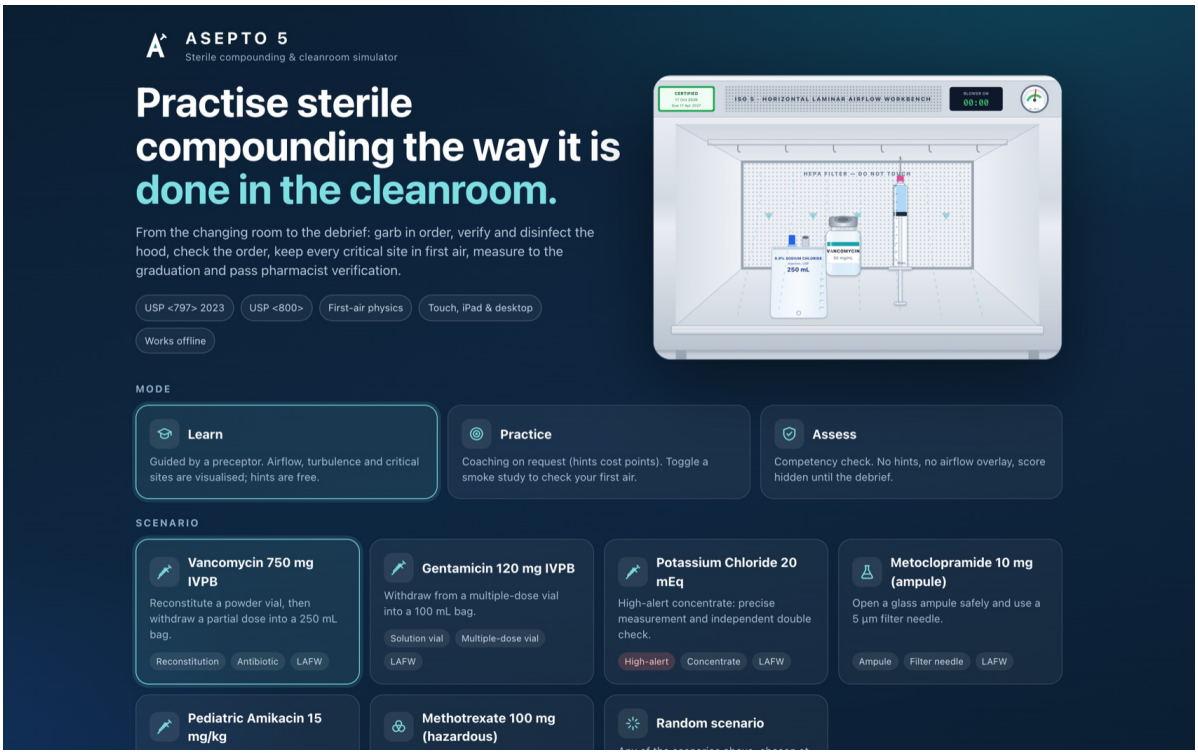


ASEPTO 5

Sterile Compounding & Cleanroom Simulator

User Guide for Students and Instructors · October 2026



Platform	Standards	Data
Any modern browser on Windows, macOS, iPad, Android or iPhone. One HTML file; works offline.	Aligned with USP <797> (2023 revision) and USP <800>.	100% client-side. Nothing is sent to a server; results stay in the browser tab.

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Contents

1. Introduction — what ASEPTO 5 is and what is new
2. Getting started — opening the app, modes and scenarios
3. The screen at a glance
4. Phase 1 — Personnel preparation
5. Phase 2 — Garbing in the anteroom
6. Phase 3 — Preparing and cleaning the hood
7. Phase 4 — Order verification
8. Phase 5 — Compounding
9. Phase 6 — Doffing
10. The debrief report
11. Scoring and competency
12. Using ASEPTO on iPad and phones
13. Notes for instructors
14. Troubleshooting
15. Glossary

1. Introduction

ASEPTO is an interactive simulator that trains pharmacy students and technicians in the complete sterile-compounding workflow — from preparing yourself in the changing room to removing your garb on exit. Students work through realistic scenes, make the same decisions a compounder makes in a cleanroom, and receive an itemised competency report referenced to USP <797> and <800>.

ASEPTO 5 keeps the order of steps and the gating logic of version 4 (for example: the mask must be donned before the hair cover, the hood must be at least 90% clean, and the volume calculation must be correct before compounding). Everything around that logic has been rebuilt to look and behave like an industry training tool.

What is new in version 5

Area	Version 4	Version 5
Look & feel	Simple shapes on a flat canvas	Illustrated rooms, hood, figure and supplies; works on desktop, iPad and phone
Learning modes	One mode	Learn (guided), Practice (hints cost points), Assess (no help, score hidden)
Scenarios	One generic drug	Six clinical cases incl. reconstitution, high-alert, ampule, paediatric and hazardous drug
Garbing	Drag items to a mannequin	Locker room, step-over bench, 30-second handwash, gown ties, hand rub, aseptic gloving
Hood cleaning	Any straight stroke	Pre-use checks, top-to-bottom and back-to-front rules, HEPA contact, alcohol drying time
Compounding	Right-click menus, fixed 10 mL draw	Real syringe graduations, vial pressure, bubbles, coring, filter needles, pharmacist verification
First air	Red shadows	Animated HEPA airflow, turbulence zones and critical-site rings
Report	Grade A or B only	Competency verdict, domain scores, error list with USP references, breach map, PDF/CSV/JSON export

2. Getting started

2.1 Opening the simulator

1. Open **Asepto_V5.html** in Chrome, Edge, Safari or Firefox. No installation or internet connection is needed.
2. On an iPad or phone, open the file from the Files app or from an LMS link, then (optionally) use **Share → Add to Home Screen** for a full-screen app.
3. Turn the device to **landscape** for the best view of the rooms and the hood. A reminder appears on small phones held upright.

2.2 The start screen

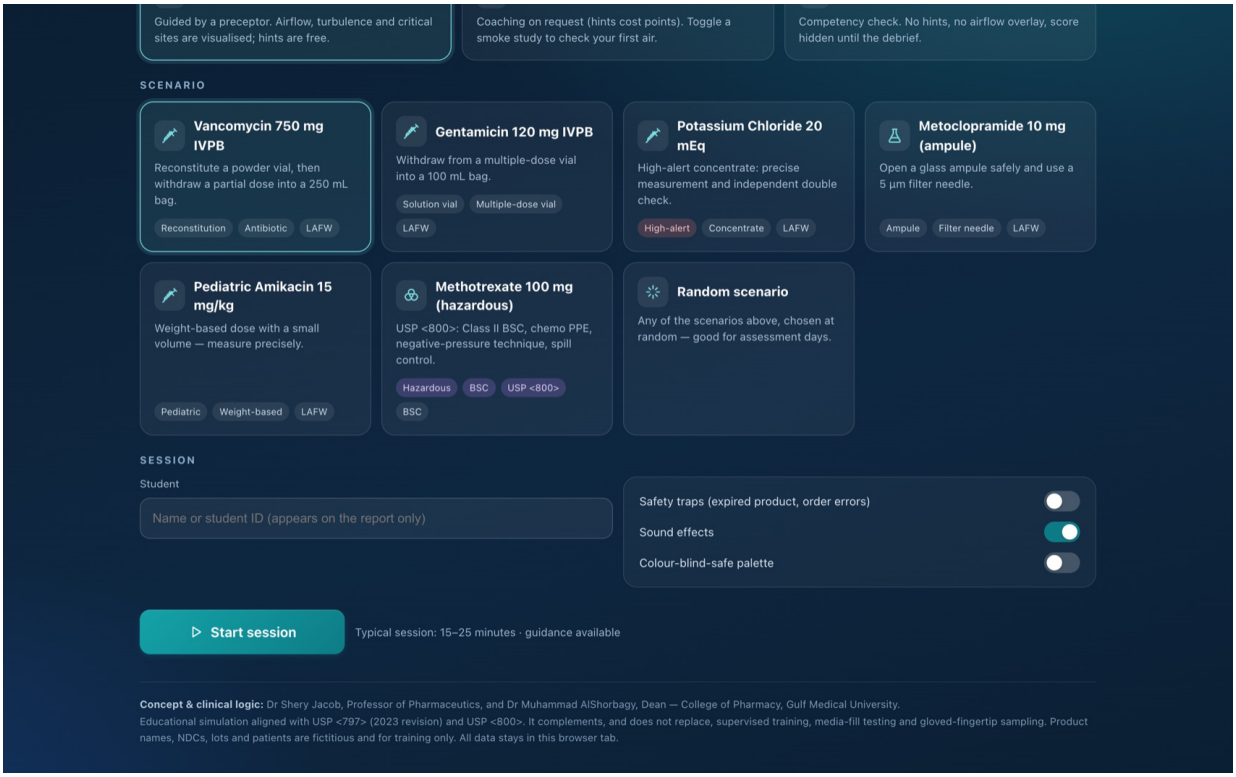


Figure 1 — Choose a mode and a scenario, enter your name or ID, then select Start session.

1. Choose a **mode** (see the table below).
2. Choose a **scenario**, or Random scenario for assessment days.
3. Type your **name or student ID** — it only appears on your report.
4. Leave **Safety traps** on for Practice and Assess. Traps randomly add an expired vial or a 10× dosing error to the order.
5. Select **Start session**.

Mode	What the student sees	Best for
Learn	A preceptor explains every step; airflow and turbulence are drawn; critical sites are ringed; hints are free; full explanations with USP references after each error.	First exposure and lab demonstrations

Mode	What the student sees	Best for
Practice	Brief guidance; hints cost points; a Smoke study switch shows the airflow on demand.	Independent rehearsal before assessment
Assess	No hints, no airflow overlay, score and violations hidden until the debrief. Errors are recorded silently as "Deviation recorded".	Competency checks and graded practicals

2.3 Scenario library

Scenario	Key learning	Hood
Vancomycin 750 mg IVPB	Reconstitute a 1 g powder vial with 20 mL sterile water, swirl, withdraw 15 mL	LAFW
Gentamicin 120 mg IVPB	Multiple-dose vial, small volume (3 mL)	LAFW
Potassium chloride 20 mEq	High-alert concentrate; independent double check	LAFW
Metoclopramide 10 mg (ampule)	Opening glass ampules, 5 µm filter needle, needle change	LAFW
Paediatric amikacin 15 mg/kg	Weight-based dose, 1.2 mL measurement	LAFW
Methotrexate 100 mg	USP <800>: biological safety cabinet, chemo PPE, negative pressure, spill kit	Class II BSC

3. The screen at a glance



Figure 2 — The compounding screen with its main controls numbered.

#	Element	What it does
1	Progress stepper	The seven stages of the session. Completed stages show a tick.
2	Score · First air · Time	Live score, number of first-air violations and elapsed time (hidden in Assess mode).
3	Sound and Menu	Mute; menu with settings (reduce motion, colour-blind palette, dominant hand), Restart attempt and Quit.
4	View switch	Full view, Hood, or Supplies — zooms the compounding scene (useful on phones).
5	HEPA filter	The source of first air. In the LAFW air flows from here toward you.
6	Selected item & critical site	A dashed outline marks the selected item. Rings mark critical sites: green = in first air, red = blocked, amber = contaminated.
7	6-inch line	Work behind this line. The hatched area is the outer 6 inches of the hood.
8	Supplies tray	Everything you need, outside the hood. Wipe each item before introducing it.
9	Waste bin	Wrappers, caps and used pads. Sharps never go here.
10	IV workflow station	Drag the finished, labelled bag here for pharmacist verification.
11	Action tray	Appears when you tap an item: every available action as a large button.
12	Task checklist	The steps of the current phase; the active step is highlighted.
13	Preceptor & Hint	Guidance for the next step (Learn), or hints on request (Practice).

4. Phase 1 — Personnel preparation

GOAL · Arrive at the anteroom clean and ready

Remove every personal item and confirm your personal hygiene and health before entering.

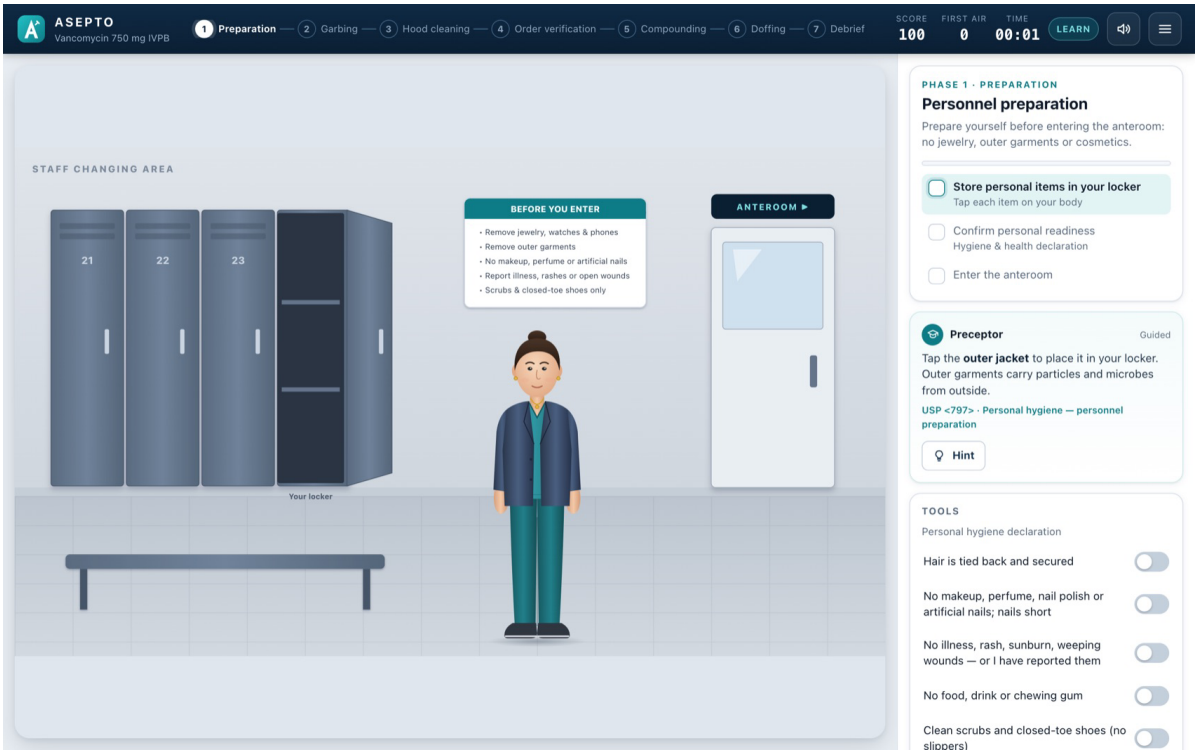


Figure 3 — The changing area. Personal items are worn by the figure; your locker is open on the left.

How to complete this phase

1. **Tap each personal item** on the figure — jacket, watch, ring, earrings, necklace or phone. It moves into your locker. Look carefully: a phone or watch may be hidden under the jacket.
2. In the **Tools** panel, switch on all five declarations: hair secured; no makeup, perfume, nail polish or artificial nails; no illness, rash or open wounds (or reported); no food or gum; clean scrubs and closed-toe shoes.
3. Select **Enter anteroom** (or tap the Anteroom door).

WATCH OUT · Common errors

Trying to enter while still wearing a personal item: **minor (−2)**, and entry is blocked until it is removed.

5. Phase 2 — Garbing in the anteroom

GOAL · Don PPE from dirtiest to cleanest
Mask → hair cover → shoe covers → hand hygiene → gown → hand antisepsis → sterile gloves. This order is enforced exactly as in version 4.

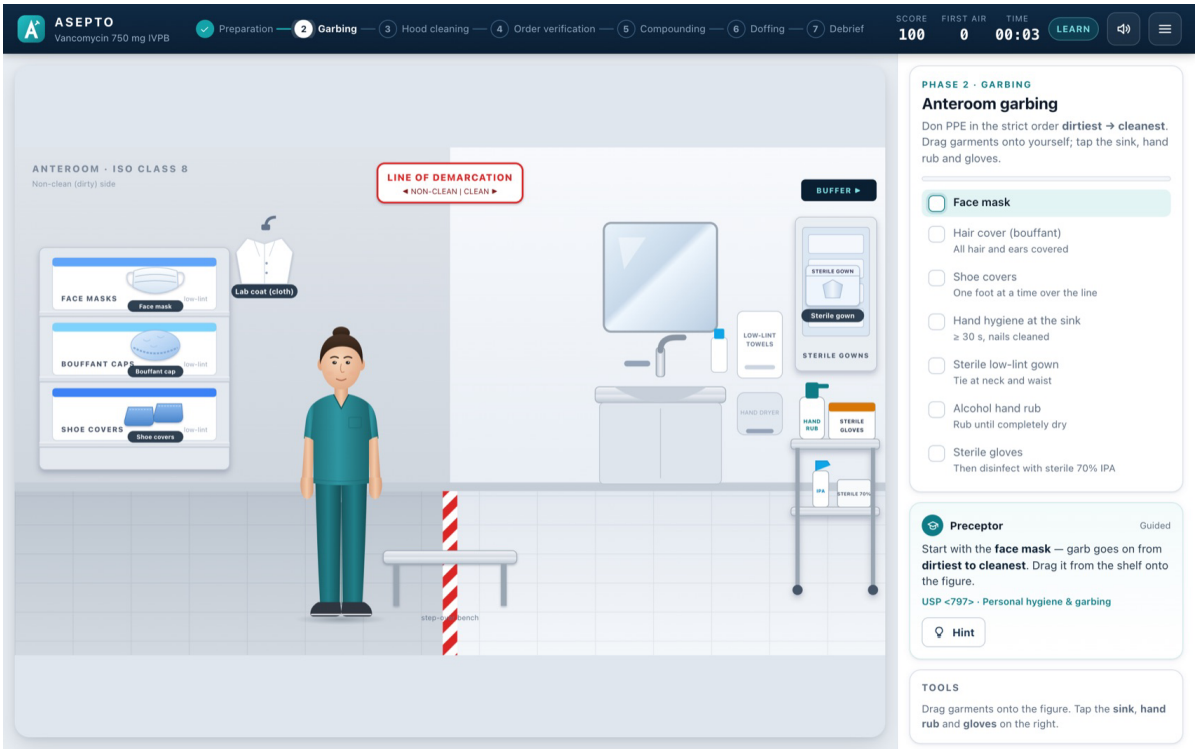


Figure 4 — The anteroom: garb shelf (left), line of demarcation, sink, gown dispenser and buffer-entry cart (right).

How to complete this phase

1. **Drag the face mask** from the shelf onto the figure.
2. **Drag the bouffant cap** onto the figure. All hair and both ears are covered.
3. **Drag the shoe covers** onto the figure. The figure moves to the step-over bench: **tap the left foot and the right foot** — each is covered and swung over the line onto the clean side.
4. **Tap the sink** and complete hand hygiene (below).
5. **Drag the sterile gown** (not the cloth lab coat) onto the figure, then **tap the neck tie and the waist tie**.
6. **Tap the hand rub** on the cart and rub until dry.
7. **Tap the sterile gloves** and don them aseptically. The scene then moves to the buffer room automatically.

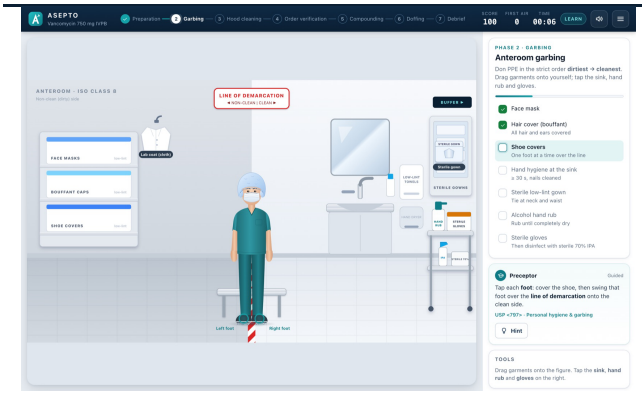


Figure 5 — Shoe covers at the bench: tap each foot.

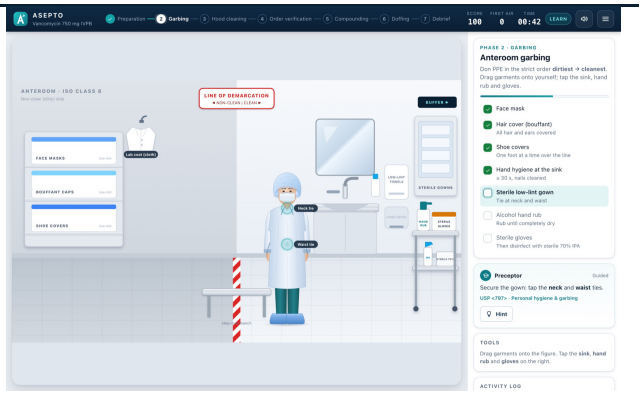


Figure 6 — Secure the gown at neck and waist.

Hand hygiene station

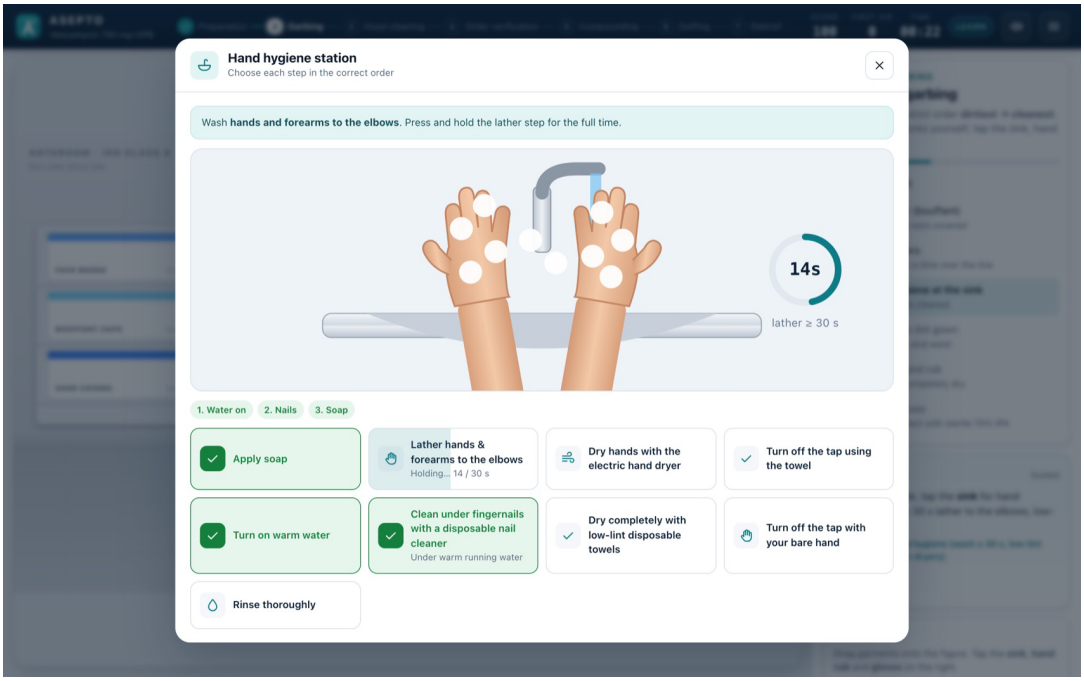


Figure 7 — Choose the steps in order. Press and hold "Lather" for the full 30 seconds; the ring shows the time.

Correct order: **turn on warm water → clean under nails with a disposable nail cleaner → apply soap → lather hands and forearms to the elbows for at least 30 s → rinse → dry with low-lint towels → turn off the tap with the towel.**

Sterile gloving

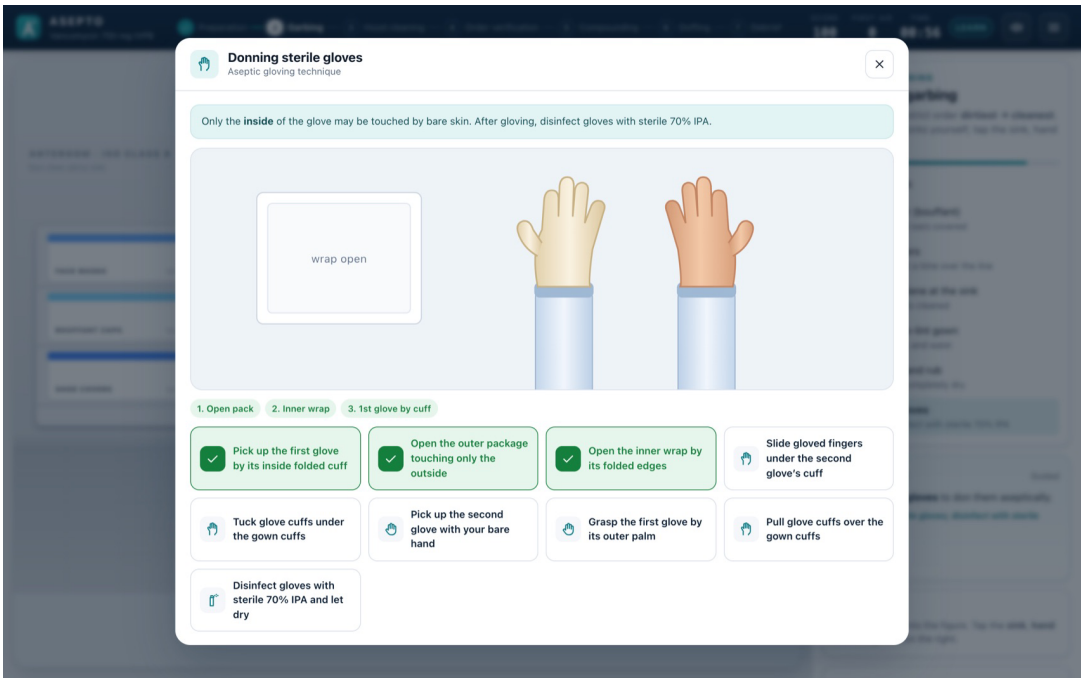


Figure 8 — Gloving: only the inside of the glove may touch bare skin.

Correct order: open the outer package touching only the outside → open the inner wrap by its folded edges → pick up the first glove by its inside folded cuff → slide gloved fingers under the second glove's cuff → pull glove cuffs over the gown cuffs → disinfect gloves with sterile 70% IPA. In the methotrexate scenario two pairs of chemotherapy-tested gloves are donned (inner pair under the gown cuff, outer sterile pair over it).

Error	Severity	Why it matters
Any garment out of order (e.g. gown before washing)	Major −5	Re-contaminates garb already donned
Choosing the cloth lab coat	Major −5	Cloth sheds particles; use a low-lint disposable gown
Lathering less than 30 s	Major −5	USP <797> minimum hand-wash time
Using the electric hand dryer	Major −5	Hand dryers are not permitted; they disperse particles
Touching the outer surface of a sterile glove	Major −5	Gloving restarts from the beginning
Washing or sanitising too early	Minor −2	Hands would be re-contaminated by later steps

6. Phase 3 — Preparing and cleaning the hood

GOAL · Verify the hood, then disinfect every surface

Coverage must reach at least 90% (as in version 4), with straight, overlapping strokes in the right direction.

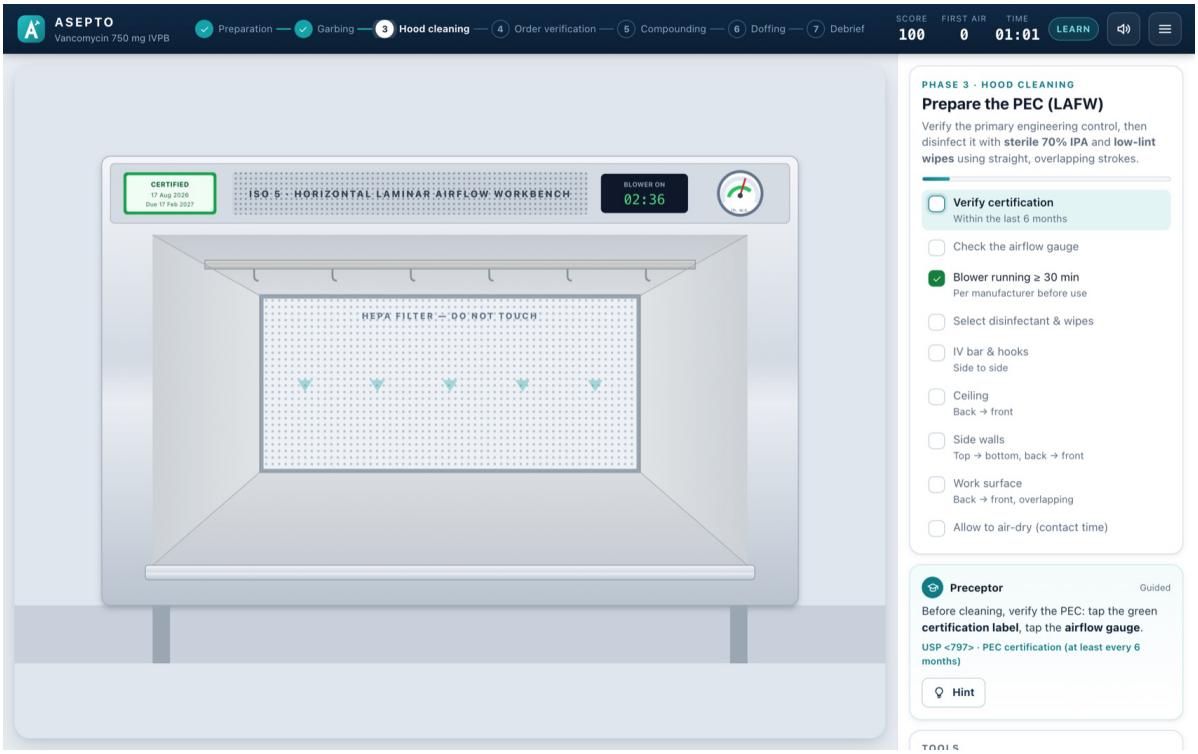


Figure 9 — The laminar airflow workbench: certification label (top left), blower timer and airflow gauge (top right).

Step A — pre-use checks

1. Tap the green **CERTIFIED** label: certification must be within the last 6 months. Select **Certification is current**.
2. Tap the round **airflow gauge**: confirm the reading is within the acceptable range.
3. Tap the **blower timer**. If it shows less than 30 minutes, select **Wait until 30 min**.

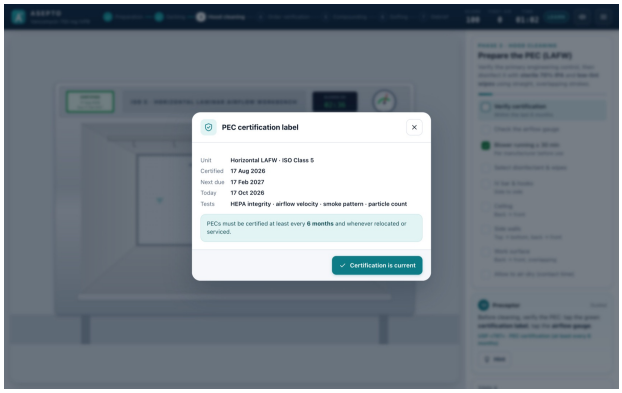


Figure 10 — Certification details.

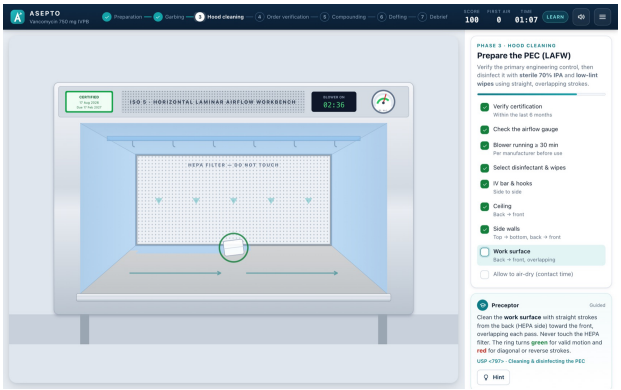


Figure 11 — Wiping the work surface; blue sheen = wet alcohol.

Step B — choose materials and clean

1. In **Tools**, choose **Sterile 70% IPA** and **Low-lint sterile wipe**, then **Start cleaning**.
2. Wipe in this order: **IV bar and hooks** (side to side) → **ceiling** (back to front) → **left and right walls** (top to bottom, working from the back toward the front) → **work surface** (side to side, starting at the HEPA filter and moving toward the front).
3. Watch the ring around the wipe: **green** = valid stroke, **red** = diagonal, circular or reverse stroke. Follow the progress bars for each zone in Tools.
4. When all zones are done, wait for the blue sheen to fade (contact time) and select **Finish cleaning**.

Error	Severity
Non-sterile IPA or paper towels selected	Major −5 each
Touching the HEPA filter face	Major −5
Finishing with less than 90% coverage	Major −10 (must continue cleaning)
Wiping toward the HEPA filter	Minor −2
Diagonal/circular strokes, or wiping walls upward	Minor −1
Cleaning out of order; returning over a cleaned area	Minor −2
Skipping a pre-use check; starting before 30 min; not letting IPA dry	Minor −2 each

7. Phase 4 — Order verification

GOAL · Verify the order and complete the calculations

The volume calculation remains the gate to compounding, exactly as in version 4.

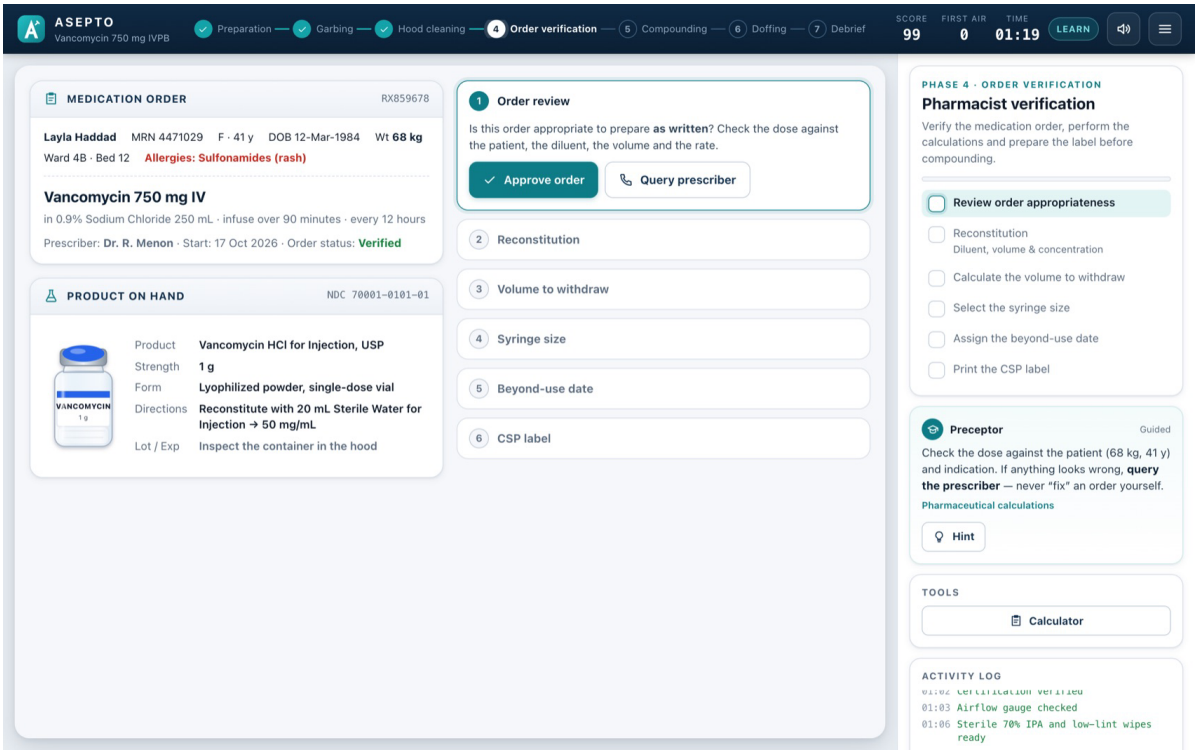


Figure 12 — The pharmacy workstation: medication order and product on the left, worksheet on the right.

How to complete this phase

1. **Review the order.** Check the dose against the patient's weight, age and indication. Select **Approve order**, or **Query prescriber** if something is wrong (e.g. a 10× dose). The prescriber replies with the corrected order.
2. **Reconstitution** (powder vials only): select the diluent named on the label, enter the diluent volume and the resulting concentration.
3. **Volume to withdraw:** dose ÷ concentration (for weight-based doses, first mg/kg × weight). Accepted within ±1%. A calculator is available in Tools.
4. **Syringe size:** choose the smallest syringe that holds the full volume in one draw.
5. **Beyond-use date:** Category 2 CSP from sterile components, no sterility testing — 4 days at room temperature, 10 days refrigerated, 45 days frozen.
6. **Print the label** and continue to compounding. The label waits in your supply tray.

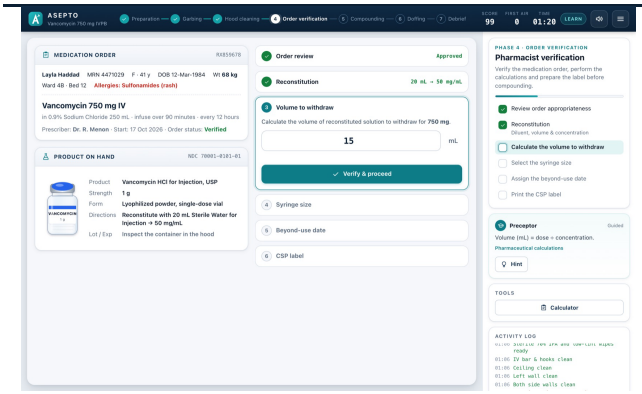


Figure 13 — Reconstitution and volume calculation.

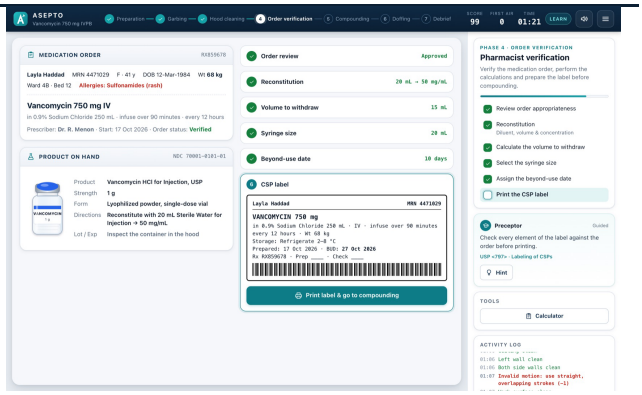


Figure 14 — Syringe, BUD and the printed CSP label.

Error	Severity
Approving an order that contains a 10× dosing error	Critical −20
Wrong reconstitution diluent; calculation retry	Major −5 each
Incorrect BUD	Minor −3
Syringe too small or larger than needed	Minor −2
Querying an order that was correct	Minor −1

8. Phase 5 — Compounding

> **GOAL · Prepare the CSP aseptically and accurately**
> Keep every critical site in first air, measure to the graduation, and pass pharmacist verification.

8.1 Understanding first air

In the laminar airflow workbench, HEPA-filtered air flows from the back of the hood toward you. Any object — or your hand — creates a **zone of turbulence** downstream of it, about three times its width. A critical site (needle, vial septum, ampule neck, bag port, syringe tip) must never sit in such a zone.



Figure 15 — First-air breach: the sterile-water vial is upstream of the exposed needle. The needle's ring turns red and the violation is recorded.

- Each **second** a critical site stays blocked records one first-air violation (−2) and marks that site as contaminated (amber ring).
- A contaminated **septum or port** must be disinfected again; a contaminated **needle** must be replaced. Using it anyway is a major error each time.
- Touching a critical site directly is a major error. Hold syringes by the barrel, vials by the body.
- Keep items **side by side**, at least 6 inches inside the hood (4 inches inside the front grille in the BSC), never one behind another.

8.2 Setting up the hood

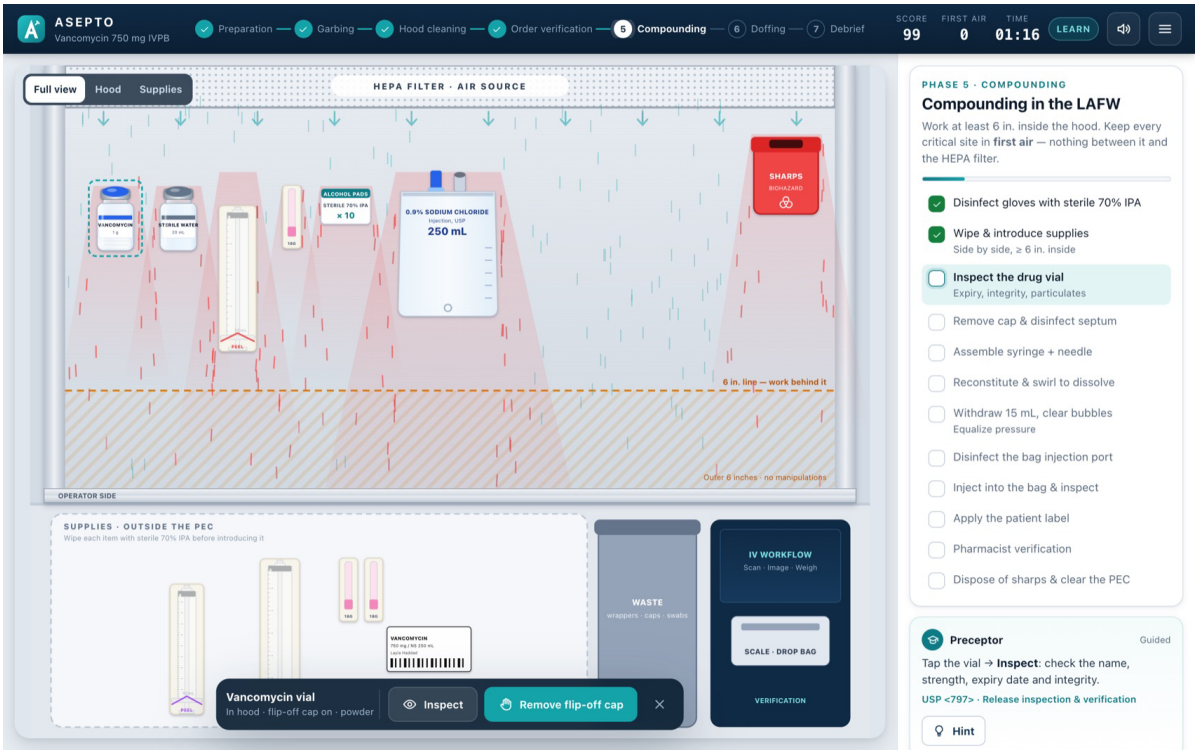


Figure 16 — Supplies introduced side by side; the vial is selected and its actions appear in the tray.

1. Select **Disinfect gloves (sterile IPA)** in Tools.
2. For each supply: tap it → **Wipe with sterile IPA** → **Introduce into hood** (or drag it in). You need the drug container, the chosen syringe, needle(s), alcohol pads and the IV bag (plus sterile water for vancomycin).
3. Tap the vial → **Inspect**: compare the expiry date with today's date and check integrity. **Reject** an expired product — a replacement appears in the tray.
4. Tap the vial → **Remove flip-off cap**, then **Disinfect septum**. Wait for the alcohol to dry (the blue sheen disappears).
5. Tap the syringe → **Peel open**. Peel a needle and **drag it onto the syringe tip** to attach it. Tap the syringe → **Uncap needle**.

> **TIP · Two ways to do most things**
>
> **Drag** items directly (e.g. drag a needle onto a syringe, a syringe needle onto a vial septum, a label onto the bag), or **tap** an item and use the buttons in the action tray. Both give the same result — use whichever suits your device.

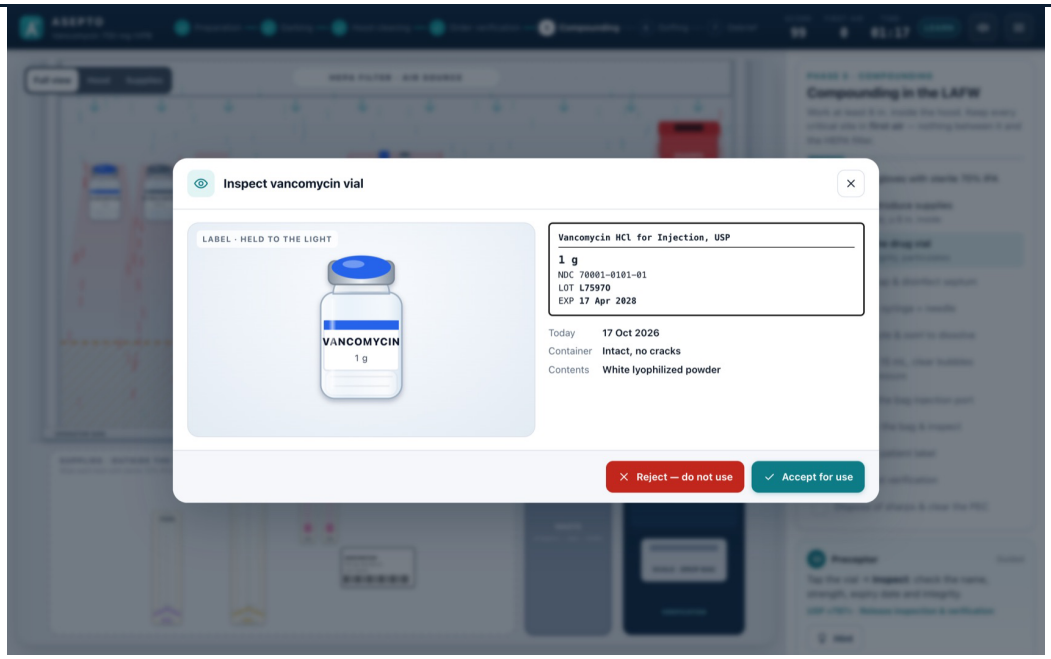


Figure 17 — Product inspection: name, strength, lot and expiry against today's date.

8.3 The syringe close-up

Drag the syringe's needle onto the vial septum, ampule or bag port (or tap the syringe → **Use with…**). A close-up opens.

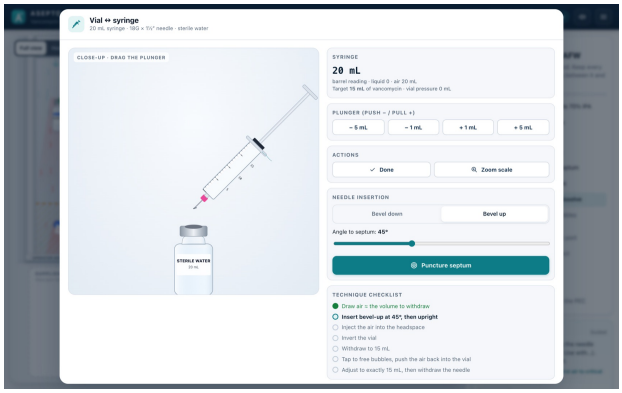


Figure 18 — Needle insertion: bevel up at about 45°.

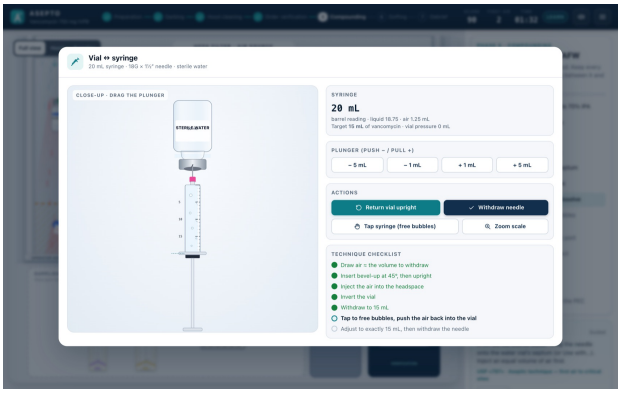


Figure 19 — Vial inverted; an air bubble is visible in the barrel.

Withdrawing from a vial

1. **Draw air** roughly equal to the volume you will withdraw (drag the plunger, or use the + buttons).
2. Select **Insert needle…**, choose **Bevel up**, set the angle to about **45°** and select **Puncture septum**. A bevel-down or straight-in puncture risks coring (rubber particles found later at final inspection).
3. **Push the plunger** to inject the air into the vial headspace (equalise the pressure).
4. Select **Invert vial**, then **pull the plunger** to withdraw the solution.
5. Select **Tap syringe** to free bubbles, then push the air back into the vial.
6. Adjust to the exact volume — read at the **leading edge of the black plunger tip**. Use **Zoom scale** for precision.
7. Select **Withdraw needle**.

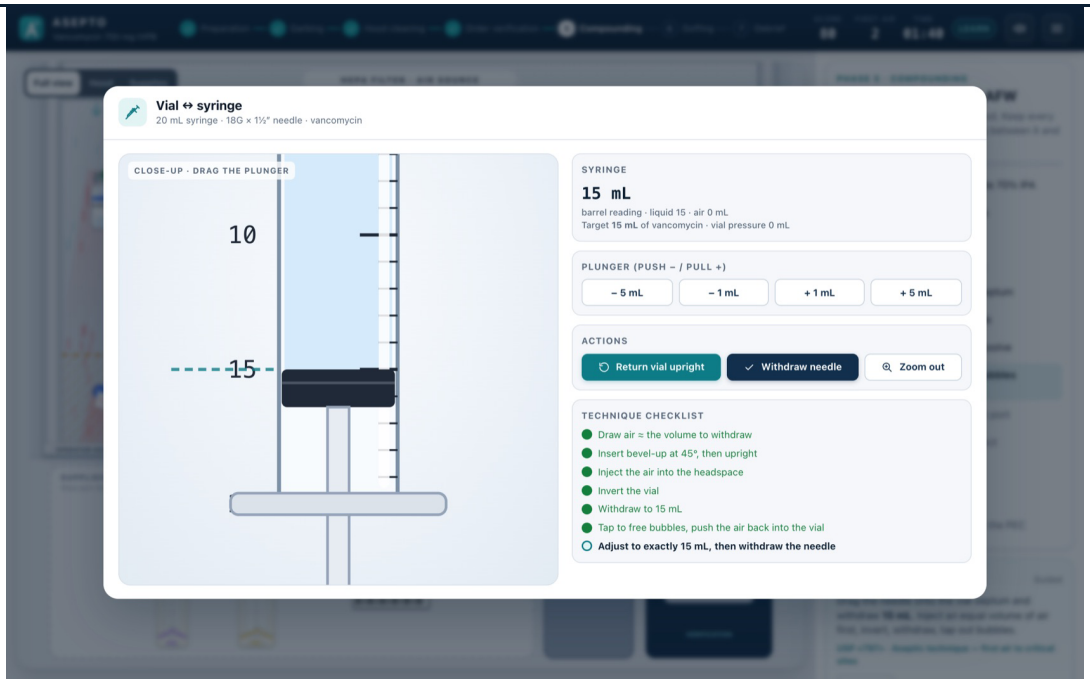


Figure 20 — Zoom scale: read the volume at the plunger's leading edge (here exactly 15 mL).

> **TIP · Pressure matters**
> Withdrawing without replacing the volume with air creates a **vacuum** that pulls the plunger back. Injecting much more air than you withdraw leaves the vial **pressurised** and it may spray. For **hazardous drugs** use negative-pressure technique: never inject more air than you withdraw — positive pressure releases aerosol and triggers a spill.

Reconstitution (vancomycin)

Draw 20 mL sterile water from the diluent vial, inject it into the powder vial, pull back the displaced air, withdraw the needle, then tap the vial → **Swirl to dissolve** (press and hold) and confirm the solution is clear before withdrawing the dose.

Opening an ampule (metoclopramide)

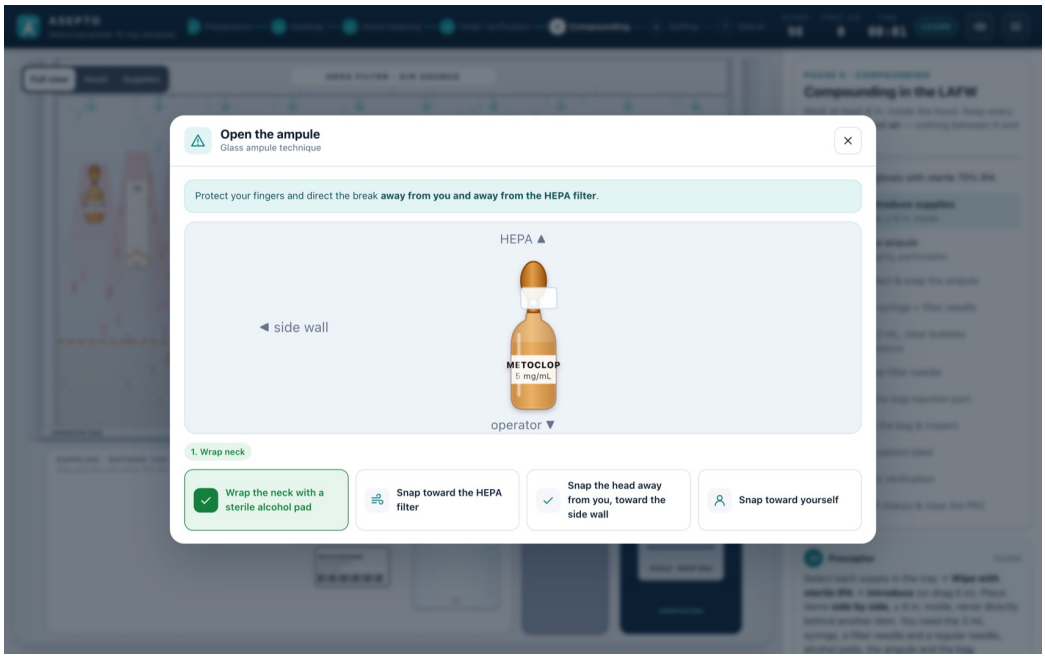


Figure 21 — Wrap the neck and snap away from you, toward the side wall — never toward the HEPA filter.

- Tap the ampule → **Tap fluid down from head** → **Disinfect neck** → **Snap open…**.
- Withdraw with the **5 µm filter needle**. Never push air or fluid back into an ampule.
- Outside the ampule select **Tap syringe**, then **Tap & expel air (needle up)**.
- **Change the needle**: Remove needle → sharps, attach a regular needle, then inject into the bag. Glass head goes to the sharps container.

8.4 Finishing the CSP

1. Tap the bag → **Disinfect injection port**; wait for it to dry.
2. Drag the needle onto the port (or Use with…) → **Insert into port** → push the plunger fully → **Withdraw needle**.
3. Tap the bag → **Inspect final CSP** (reject if particles are seen).
4. Drag the **label** onto the bag (or tap the bag → Apply label).
5. Drag the bag onto the **IV workflow station** (or tap → Send to verification) and run the four checks.
6. Discard syringes and needles into the **sharps container**, wrappers and pads into the **waste** bin, then select **Proceed to exit**.

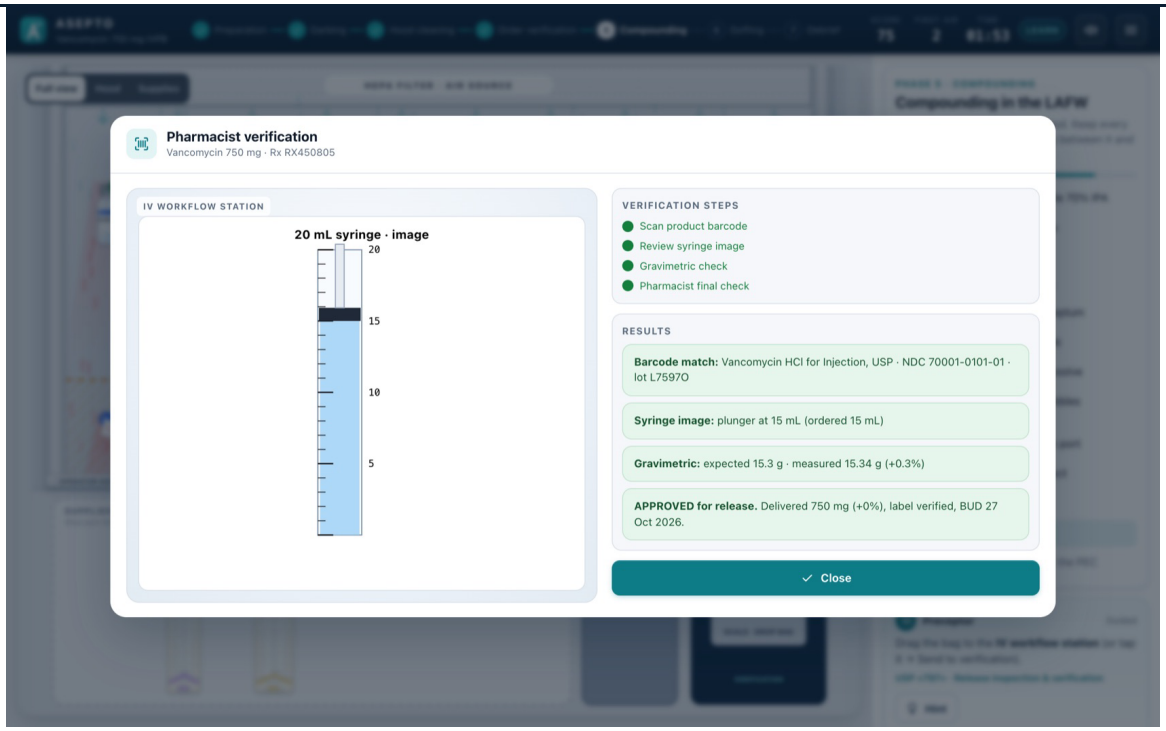


Figure 22 — Pharmacist verification: barcode scan, syringe image, gravimetric check and final approval.

Verification result	Outcome
Delivered dose within ±5% of the order	Approved for release
Deviation between 5% and 10%	Rejected — Major −5
Deviation above 10%, no drug in bag, or expired product used	Rejected — Critical −20

8.5 Distractions

Up to four realistic interruptions appear during compounding. Read the card and choose the correct response before the timer bar runs out.

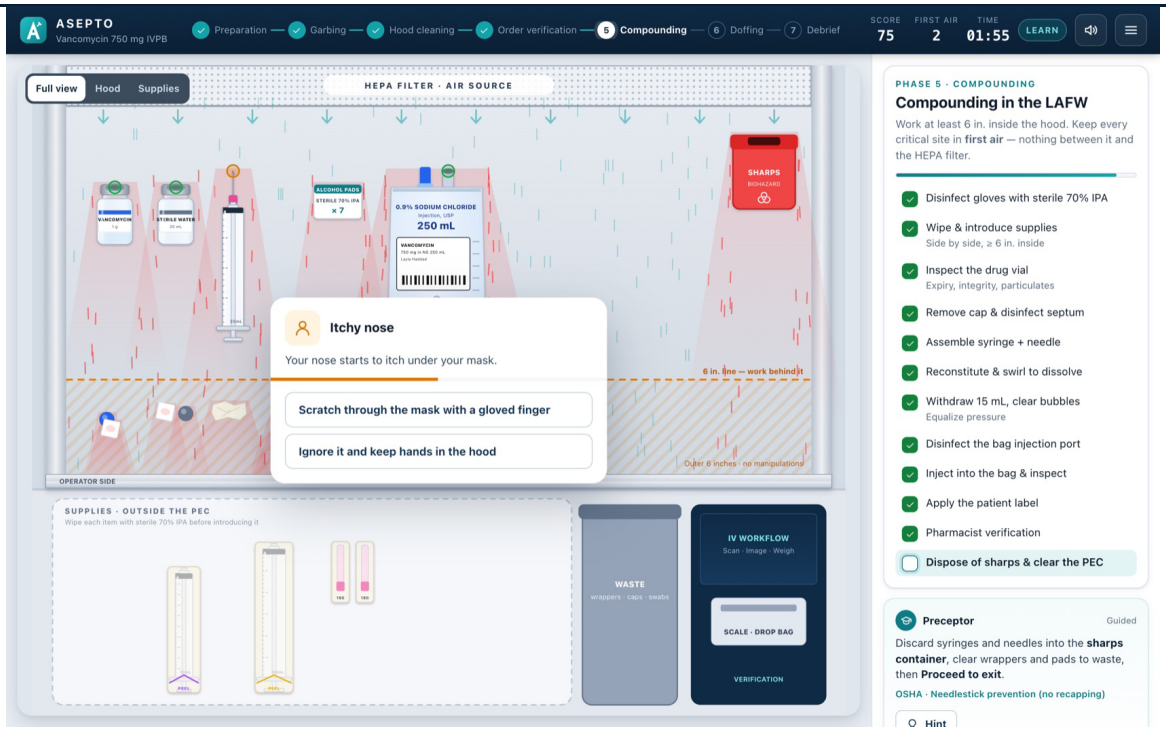


Figure 23 — A distraction card (itchy nose): choose the correct response before the timer bar runs out.

Event	Correct response	Wrong response
Phone ringing	Ignore it; keep working aseptically	Leaving to answer — Major
Colleague asks a question	Reply after the manipulation, without talking toward the hood	Chatting into the hood — Minor
Itchy nose	Ignore it	Touching your face — Major; gloves must be disinfected again
Sneeze coming	Turn away and step back	Sneezing toward the hood — Major; exposed sites contaminated
Airflow alarm	Stop, protect sites, notify supervisor; then re-disinfect septa and ports	Continuing to compound — Major
Spill inside the BSC (methotrexate)	Work through the spill-kit steps in order	Switching the BSC off — Major

8.6 Hazardous drugs in the biological safety cabinet

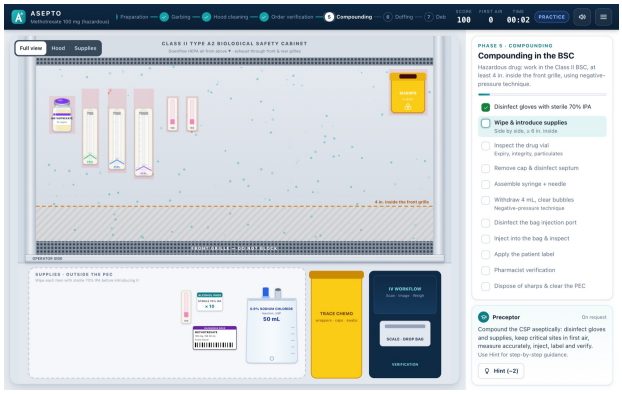


Figure 24 — Class II BSC: downflow air, front and rear grilles, yellow trace-chemo waste.

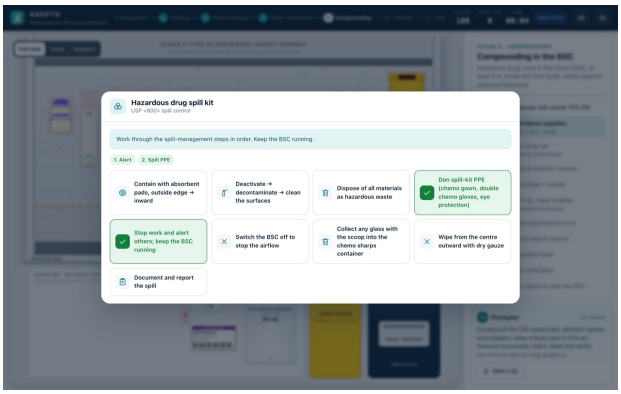


Figure 25 — Spill-kit procedure (USP <800>).

- Air comes **from above**: anything directly over a critical site — including your hand — blocks first air.
- Keep work **at least 4 inches inside** the front grille and **never block the grilles**.
- Use **negative-pressure technique** and dispose of gloves, gown and waste as **trace chemotherapy waste**.
- Spill kit order: alert others → don spill-kit PPE → contain from the outside edge inward → collect glass → deactivate, decontaminate, clean → dispose as hazardous waste → document.

Compounding error	Severity
Using an expired product	Critical −20
Puncturing a septum or port that was not disinfected, or that lost first air	Major −5
Using a needle that lost first air or was touched; touching a critical site	Major −5
No filter needle for an ampule; not changing the filter needle	Major −5
Manipulation within the outer 6 inches	Major −5
Recapping a needle; sharps in regular waste	Major −5
First-air violation (each second a site is blocked)	Minor −2
Item introduced without wiping; puncturing while alcohol is wet; coring	Minor −2
Leaving without a verified CSP	Major −10

9. Phase 6 — Doffing

GOAL · Remove PPE from most to least contaminated

Gloves → gown → hair cover → mask → shoe covers (order unchanged from version 4), then hand hygiene.

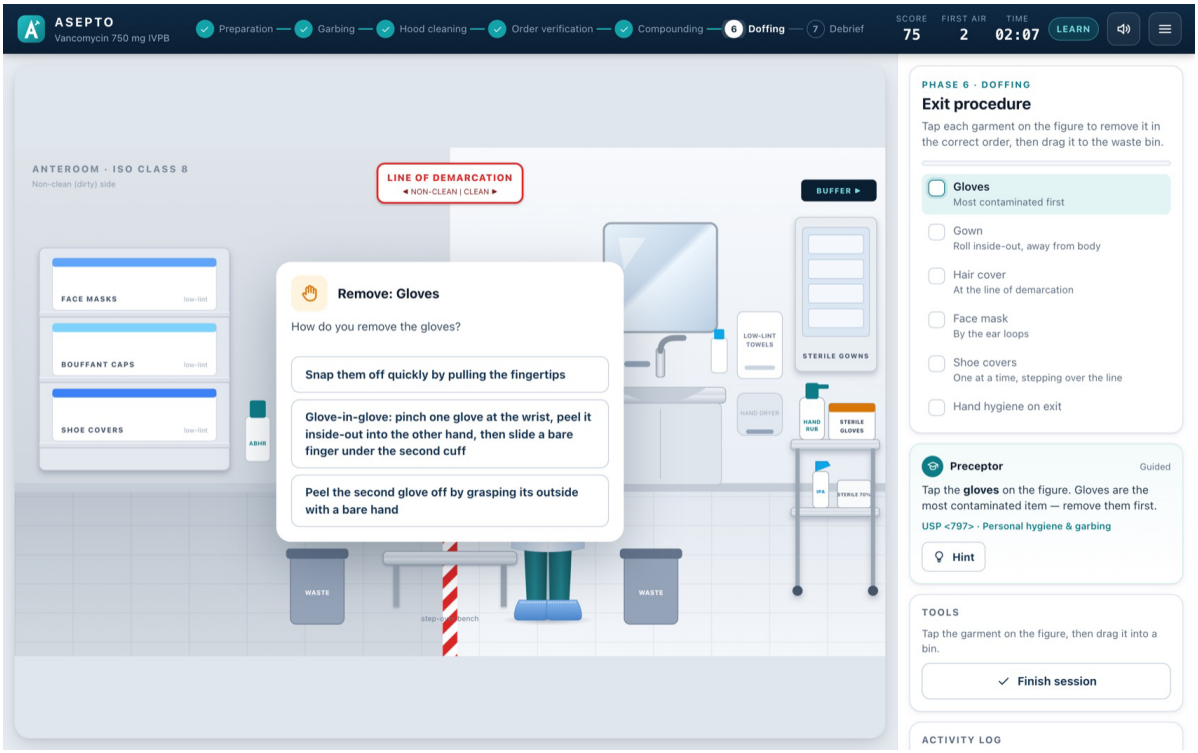


Figure 26 — Tap a garment on the figure, choose the correct removal technique, then drag it into a bin.

1. Tap the **gloves** on the figure and choose the **glove-in-glove** technique. Drag the gloves into a waste bin (the yellow trace-chemo bin for methotrexate).
2. Tap the **gown**: untie, pull from the shoulders and roll it inside-out away from the body. Discard it.
3. At the line of demarcation, remove the **hair cover**, then the **mask** by its ear loops.
4. Remove the **shoe covers** as you step over the line to the non-clean side.
5. Tap the **hand rub** on the non-clean side to perform hand hygiene. The debrief opens automatically.

WATCH OUT · Common errors

Removing an item out of order: **Major −5**. Poor removal technique or the wrong bin: **Minor −2**. Skipping hand hygiene on exit: **Minor −2**.

10. The debrief report

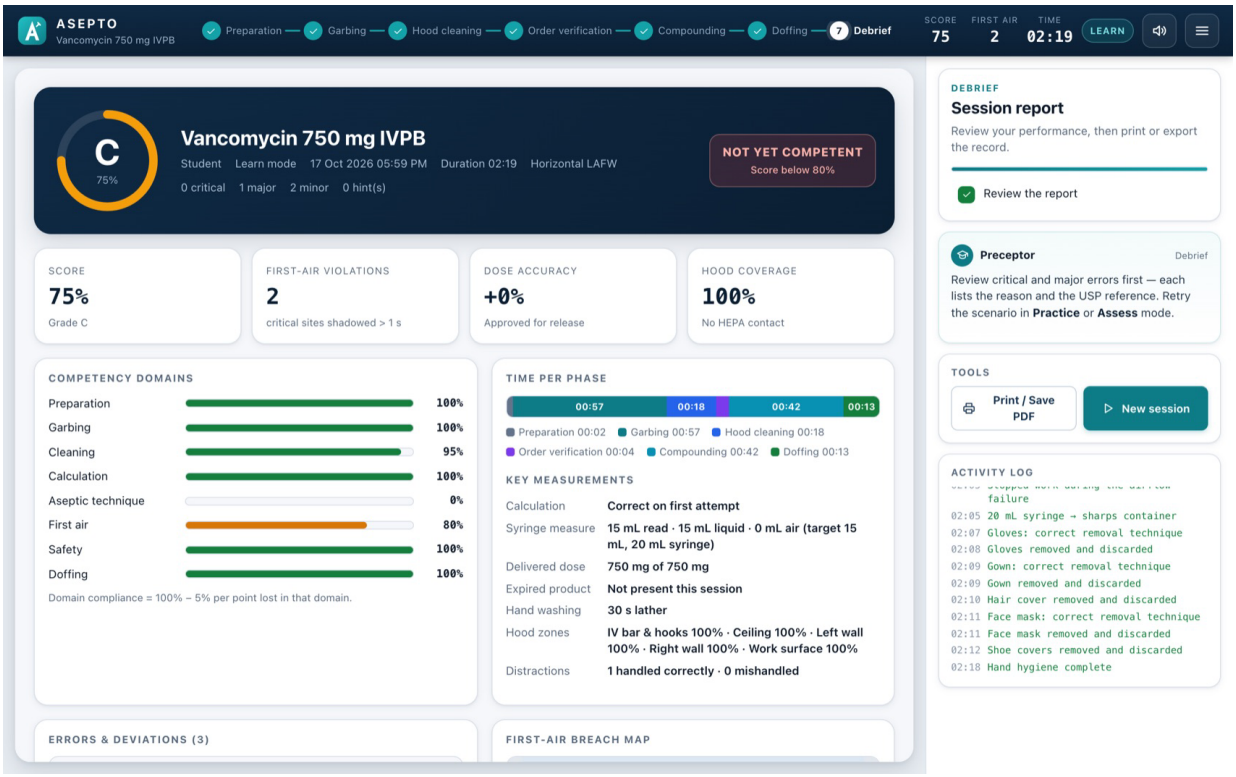


Figure 27 — The report header, key statistics, competency domains and key measurements.

- **Grade and verdict.** COMPETENT requires a score of at least 80% and no critical errors.
- **Statistics.** Score, first-air violations, dose accuracy and hood coverage.
- **Competency domains.** Preparation, Garbing, Cleaning, Calculation, Aseptic technique, First air, Safety and Doffing (100% minus 5% per point lost in that domain).
- **Time per phase** and **key measurements** — calculation attempts, syringe reading versus liquid, delivered dose, expired-product detection, hand-wash time, zone coverage and distractions.

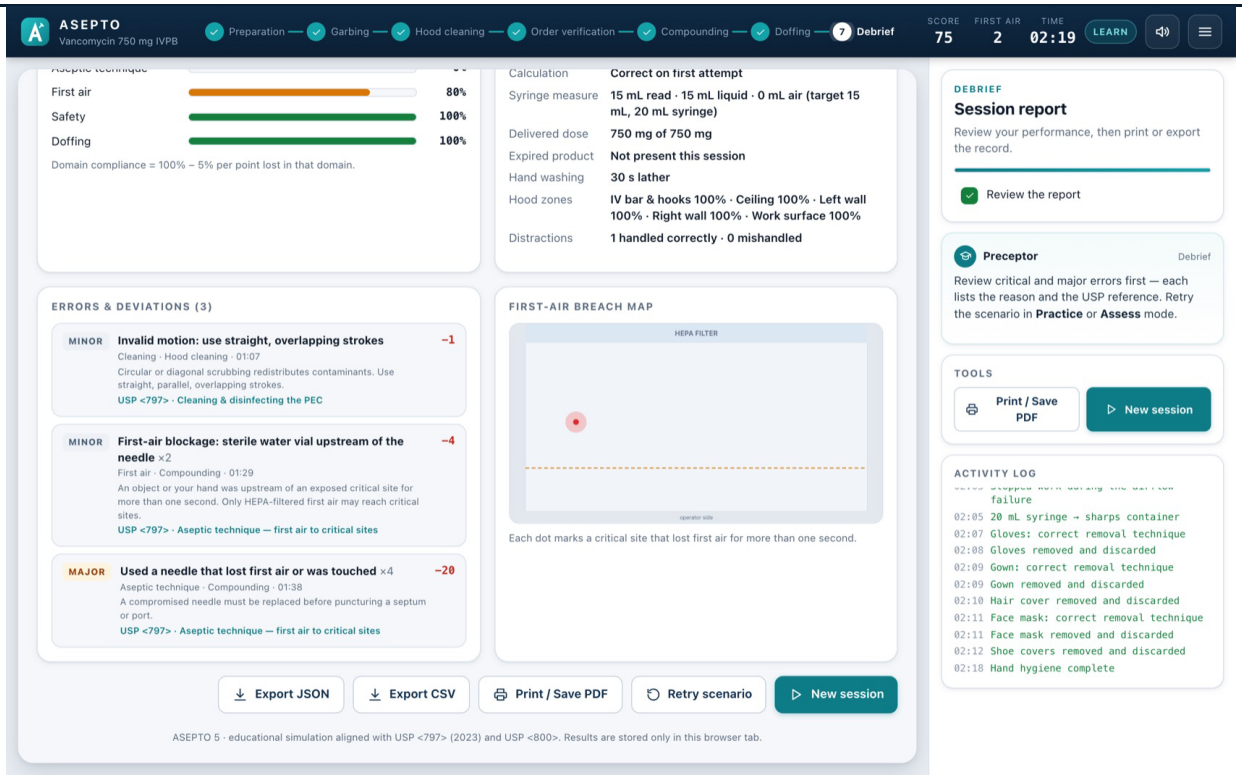


Figure 28 — Every deviation with its severity, points, explanation and USP reference, plus the first-air breach map.

This example shows how one first-air breach cascades: the needle that lost first air was not replaced and was used for four more punctures, each recorded as a major error.

Saving the record

- **Print / Save PDF** — a clean printable report.
- **Export CSV** — one row per error, for spreadsheets or gradebooks.
- **Export JSON** — the complete session record, including the timeline.
- **Retry scenario** or **New session** to practise again.

11. Scoring and competency

Every session starts at 100 points. Points are deducted as errors occur; repeated errors are grouped on the report with a count.

Severity	Points	Examples
Minor	−1 to −3	Diagonal wiping, first-air violation, wet septum puncture, wrong bin, incorrect BUD
Major	−5 (up to −10)	Garbing order, hand dryer, contaminated needle, no filter needle, recapping, <90% coverage (−10)
Critical	−20	Approving a 10× dose error, using an expired product, dose error above 10%

Grade	Score
A	90–100%
B	80–89%
C	70–79%
D	60–69%
F	below 60%

CRITICAL · Critical errors

A critical error opens a pop-up explaining why, in a real cleanroom, the preparation would be stopped. The student may continue the simulation, but the session is recorded as **Not yet competent**.

Hints	Learn	Practice	Assess
Cost per hint	Free	Preparation, cleaning, compounding −2; garbing, order, doffing −5	Not available

12. Using ASEPTO on iPad and phones

ASEPTO 5 adapts to the screen. All drag actions work with a finger or stylus, and every action is also available as a large button in the action tray.

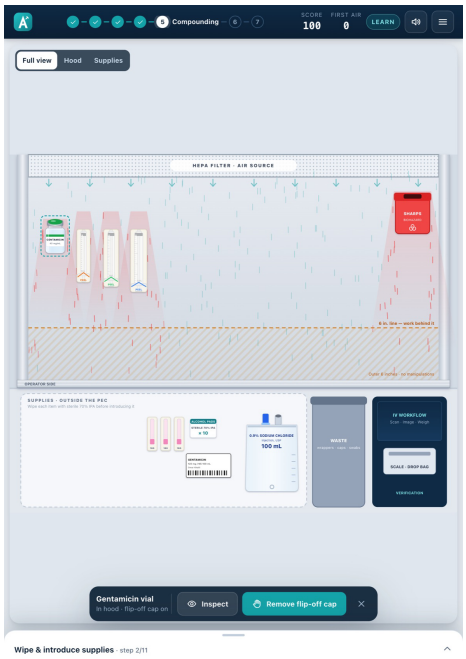


Figure 29 — iPad portrait: the task panel becomes a pull-up sheet.

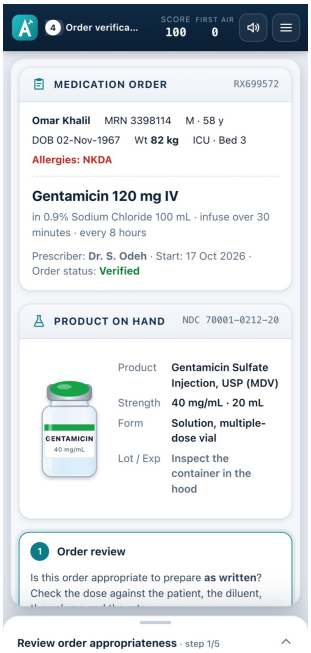


Figure 30 — Phone portrait: the order workstation.

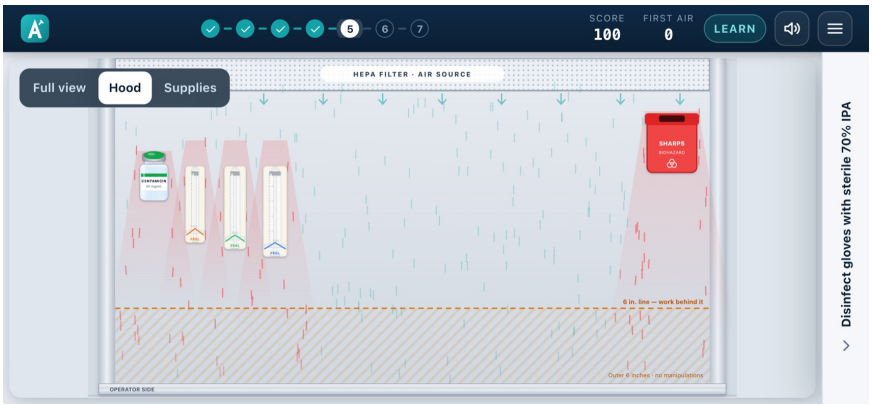


Figure 31 — Phone landscape: Hood view zooms in; the task panel slides in from the right edge.

Device	Layout	Tips
Desktop / laptop	Task panel on the right	A ghost hand follows the mouse inside the hood.
iPad (landscape)	Same as desktop	Recommended for lab sessions.
iPad (portrait) / phone (portrait)	Task panel is a sheet at the bottom — tap its handle to open or close it	Rotate to landscape for the rooms and the hood.
Phone (landscape)	Task panel is a drawer on the right edge	Use Hood and Supplies views to make items larger.

13. Notes for instructors

Suggested teaching sequence

1. Demonstrate one scenario in **Learn** mode on a projector.
2. Students repeat it in **Practice** mode in pairs, with Safety traps on.
3. Assess with **Assess** mode and a **Random scenario**; students export the report as PDF or CSV and submit it.

Privacy

The simulator runs entirely in the browser. No data is uploaded; closing or refreshing the tab ends the session (a warning appears first). Only the exported files leave the device.

Changing or adding scenarios

Scenarios are defined in **v5/src/js/02-data.js** (patient, order, product, target volume, syringe, storage, BUD and the optional dosing-error trap). After editing, run **node v5/build.mjs** to rebuild Asepto_V5.html. See v5/README.md for the layout of the source.

> **WATCH OUT · Scope**
> ASEPTO complements, and does not replace, supervised training, media-fill testing and gloved-fingertip sampling required by USP <797>. Product names, NDCs, lots and patients are fictitious.

14. Troubleshooting

Problem	Likely cause	Solution
A garment snaps back to the shelf	Dropped outside the figure, or out of order	Drop it on the figure's body; check the checklist for the next item.
Cleaning progress does not increase	Strokes are diagonal or in the wrong direction (red ring)	Use straight strokes: walls top to bottom; ceiling and surface away from the HEPA filter.
"Choose your disinfectant first"	Materials not selected	Open Tools, choose sterile 70% IPA and a low-lint wipe, then Start cleaning.
Cannot introduce an item	Item is in the tray	Tap it → Wipe with sterile IPA → Introduce into hood, or drag it into the hood.
Syringe draws only air	Vial is upright, or the needle is not inserted	Insert the needle, then select Invert vial before pulling.
Plunger springs back	Vacuum in the vial	Inject an equal volume of air before withdrawing.
Dose rejected at verification	Bubble left in the syringe, misread scale, or reconstitution volume wrong	Tap out bubbles, use Zoom scale, re-check the calculation.
"Apply the patient label before verification"	Bag not labelled	Drag the label from the tray onto the bag.
Items look tiny on a phone	Small screen	Use landscape and the Hood / Supplies view buttons.
No sound	Muted or not yet allowed by the browser	Tap the speaker icon; sounds start after your first tap.

15. Glossary

Term	Meaning
BSC	Biological safety cabinet — vertical-flow PEC used for hazardous drugs.
BUD	Beyond-use date — the date after which a CSP must not be used.
Coring	Cutting a fragment of rubber from the vial stopper with the needle.
Critical site	Any surface that touches the sterile drug: needle, septum, ampule neck, bag port, syringe tip.
CSP	Compounded sterile preparation.
DCA	Direct compounding area — the part of the PEC where critical sites are exposed to first air.
First air	HEPA-filtered air that has not yet touched any object.
HEPA	High-efficiency particulate air filter.
IPA	Isopropyl alcohol; sterile 70% IPA is used inside the PEC.
LAFW	Laminar airflow workbench — horizontal-flow PEC.
Line of demarcation	The line separating the non-clean and clean sides of the anteroom.
PEC	Primary engineering control (the hood or cabinet).
Zone of turbulence	Disturbed air downstream of an object — about three times its width.

ASEPTO 5 · Concept & clinical logic: Dr Shery Jacob and Dr Muhammad AlShorbagy, College of Pharmacy, Gulf Medical University · AI-assisted development