# Safe Use of Medication for Healthy Aging:

## What Every Adult Should Know





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Drug discovery is the foundation of modern medicine, turning scientific breakthroughs into treatments that save lives, improve quality of life, and address unmet medical needs.

Despite its potential, drug discovery is a long, high-risk, and costly process — with over 90% of candidates failing before reaching the market due to safety, efficacy, or economic barriers.



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# Stages for Bringing a Drug to Market

10-15 years process with an estimated cost of $1.5B to $2.8B

## Drug Discovery:

For every 5,000–10,000 compounds screened in discovery, typically only 1 reaches the market.

- Identifying new potential medicines
- **Main activities:**
  Understanding a disease and finding a biologic target that leads to a cure/enhancement of condition
  Searching for molecules that can interact with that target
  Early lab testing to see if the compound has the 'drug-like' properties
- **Outcome**: A promising lead compound ready for pre-clinical testing

## Drug Development:

- Prove that the discovered drug is safe, effective, and manufacturable — then get it approved for patients
- **Main activities:**
  Preclinical studies in animals and lab systems for safety and dosing
  Clinical trials (Phases I–III) in humans to test safety, efficacy, and optimal use
  Regulatory submissions
  Post-approval monitoring (Phase IV) to track long-term effects

**Outcome**: An approved medicine available for prescription

**References**: DiMasi JA, Grabowski HG, Hansen RW. Innovation in the pharmaceutical industry: New estimates of R&D costs. J Health Econ. 2016;47:20–33.Wouters OJ et al. Estimated Research and Development Investment Needed to Bring a New Medicine to Market, 2009–2018. JAMA. 2020;323(9):844–853.FDA – Drug Development Process



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# Brand Versus Generic Drugs

| Aspect | Brand Name | Generic |
|---|---|---|
| **Definition** | Original drug developed and marketed by a pharmaceutical company under a proprietary name. | Same active ingredient, dosage, safety, strength, quality, and route of administration as brand name, marketed after patent expiry. |
| **Cost** | Usually more expensive (to cover R&D and marketing costs). | 80–85% cheaper on average. |
| **Appearance** | Unique shape, color, packaging, and branding. | May look different (color, shape) but must be clearly labeled with the generic name. |
| **Efficacy & Safety** | Proven in clinical trials before approval. | FDA/EMA requires bioequivalence to brand (must work the same in the body). |
| **Patent Status** | Patent-protected for up to 20 years from filing. | Available after patents/exclusivity expire. |
| **Examples** | Lipitor® (atorvastatin), Advil® (ibuprofen) | Atorvastatin, Ibuprofen |

**Patent length is around 20 years which is filed during the discovery stage**

**References:** FDA – Generic Drug Facts:



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# Drug-Drug Interactions

## What are drug-drug interactions?

- When two or more medications affect each other's strength or how they work
- Can cause a medicine to be too strong, too weak, or create unwanted side effects.
- Can occur with prescriptions, OTC drugs, supplements, and herbal products.

## How to reduce the risk?

- Keep an updated list of all medications and supplements.
- Use one pharmacy when possible.
- Read labels for warnings.
- Ask a pharmacist before starting anything new.
- Report unusual symptoms



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# Proper Storage of Medications

- **Follow label instructions** – Some drugs need refrigeration; others should be kept at room temperature (68–77°F / 20–25°C).
- **Avoid extreme conditions** – Keep away from heat, moisture, and direct sunlight (avoid bathroom cabinets).
- **Original container** – Keep in the original packaging with the label intact.
- **Out of reach** – Store away from children, pets, and anyone at risk of accidental ingestion.
- **Special storage** – Certain drugs (e.g., insulin, biologics, eye drops) have unique temperature requirements after opening.


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# How Are Side Effects Identified?

## Before Approval (Clinical Trials)

- Medicines are tested on volunteers and patients in several trial phases.
- Researchers closely monitor participants for any unwanted effects.
- Common side effects (e.g., nausea, headache) are usually detected here.

## After Approval (Real-World Use):

- Once medicines are prescribed to larger populations, rarer side effects may appear.
- Doctors, pharmacists, and patients report these to health authorities (e.g., FDA, EMA).



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# How Side Effects Are Listed For The Public?

## Package Inserts & Labels:

- Side effects are grouped by common, less common, and rare.
- Frequency is based on data collected from trials and patient reports.

## Safety Updates:

- New side effects may be added if discovered after approval.
- Regulatory agencies continuously update medicine information to protect patients.

## Why It Matters:

- Helps patients and doctors make informed choices.
- Encourages reporting of any unusual reactions.



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# Medications Expiration date

- **Definition**: The expiration date is the final date the manufacturer guarantees full potency and safety.
- **Potency loss:** After expiration, many drugs lose effectiveness; some may become unsafe.
- **Exceptions:** A few drugs (e.g., certain antibiotics, nitroglycerin, insulin) degrade faster and should never be used past expiry.
- **Disposal:** Use take-back programs or follow FDA guidelines (never flush unless instructed).
- **Check regularly:** Review home medicines every 6–12 months and remove expired ones.



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# Safe Disposal of Medications

- **Do not flush** medicines unless the label or patient information specifically instructs it.
- **Take-back programs** – Use community or pharmacy take-back programs to safely return unused or expired medications.
- **Household disposal** (if no take-back option): Mix medicines (do not crush tablets) with an unappealing substance like coffee grounds or dirt.
- Place the mixture in a sealed plastic bag.
- Throw the bag in the household trash.
- **Remove personal information** from prescription labels before disposal.
- **Special considerations:** Certain controlled substances may have specific disposal requirements under local regulations.
- **Key Message:** Proper disposal protects children, pets, the environment, and prevents misuse.



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**"Medicines achieve their greatest benefit only when the right drug is given to the right patient, in the right dose, for the right duration, with clear understanding and monitoring."** World Health Organization (WHO)

**"Safe medication practice begins with knowledge, continues with communication, and succeeds through adherence and ongoing evaluation."**
American Pharmacists Association (APhA)



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