

Bacteriostatic Water Side Effects & Benzyl Alcohol Allergy (2026)

Bacteriostatic water side effects, checked against the evidence. This guide covers what the FDA label says about [bacteriostatic water](#), how much benzyl alcohol a small injection really delivers, who should avoid it, and how to recognise a benzyl alcohol allergy before it becomes an emergency.

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Bacteriostatic water side effects at a glance

- **Bacteriostatic water side effects are rare and mostly local.** It is sterile water with 0.9% (9 mg/mL) or 1.1% (11 mg/mL) benzyl alcohol as a preservative. Its FDA label says reactions to injected 0.9% benzyl alcohol "are not known to occur in man"^[1].
- **Newborns are the big exception.** The label says it must not be used in neonates^[1]. In 1982, 16 newborn deaths were linked to benzyl alcohol flushes at 99 to 405 mg per kg a day^[2].
- **A typical small injection carries very little.** 0.5 mL of 0.9% bacteriostatic water holds 4.5 mg of benzyl alcohol: about 1.5% of the acceptable daily intake (ADI) for a 70 kg adult^[3].
- **Benzyl alcohol allergy is real but uncommon.** US dermatologists named it the 2026 Allergen of the Year^[4], yet only 0.2 to 0.3% of patch-tested clinic patients react to it^[5,6].
- **It tends to numb, not burn.** In randomized trials, saline with 0.9% benzyl alcohol cut injection pain compared with preservative-free saline^[7,8].
- **Emergency signs:** trouble breathing, swelling of the face or throat, or fainting after an injection. Call 911^[9].

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1. What is in bacteriostatic water?

It has only two ingredients: water and benzyl alcohol. The FDA-listed product is Bacteriostatic Water for Injection, USP: sterile water for injection with 0.9% (9 mg/mL) or 1.1% (11 mg/mL) benzyl alcohol added to stop bacteria growing after the vial is opened. Its pH is 5.7 (range 4.5 to 7.0). It is labeled Rx only^[1].

It has one approved job. The label says it is "indicated only for diluting or dissolving drugs" given into a vein, a muscle or under the skin, following the drug maker's instructions^[1]. It is not a drink, a fluid replacement or a stand-alone injection. That matters for bacteriostatic water side effects: almost any reaction you feel comes from the combination of the water, the benzyl alcohol, the drug dissolved in it and the injection itself.

Benzyl alcohol is an aromatic alcohol used as a preservative, solvent and fragrance in cosmetics, creams and injectable medicines^[4]. In the body it is oxidized to benzoic acid, joined to glycine in the liver and passed in urine as hippuric acid^[2]. Europe's medicines regulator notes that many intramuscular medicines contain it partly because "its anaesthetic properties reduce pain at the injection site"^[10].

This guide covers safety only. For how much water to add to a vial, mixing steps and storage, see our [bacteriostatic water guide](#); for preservative-free alternatives, see [bacteriostatic vs sterile water vs saline](#).

2. Bacteriostatic water side effects on the FDA label

The label is short and blunt. Table 1 lists every safety statement in the current Hospira prescribing information, in plain English^[1].

Label section	What it says	What it means for you
Warning (on every vial)	"NOT FOR USE IN NEONATES."	Never use it for a newborn baby. See section 4.
Contraindications	Must not be used in neonates; not for fluid replacement; not for epidural or spinal anesthesia; must be made approximately isotonic before use.	Use it only as a diluent for a drug, never on its own as a fluid, and never near the spine.
Warnings	Benzyl alcohol has been associated with toxicity in neonates. Given into a vein without a dissolved drug (solute), it may cause hemolysis (bursting of red blood cells).	Plain bacteriostatic water should not go into a vein.
Adverse reactions	Fever (febrile response), local tenderness, abscess, tissue necrosis or infection at the injection site, vein clots or phlebitis spreading from the site, and extravasation (leakage outside the vein).	These come from "this solution, added drugs or the technique" of mixing and injecting, not only the benzyl alcohol.

Label section	What it says	What it means for you
Benzyl alcohol in adults	Reactions to IV, IM or subcutaneous 0.9% benzyl alcohol “are not known to occur in man”. An IV dose of up to 30 mL is estimated to be safe for an adult; about 9 mL in a 6 kg infant could change blood pressure.	Ordinary small volumes in adults are far below any known harm level.
Pregnancy	No reproduction studies have been done; it is not known whether it can harm a fetus. Use only if clearly needed.	Ask your doctor before any injection made with it while pregnant.
Children	Safety and effectiveness have not been established in pediatric patients.	Not for children without a doctor's direction.
Drug interactions	Some drugs are incompatible with a vehicle containing benzyl alcohol.	Check the drug's own instructions; some must be mixed with preservative-free water.

The adverse-reaction list is generic: it covers any injection prepared with the diluent. The label gives no percentages because no trial measured bacteriostatic water side effects on their own. If a reaction happens, the label tells clinicians to stop, assess the patient and keep the rest of the vial for testing^[1].

3. How much benzyl alcohol is in one injection?

The dose depends only on volume and strength. Each mL of 0.9% bacteriostatic water holds 9 mg of benzyl alcohol; each mL of 1.1% holds 11 mg^[1]. After a peptide or drug is dissolved, nearly the whole injected volume is bacteriostatic water, so the volume you inject tells you the benzyl alcohol you get.

Volume injected	Units on a U-100 syringe	Benzyl alcohol, 0.9%	Benzyl alcohol, 1.1%	Share of daily ADI, 70 kg adult (0.9% / 1.1%)
0.05 mL	5	0.45 mg	0.55 mg	0.15% / 0.18%
0.1 mL	10	0.9 mg	1.1 mg	0.29% / 0.35%
0.25 mL	25	2.25 mg	2.75 mg	0.73% / 0.89%
0.5 mL	50	4.5 mg	5.5 mg	1.5% / 1.8%
1 mL	100	9 mg	11 mg	2.9% / 3.5%
2 mL	n/a	18 mg	22 mg	5.8% / 7.1%

ADI = acceptable daily intake. JECFA's group ADI is 0 to 5 mg per kg of body weight a day, expressed as benzoic acid^[3]; converted by molecular weight that is about 4.4 mg/kg of benzyl alcohol, or about 310 mg a day at 70 kg (our calculation). Europe's food committee places benzyl alcohol in the same 0 to 5 mg/kg group^[10]. To turn a dose in mg into syringe units, use our [peptide calculator](#).

How to read Figure 1 (below). Each gridline is ten times the one before it. Injecting 1 mL a day of 0.9% bacteriostatic water gives a 70 kg adult about 0.13 mg/kg: roughly one thirty-fourth of the acceptable daily intake, and about 770 times less per kg than the lowest dose seen in newborns with gasping syndrome^[3,2].

Why the ADI is a fair yardstick. The ADI was set for food, which is swallowed, not injected. The EMA notes that swallowed benzyl alcohol is close to 100% absorbed, so it treats oral limits as applicable to other routes^[10]. The ADI is an amount judged acceptable every day for a lifetime; it is not a toxic threshold.

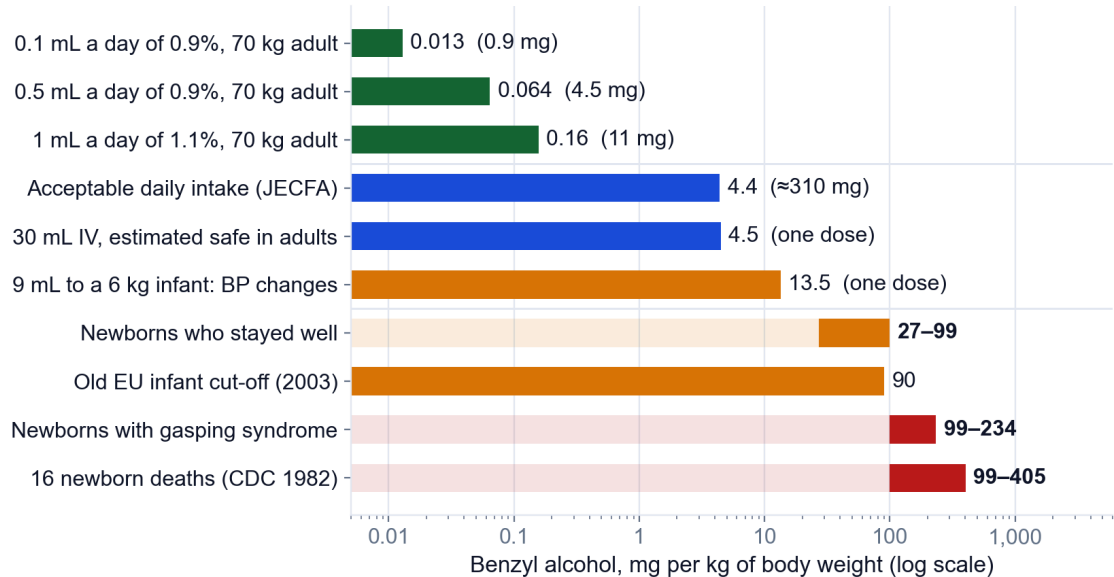
Limits of this comparison. Newborn numbers come from very sick premature babies whose livers could not clear benzyl alcohol^[2]; they are not a safety margin for adults. And these figures cover the preservative only, not

the drug you dissolve in it. Still, at everyday volumes, serious bacteriostatic water side effects from the benzyl alcohol dose itself are not expected in adults^[1].

How much benzyl alcohol is in a small injection?

Daily intake from bacteriostatic water vs the doses linked to harm in newborns

Green = small daily injections. Blue = adult reference points. Amber/red = newborn exposures.



Own calculation from label strengths (0.9% = 9 mg/mL, 1.1% = 11 mg/mL). JECFA group ADI 0-5 mg/kg as benzoic acid (≈4.4 mg/kg benzyl alcohol); Hospira label; CDC MMWR 1982; Gershnik 1982 via WHO FAS 37; EMA/CHMP/508188/2013. Newborns clear benzyl alcohol far more slowly than adults: context, not a like-for-like margin.

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Figure 1. Benzyl alcohol from small daily injections compared with adult reference points and newborn exposures, in mg per kg (log scale).

Sources: Hospira label; JECFA; CDC MMWR 1982; Gershnik 1982; EMA.

4. Why newborns must never get it

Newborns cannot break benzyl alcohol down fast enough. In 1982 the CDC reported 16 deaths in premature babies at two US hospitals whose IV lines were flushed every day with saline containing 9 mg/mL benzyl alcohol. Estimated intakes were 99 to 405 mg per kg a day. Similar deaths stopped once preservative-free flushes were used^[2].

The illness became known as **gasping syndrome**. Babies developed severe metabolic acidosis, gasping breathing, seizures and low blood pressure, and some died at 6 to 46 days of age^[3]. In the best-known series, affected babies had received 99 to 234 mg/kg a day, while similar babies who stayed well had received 27 to 99 mg/kg^[11,3]. The CDC itself cautioned that these babies were already very ill, which makes single cases hard to attribute^[2].

The rules that followed are still in force:

- **US label:** must not be used in neonates; where water is needed to mix drugs for a newborn, use preservative-free Sterile Water for Injection only^[1].
- **Europe:** do not give to a newborn (up to 4 weeks old) unless a doctor recommends it; do not use for more than a week in children under 3 unless advised; and the minimum amount at which toxicity may occur "is not known"^[10].

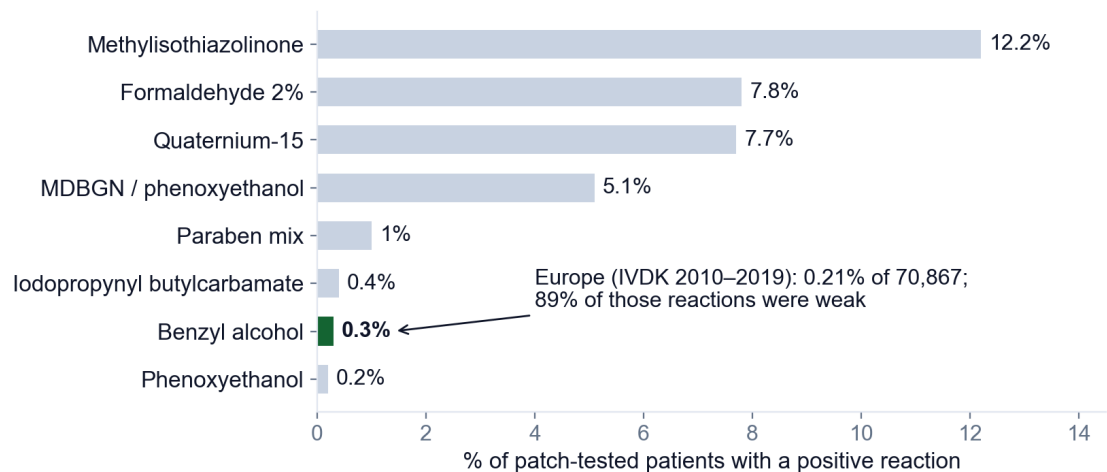
- **Pregnancy, breastfeeding, liver or kidney disease:** the EMA asks patients to seek advice because large amounts can build up and cause metabolic acidosis^[10].

5. Benzyl alcohol allergy

Allergy to bacteriostatic water means benzyl alcohol allergy. The water itself is not the problem. Among bacteriostatic water side effects, allergy is the one most worth knowing about. The American Contact Dermatitis Society named benzyl alcohol the **2026 Allergen of the Year**, warning that it can cause allergic contact dermatitis, "particularly with prolonged or repeated exposure", and that it is missing from many standard patch-test series, so it may be under-recognised^[4]. The same review lists injectable formulations among its sources^[4].

Benzyl alcohol allergy is real but rare

Positive patch tests among dermatology-clinic patients, by preservative



North American Contact Dermatitis Group 1994–2016, 50,799 patients (Atwater AR et al., J Am Acad Dermatol 2021, PMID 33579596). IVDK: Geier J et al., JEADV 2022 (PMID 35080274). Clinic patients, not the general public.

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Figure 2. Benzyl alcohol is one of the least common preservative allergies among dermatology patients. Sources: NACDG 1994-2016; IVDK 2010-2019.

How common is it? Among 50,799 North American patients patch tested between 1994 and 2016, 0.3% reacted to benzyl alcohol 1%, one of the lowest rates of any preservative tested^[5]. In Germany and neighbouring countries, 146 of 70,867 patients (0.21%) reacted between 2010 and 2019; 89% of those reactions were only weakly positive and many did not reproduce on retesting^[6]. Those authors concluded benzyl alcohol "cannot be regarded as a significant contact allergen"^[6], and the debate is still running in 2025^[12]. Both figures come from people already referred to skin clinics, so the rate in the general public is likely lower.

Who is more at risk? In the European data, people who reacted were more likely to be over 40, to have leg (stasis) dermatitis, and to have been tested for a reaction to a topical medicine; most also reacted to fragrances, other preservatives or ointment bases^[6]. Dermatologists have warned that saline preserved with benzyl alcohol poses a contact-dermatitis risk for fragrance-sensitive patients^[13].

Reactions to injected benzyl alcohol: the case reports

Reactions to injected benzyl alcohol are documented, but only as single cases. Delayed, immediate, hive-type and whole-body reactions have all been described^[14].

Case	What was injected	What happened
46-year-old woman, JAMA Dermatology (then Arch Dermatol) 1984 ^[15]	A vein-sclerosing injection preserved with benzyl alcohol	Allergic contact dermatitis: redness, palpable swelling and raised borders at the treated area
Patient on chemotherapy, 1986 ^[16]	Benzyl alcohol-preserved cytarabine, vincristine and heparin	Whole-body reaction three separate times: fever and a spotty (maculopapular) rash on the chest and arms; confirmed by skin test; none life-threatening
Worker exposed to silica, 1992 ^[17]	IV gallium-67 scan agent	Allergic skin reaction plus severe joint symptoms; positive prick test to benzyl alcohol
Vitamin B12 patient, 2004 ^[18]	Vitamin B12 injections	Reactions traced to benzyl alcohol; controlled by switching to nasal B12
54-year-old woman, 2021 ^[19]	Anesthetic drugs containing benzyl alcohol	Itching over the whole body and a rash lasting four days; positive patch test; no reaction a year later when benzyl alcohol was avoided

Case reports show that a reaction can happen; they cannot tell you how often. No study has measured allergy rates in people injecting bacteriostatic water at home.

6. Does bacteriostatic water sting or burn?

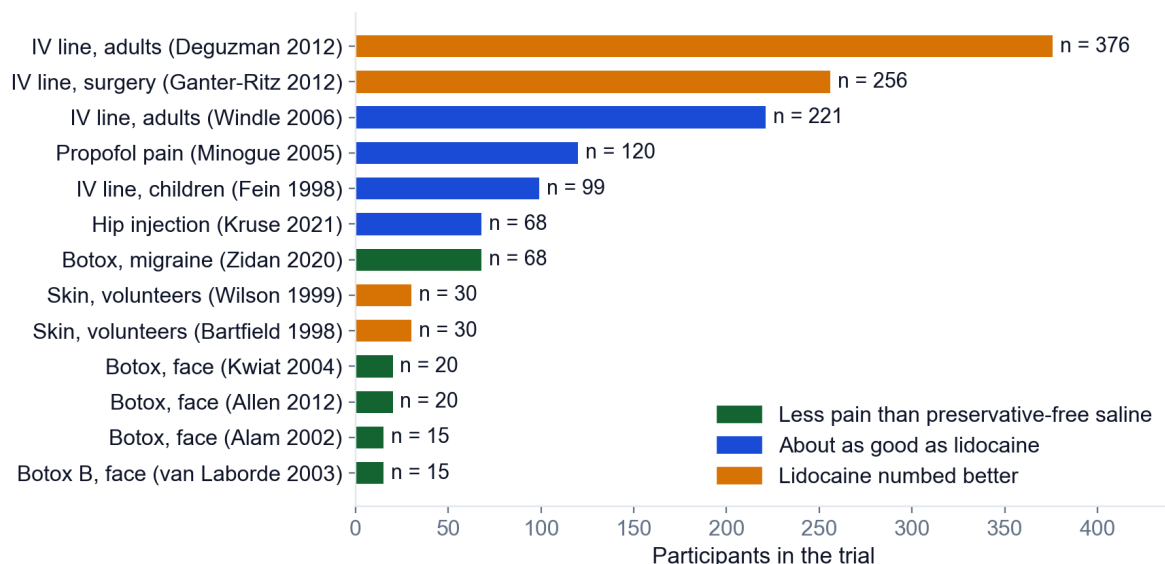
Benzyl alcohol usually reduces injection pain. A 2022 review counted 62 studies of saline preserved with 0.9% benzyl alcohol since 1928, 31 of them on its numbing effect^[20]. The randomized trials point the same way:

- **Versus preservative-free saline:** Botox mixed with preserved saline hurt less in all 15 patients of one split-face trial (pain 54% lower)^[7], and in 90% of 20 patients in another (60% lower)^[8]. In 68 migraine patients, pain scores were 3.2 versus 5.3 out of 10^[21].
- **Versus lidocaine:** in 99 children having an IV line placed, median pain was 9 mm with benzyl alcohol saline, 10 mm with lidocaine and 41 mm with nothing (on a 100 mm scale)^[22]. Before propofol, 38% complained of pain after a benzyl alcohol saline pre-injection versus 84% with placebo and 52% with lidocaine^[23]. Before hip injections in 68 patients, the two worked equally well^[24].
- **Where lidocaine wins:** in 376 adults, buffered lidocaine gave less IV-line pain^[25]. A 2014 meta-analysis of 13 trials (1,559 people) concluded lidocaine is more effective for IV-line pain^[26]. Benzyl alcohol numbs less deeply and for less time than lidocaine^[27,28].

So why might a shot sting? Stinging is rarely one of the bacteriostatic water side effects that matter. Plain water injected into the skin hurts: in a trial of 100 women given sterile water injections, average pain was 41 out of 100 under the skin and 61 into the skin^[29]. The drug dissolved in the water, the volume and the injection technique also matter, and the label lists local tenderness among reactions caused by "this solution, added drugs or the technique"^[1]. A sting that fades within minutes is common; redness, itching or swelling that grows over the next day is not, and may be the allergy described in section 5.

Benzyl alcohol numbs the skin a little

Randomized trials of saline with 0.9% benzyl alcohol used to cut injection pain



PubMed abstracts: PMIDs 23164205, 22382793, 16935736, 15728052, 9583393, 32935453, 32350975, 10216324, 9832659, 15167724, 22268727, 11939813, 12789177. Meta-analysis of 13 trials (1,559 people): lidocaine better for IV-line pain (PMID 25261140). Small, mostly single-centre trials.

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Figure 3. Trials of benzyl alcohol-preserved saline as a numbing agent, by size and result. Most are small, single-centre and use saline rather than water. Sources: PubMed abstracts listed in the figure.

7. Who should avoid bacteriostatic water

Most adults tolerate small volumes without trouble. These groups should not use it, or should only use it on a doctor's advice:

Who	Why	Source
Newborns (up to 4 weeks)	Risk of gasping syndrome; use preservative-free sterile water only	US label ^[1] ; EMA ^[10]
Children under 3	Benzyl alcohol can build up; no more than a week unless a doctor advises	EMA ^[10]
Known benzyl alcohol allergy , or a positive patch test	Repeat exposure can bring the reaction back; the 2021 patient had no reaction once it was avoided	Case reports ^[19,16]
Fragrance-allergic skin	Benzyl alcohol is also a fragrance ingredient; dermatologists flag a contact-dermatitis risk	Letter in Dermatol Surg ^[13] ; IVDK ^[6]
Pregnancy and breastfeeding	No reproduction studies; use only if clearly needed; ask before use	US label ^[1] ; EMA ^[10]
Liver or kidney disease	Reduced clearance; large amounts can cause metabolic acidosis	EMA ^[10]
Epidural or spinal injection	Contraindicated	US label ^[1]

Who	Why	Source
Into a vein with nothing dissolved in it	May cause hemolysis	US label ^[1]

If you are in one of these groups and a medicine has to be mixed, ask the prescriber or pharmacist about preservative-free sterile water; our [sterile water vs bacteriostatic water comparison](#) explains the trade-off. Whether 0.9% or 1.1% suits you is covered on our [bacteriostatic water](#) page; for side effects, 1.1% simply delivers 22% more benzyl alcohol per mL.

8. Bacteriostatic water side effects that need urgent care

Most reactions are small and local. Figure 4 sorts the possible reactions by how fast they appear and how serious they are.

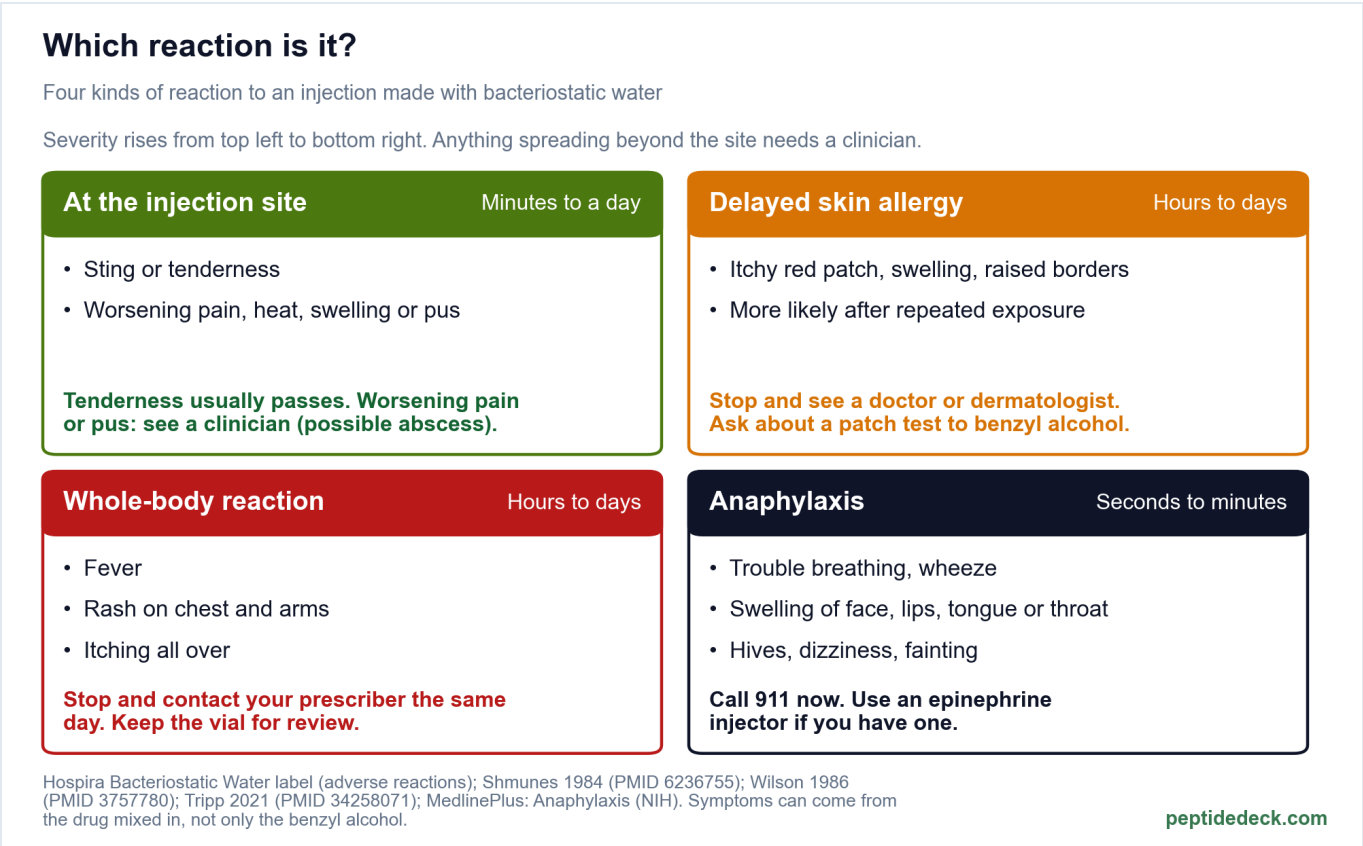


Figure 4. Telling local, allergic, whole-body and emergency reactions apart. Sources: Hospira label; Shmunes 1984; Wilson 1986; Tripp 2021; MedlinePlus.

If you notice...	It could be	What to do
Trouble breathing, wheeze, throat tightness, a hoarse or whispered voice, swelling of the face, lips or tongue, fainting, within seconds to minutes	Anaphylaxis	Call 911 now. Use an epinephrine injector if you have one ^[9]
Hives over the body, dizziness, racing heart or vomiting soon after the injection	Possible early anaphylaxis	Treat as an emergency ^[9]
Fever with a spreading rash, or itching all over, hours to days later	Whole-body allergic reaction	Stop using it and contact your prescriber the same day ^[16,19]

If you notice...	It could be	What to do
An itchy, red, swollen patch with raised edges around the injection site	Allergic contact dermatitis	Stop and see a doctor; ask about patch testing ^[15,4]
Increasing pain, heat, swelling or pus at the site, or fever	Abscess or infection	See a clinician promptly ^[1]
Skin breaking down at the site, or a painful vein spreading from it	Tissue damage, phlebitis or clot	See a clinician promptly ^[1]
Mild sting or tenderness that fades within a day	Normal injection discomfort	No action needed

Keep the vial and the drug you mixed. The label asks clinicians to examine the remaining solution if a reaction occurs^[1], and an allergist will need to know every ingredient you were exposed to.

9. Quick answers

What are the most common bacteriostatic water side effects? Sting or tenderness where the needle went in. The label also lists fever, abscess, infection and vein irritation, which can come from the drug or the injection technique as much as the diluent^[1]. Allergy is uncommon^[5].

Is bacteriostatic water safe? For adults using it as labeled, to dissolve a prescribed drug in small volumes, the label reports no known reactions to injected 0.9% benzyl alcohol^[1], and a 0.5 mL dose is about 1.5% of the acceptable daily intake^[3]. It is not safe for newborns^[1].

Can you be allergic to bacteriostatic water? Yes, through the benzyl alcohol. It is uncommon (0.2 to 0.3% of clinic patients patch tested)^[5,6], but documented after injections^[16,19].

Is benzyl alcohol toxic? At high doses in newborns, yes: 99 mg/kg a day and above was linked to deaths^[2,3]. Adult injection volumes are hundreds of times lower per kg.

Does bacteriostatic water 0.9% benzyl alcohol cause more side effects than 1.1%? No study compares them. The 1.1% strength carries 2 mg more benzyl alcohol per mL^[1].

Questions to ask your doctor or pharmacist

- Does my medicine's own leaflet allow bacteriostatic water, or does it need preservative-free water?
- I have reacted to a cream, cosmetic or fragrance before. Should I be patch tested to benzyl alcohol?
- I am pregnant, breastfeeding, or have liver or kidney disease. Is a benzyl alcohol diluent right for me?
- What volume will I inject each day, and how much benzyl alcohol is that?
- Which reactions at the injection site should make me stop and call you?
- Should I carry an epinephrine injector?

Read the full online guide: [Bacteriostatic Water Guide: peptidedeck.com/blog/bacteriostatic-water-guide](https://www.peptidedeck.com/blog/bacteriostatic-water-guide)

Related: [Bacteriostatic vs sterile water vs saline](#) · [Bacteriostatic water: 0.9% vs 1.1%](#) · [Peptide calculator](#)

Sources

Every number in this guide comes from one of these sources, read in October 2026. Dose and ADI percentages are our own calculations from the label strengths and the JECFA figure.

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Medical disclaimer. This guide is for education only and is not medical advice. Bacteriostatic Water for Injection is a prescription (Rx only) product in the US. Benzyl alcohol must not be used in newborns. Do not start, stop or change any injection because of this guide; talk to your prescriber or pharmacist. In an emergency, call 911 or your local emergency number. PeptideDeck is an independent publisher and is not affiliated with Hospira, Pfizer or any manufacturer of bacteriostatic water.

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