to separate a seam. Seams that are difficult to pull apart may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to separate the seam.

1.8 Zipper channels are difficult to separate after being resealed.

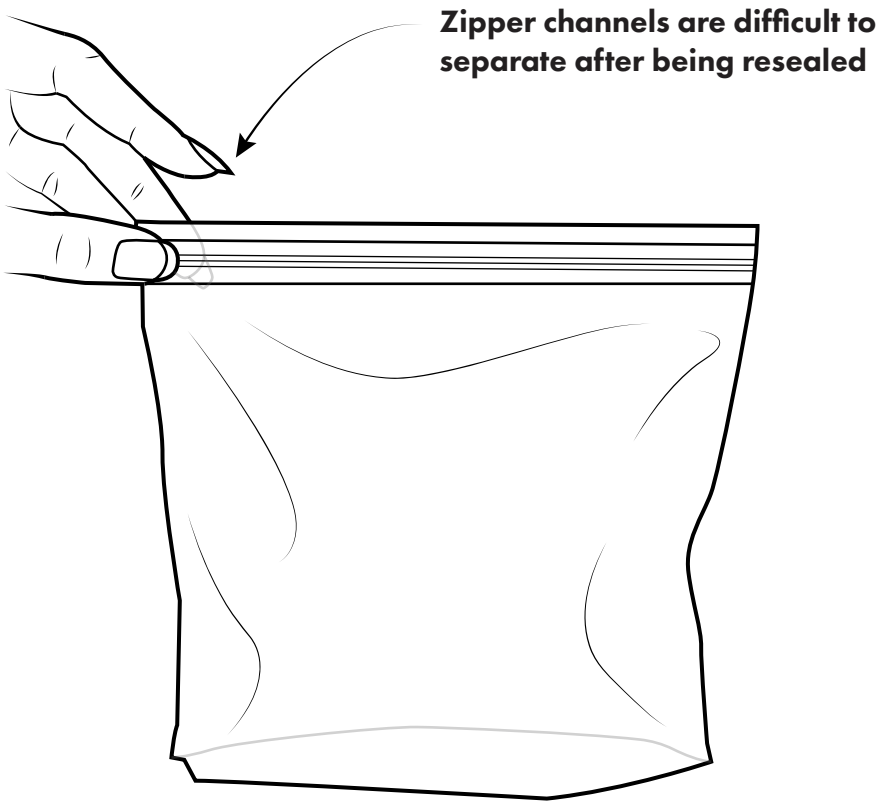
Detailed Description: The force required to separate the zipper channel may be too high once the zipper channel has been sealed. The pouch may lack adequate grasp points to enable separation of the zipper channel.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide an adequate graspable area on both sides of the zipper channel.* Wide grasp points on either side of the zipper channel reduce the need to use a tool to open the packaging. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on both sides of the zipper channel. High coefficient of friction grasp points on both sides of the zipper channel reduce the need to use a tool to open the packaging. The grasp points should be made of a non-slip material or textured to reduce slippage.

Limit the amount of force required to separate a zipper channel. Seams that are difficult to pull apart may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to separate the zipper channel.



2.1 The pouch is damaged during opening and cannot be resealed.

Detailed Description: Users may damage the zipper seal while opening the pouch. Zipper seals that pull apart from the packaging or pouch, or that are torn below the level of the zipper seal, cannot be resealed as intended. Take steps to prevent damage to the zipper seal and reduce the likelihood that the zipper seal will be damaged during opening.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Provide a tear strip or tear channel to guide the pouch tear.* Unsuccessful or incomplete tears may require the use of a tool to complete opening of the pouch. Design features used to guide the tear along the intended path of the tear can assist users in successfully completing the tear.

Provide a notch or cutout to initiate opening. A notch or a triangle-shaped cutout on the side of the packaging can assist with the initiation of the tear and reduce the need for the use of a tool.

Limit the amount of force required to initiate and sustain the pouch tear. The pouch material may be difficult to tear and may require the use of a tool to open the pouch. Consider requiring no more than 3.0 pounds of force to initiate and sustain the tear across the full length of the tear path.

Avoid placing a hole, fold or other obstruction in the tear path. If the user encounters an obstruction in the tear path while opening the pouch, the tear could be deflected, causing an incomplete opening of the pouch. A tool may have to be used to complete the opening. Avoid obstructions in the tear path that might disrupt the tear.

2.2 Zipper channels are not easily located.

Detailed Description: The location of the zipper seal may not be evident from outside the pouch. A visual or tactile indication of the zipper seal's location would help users know how to reseal the pouch appropriately.

Populations Impacted: Limited vision

Potential Solutions: *Provide a visual indication of the location of the zipper channel.* Consider adding a visual indicator, such as a label or a graphical cue, to indicate the location of the zipper channel.

2.3 Zipper channels require too much force to close.

Detailed Description: The force required to properly engage and disengage the zipper seal may exceed the functional capabilities of some users with arthritis. Limit the amount of force required and provide design features that enable users to securely grasp the packaging to facilitate the operation of the zipper seal.

Populations Impacted: Limited strength

Potential Solutions: *Limit the amount of force required to seal a zipper channel.* If the amount of force required to pinch the zipper closed is too high, users may fail to properly seal the pouch. Consider limiting the required zipper force to 3.0 pounds or less.

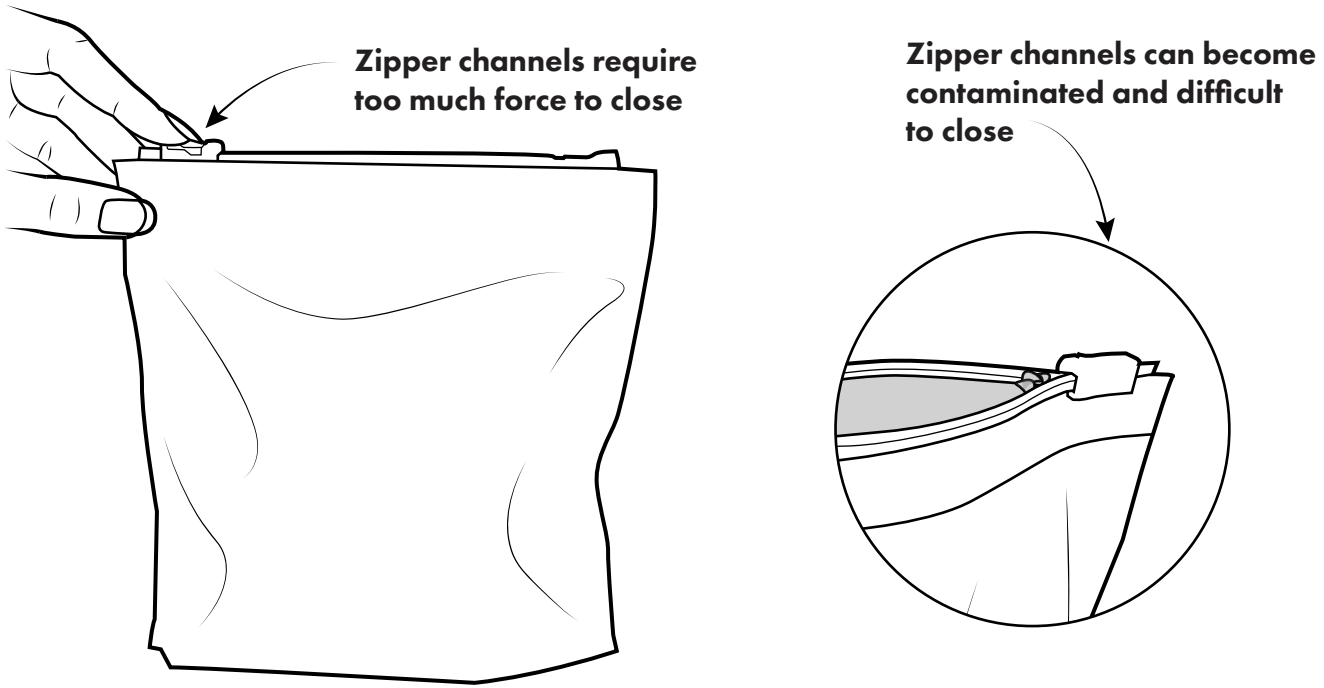
Provide an auditory or tactile cue for zipper closure. Users may continue to exert unnecessary force if they are unsure if the zipper is properly sealed. Consider providing an auditory or tactile cue to indicate when a zipper channel is seated properly.

2.4 Zipper channels can become contaminated and difficult to close.

Detailed Description: The pouch contents can become lodged in the zipper channel tracks. Clogged zipper channels can cause the zipper seal to become difficult to operate or impossible to completely seal.

Populations Impacted: Limited strength

Potential Solutions: *Protect zipper channels from debris.* Zipper channels that are clogged may become difficult or impossible to close. Protect zipper channels from filling with debris, especially if the product in the pouch is granular or has granular components.



3.1 The pouch is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting pouches that exceed 5.0 pounds for long distances. Heavier items that exceed 10.0 pounds may require a two-handed carry.

Populations Impacted: Limited strength

Potential Solutions: *Reduce the weight of the pouch to below 5.0 pounds.* Users may need to use two hands to carry and transport pouches exceeding 5.0 pounds. It is recommended that the packaging does not exceed 10.0 pounds, even if it is designed for a two-handed carry.

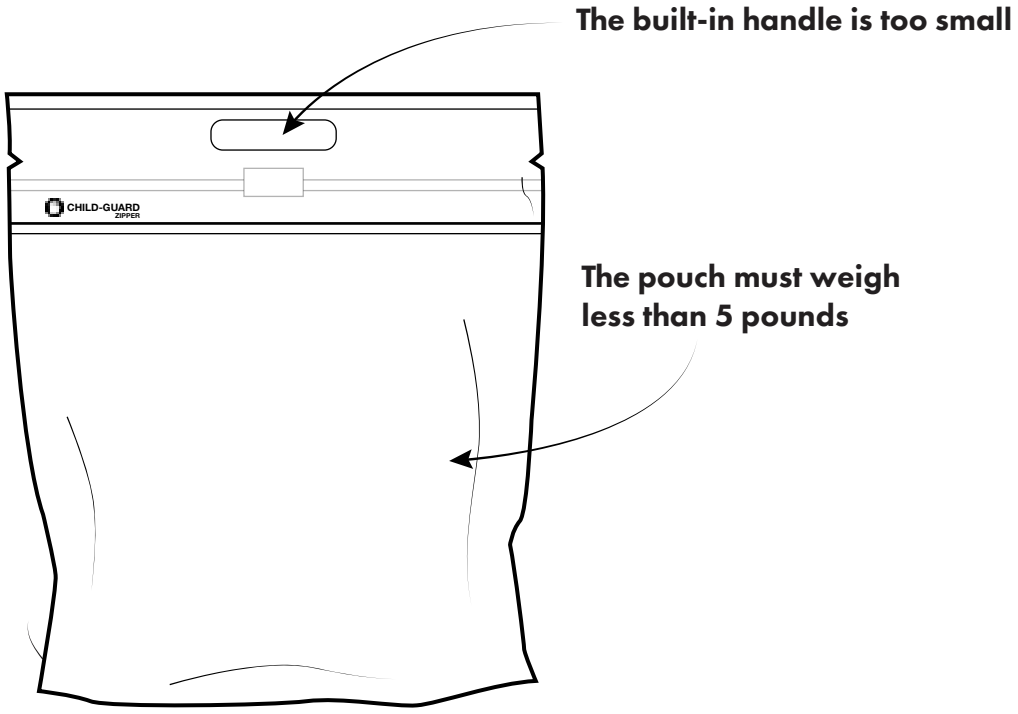
3.2 The built-in handle is too small.

Detailed Description: Pouches that utilize a handle to assist in transportation of the pouch should be adequately sized to accommodate complete insertion of an adult hand. Handles that are too small can be ineffective or painful to use if they place pressure across finger joints.

Populations Impacted: Limited grip

Potential Solutions: *Avoid handle openings that are too narrow.* Handle openings that are too narrow may prevent users from fully inserting their hand into the opening.

Avoid handle openings that are not sufficiently wide. Handle openings that are not sufficiently wide may prevent users from fully inserting their hand into the opening.

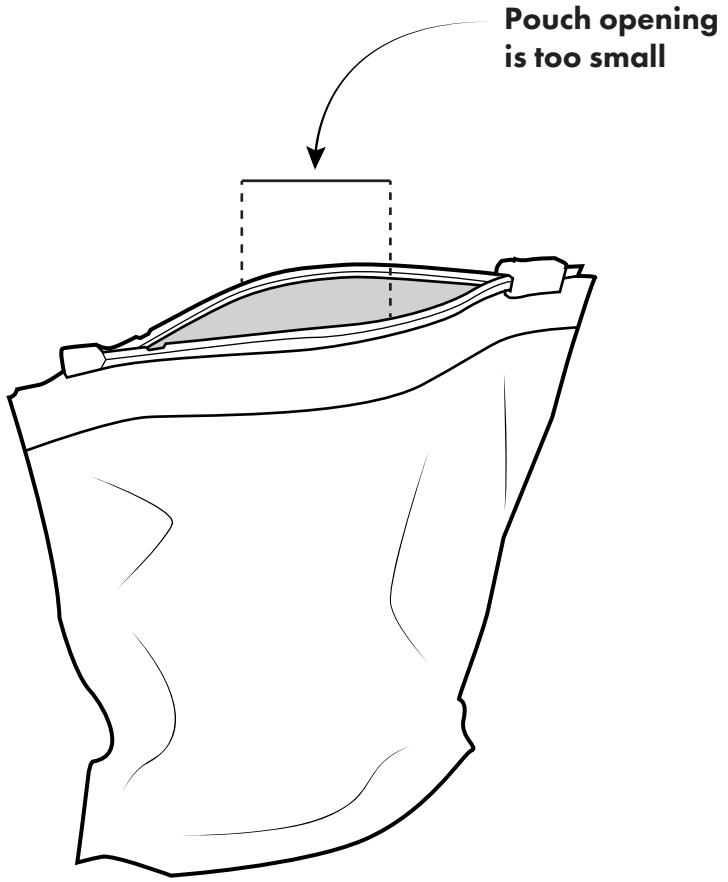


4.1 The pouch opening is too small.

Detailed Description: If the product is designed to be dispensed by reaching into the pouch to remove an item, the opening of the pouch should be appropriately sized to accommodate an adult hand or an adult hand and a dispensing aid, such as a utensil or measuring vessel. Small openings may make it difficult to remove the product from the pouch effectively without spilling.

Populations Impacted: Limited grip

Potential Solutions: *Provide a pouch opening designed for the insertion of an adult hand, or an adult hand with a dispensing tool.* Ensure that the opening of the pouch is sufficient for proper dispensing of the product. When fully opened, the pouch should accommodate the insertion of a human hand if the product is designed to be removed by reaching into the pouch.



4.2 The product is difficult to pour.

Detailed Description: Pouches containing contents that are intended to be poured directly from the pouch may be difficult to pour due to the design of the pouch. The pouch may not have obvious grasp points necessary for tilting the pouch, or the flow rate of the contents may be difficult to control because of the shape of the pouch opening. The method of dispensing pourable contents should be considered in the design of the pouch.

Populations Impacted: Limited grip

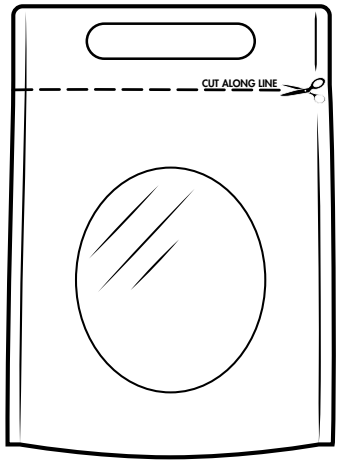
Potential Solutions: *Add grasp points to facilitate pouring.* Visually and tactilely indicated grasp points are useful when pouring contents from the pouch.

Design the pouch to facilitate pouring while standing. If the pouch is heavy, consider adding design elements to the pouch that would enable the pouch to be tilted while standing on a flat surface to facilitate pouring without needing to lift the pouch.

TOOL REQUIRED

The tool-required design is typically a heat-sealed bag with a tear-resistant material. There is no tear strip or tear notch to aid in opening the bag. To open the bag, a user must cut the material with a scissors or knife. This is not a resealable package.

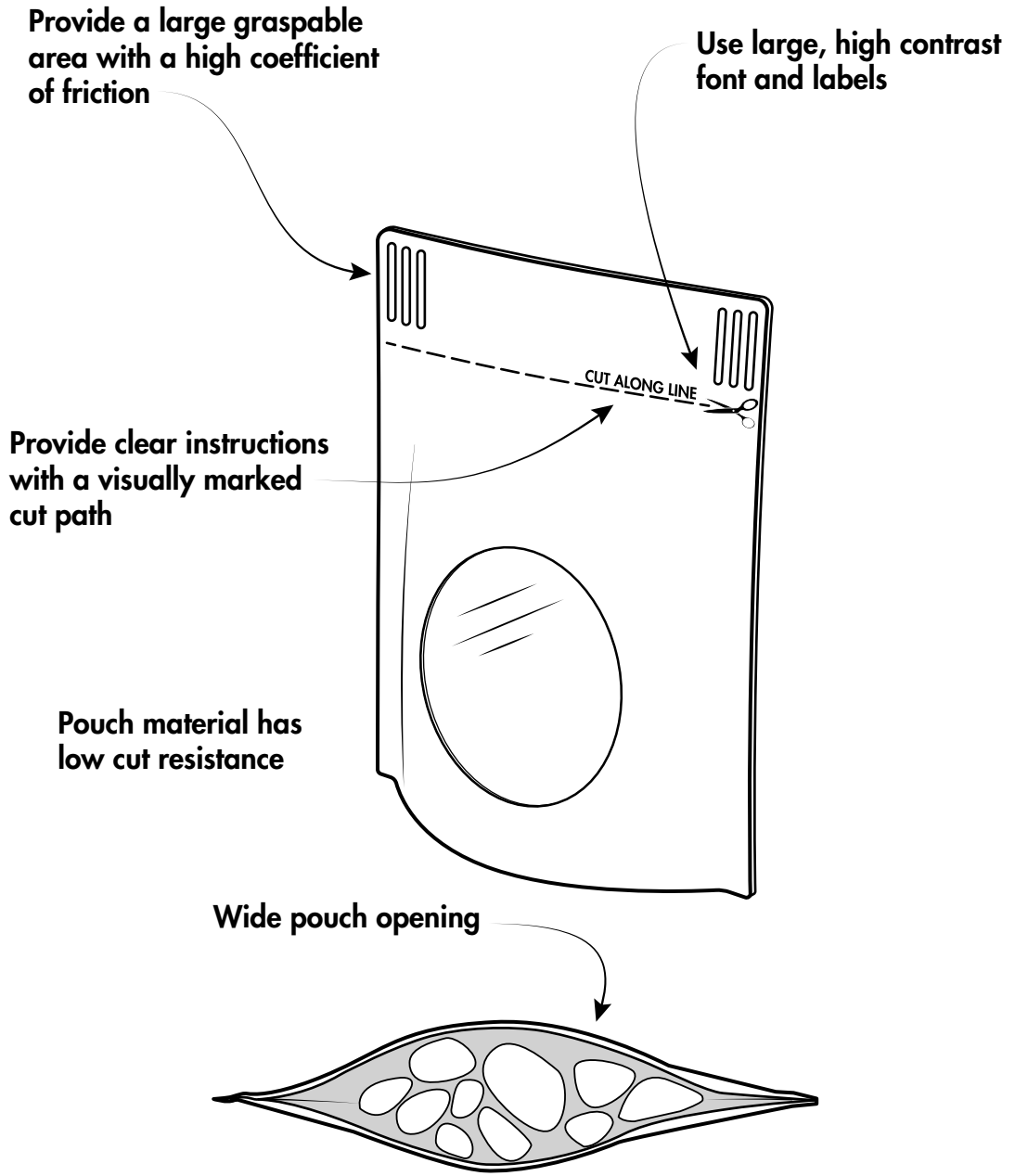
Example of Tool Required



Optimum Tool Required Guidelines

Recommendation Highlights

- **Large graspable area**
- **Clear instructions for tool usage and hand placement**
- **Large font labels**
- **High contrast labels**
- **High coefficient of friction**
- **Visually marked cut path**
- **Low cut resistance material**
- **Wide pouch opening**



TOOL REQUIRED ISSUES

Packaging requiring the use of a tool should be avoided if possible. Users with arthritis are more likely to experience injuries when using sharp instruments such as a knife or scissors to open packaging. If tool usage cannot be avoided, provide instructions for how to use a tool safely to open the packaging.

1. Opening Issues.

1.1. Opening the pouch requires the use of a tool.
1.2. The method of opening the pouch is not clear.
1.3. The force required to cut the packaging is too high.

2. Transportation Issues.

2.1. The pouch is too heavy.
2.2. The built-in handle is too small.

3. Dispensing Issues.

3.1. The pouch opening is too small.
3.2. The product is difficult to pour.

1.1 Opening the pouch requires the use of a tool.

Detailed Description: Some pouches are designed to be opened with scissors by cutting below the heat-sealed band. Use of a tool, such as a knife or scissors, should not be required to access the pouch contents because of the likelihood of injury.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Do not require the use of a tool.* Pouches that require cutting with a tool can pose a potential hazard for users with arthritis. Do not require a knife or scissors to open a pouch.

Provide an adequate graspable area on the side of the pouch above and below the cut path. Provide wide grasp points above and below the cut path. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on the side of the pouch, above and below the cut path. The grasp points should be made of a non-slip material or textured to reduce slippage.

1.2 The method of opening the pouch is not clear.

Detailed Description: Some packages lack labeling or physical affordances indicating the proper opening of the packaging. Users might open the package inappropriately. Clear indications of proper opening of the pouch should be present. When a tool is required, provide clear instructions for the safe operation of the tool.

Populations Impacted: Limited vision

Potential Solutions: *Provide clear opening instructions.* Opening instructions should be printed directly on the packaging near the location where the user interacts with the packaging to open the pouch. The instructions should be printed in a large font with high contrast. Proper tool usage should be illustrated.

1.3 The force required to cut the packaging is too high.

Detailed Description: Some pouches require the use of a tool to access the pouch contents. The force required to initiate and maintain the cut may be too high for some users.

Populations Impacted: Limited strength, limited grip

Potential Solutions: *Limit the amount of force required to initiate and sustain the pouch cut.* The pouch material may be difficult to cut. Consider requiring no more than 3.0 pounds of force to initiate and sustain the cut across the full length of the cut path.

Provide an adequate graspable area on the side of the pouch above and below the cut path. The grasp points should be at least the size of an adult thumb.

Provide an adequate coefficient of friction on the graspable areas on the side of the pouch above and below the cut path. The grasp points should be made of a non-slip material or textured to reduce slippage.

2.1 The pouch is too heavy.

Detailed Description: People with arthritis who experience limited strength or painful finger joints may have difficulty transporting pouches that exceed 5.0 pounds for long distances. Heavier items that exceed 10.0 pounds may require a two-handed carry.

Populations Impacted: Limited strength

Potential Solutions: *Reduce the weight of the pouch to below 5.0 pounds.* Users may need to use two hands to carry and transport pouches exceeding 5.0 pounds. It is recommended that the packaging not exceed 10.0 pounds, even if it is designed for a two-handed carry.

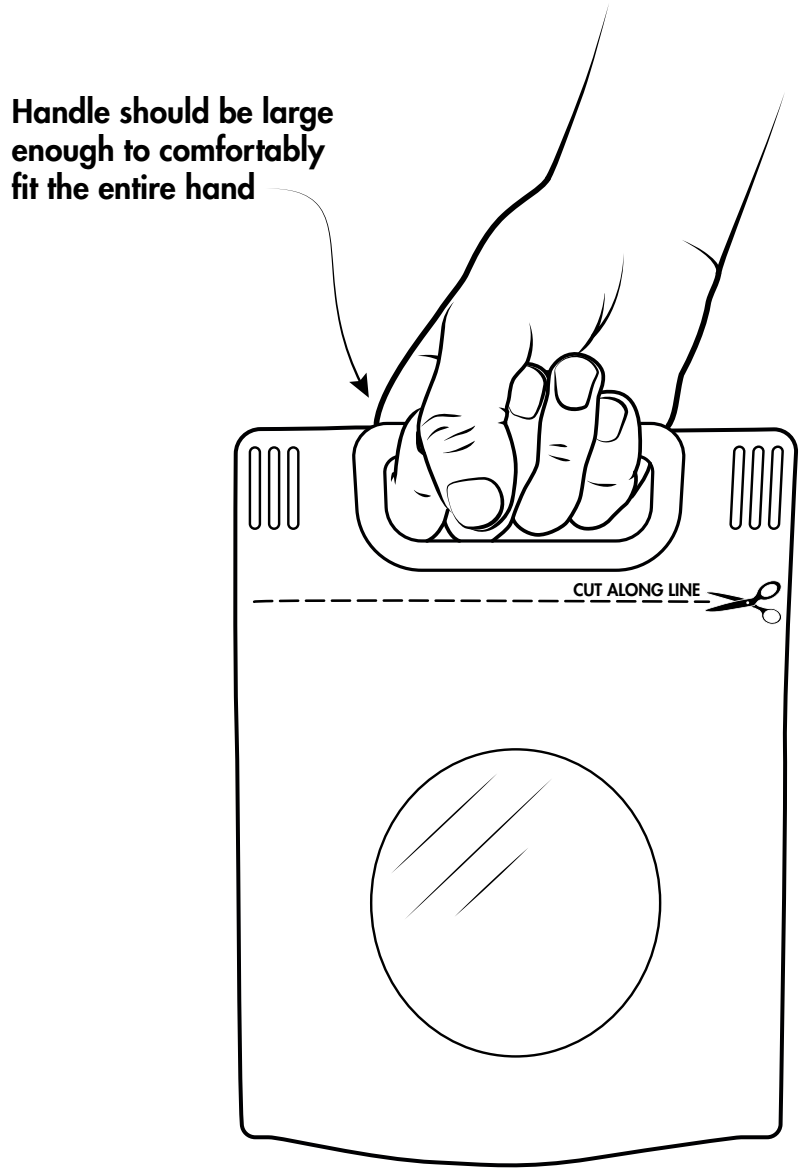
2.2 The built-in handle is too small.

Detailed Description: Pouches that utilize a handle to assist in transportation of the pouch should be adequately sized to accommodate complete insertion of an adult hand. Handles that are too small can be ineffective or painful to use if they place pressure across finger joints.

Populations Impacted: Limited grip

Potential Solutions: *Avoid handle openings that are too narrow.* Handle openings that are too narrow may prevent users from fully inserting their hand into the opening.

Avoid handle openings that are not sufficiently wide. Handle openings that are not sufficiently wide may prevent users from fully inserting their hand into the opening.

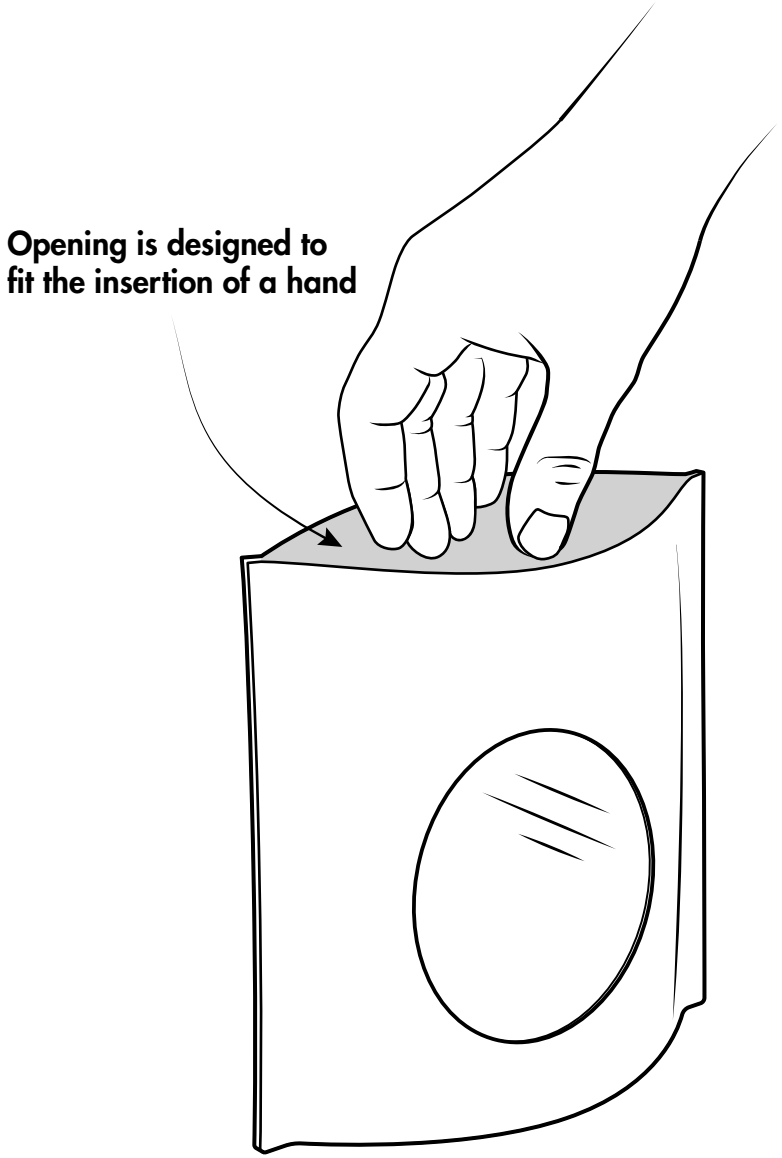


3.1 The pouch opening is too small.

Detailed Description: If the product is designed to be dispensed by reaching into the pouch to remove an item, the opening of the pouch should be appropriately sized to accommodate the adult hand, or the adult hand and a dispensing aid, such as a utensil or measuring vessel. Small openings may make it difficult to remove the product from the pouch effectively without spilling.

Populations Impacted: Limited grip

Potential Solutions: *Provide a pouch opening designed for the insertion of an adult hand, or an adult hand with a dispensing tool.* Ensure that the opening of the pouch is sufficient for proper dispensing of the product. When fully opened, the pouch should accommodate the insertion of a human hand if the product is designed to be removed by reaching into the pouch.



3.2 The product is difficult to pour.

Detailed Description: Pouches containing contents that are intended to be poured directly from the pouch may be difficult to pour due to the design. The pouch may not have obvious grasp points necessary for tilting it, or the flow rate of the contents may be difficult to control because of the shape of the pouch opening. The method of dispensing pourable contents should be considered in the design of the pouch.

Populations Impacted: Limited grip

Potential Solutions: *Add grasp points to facilitate pouring.* Visually and tactilely indicate grasp points useful when pouring the contents from the pouch.

Design the pouch to facilitate pouring while standing. If the pouch is heavy, consider adding design elements to the pouch that would enable the pouch to be tilted while standing on a flat surface to facilitate pouring without needing to lift the pouch.

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Child-Resistant Attributes

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