

1. Introduction

- An integrated medical-lab information system: from patient registration through report release and notification.
- Supports Arabic and English and works offline. Navigation is via the sidebar, by role permission.

2. Roles & permissions

- Administrator: all permissions. Lab manager: catalog, verification, reports, inventory.
- Pathologist: verify and release. Lab technician: result entry only.
- Phlebotomist: collect and receive samples. Receptionist: patients, orders, invoices.
- Radiologist: read radiology studies and write reports remotely, and answer consultations.
- Referring doctor: a portal to view only their patients' reports.

3. Registering patients

- Patients -> Register patient. Enter the name, gender, date of birth or age, and phone.
- A unique MRN is generated automatically. From the patient page: new order, cumulative, edit.

4. Creating an order & billing

- Orders -> New order: choose the patient, priority and tests/panels (auto-priced).
- The invoice and samples are created automatically. Record discount and payments (cash/bank/mobile) and print the receipt.

5. Sample collection & receipt

- Each sample has an accession number, barcode and QR. Print the label and stick it on the tube.
- Click 'Collect' when drawn, then 'Receive' when it reaches the lab.

6. Entering results

- Enter results -> choose the order. Each category in a distinct color. Use Enter to move quickly.
- The flag is computed automatically (H high, L low, ! critical) by gender and age, with highlighting and an alert.

7. Verify & release

- Workflow: entry (technician) -> verification (manager/specialist) -> release. No report before verification.
- 'Release' saves, verifies and releases in one step and notifies the patient automatically.

8. Reports & verification

- PDF report in three languages (Arabic/English/bilingual) with the lab header, abnormal/critical highlighting and the verifier's signature.
- A verification QR opens a public page confirming the report is genuine. The cumulative report shows results over time.

9. Calculated tests & auto-verification

- Some tests are computed automatically (globulin, A/G, indirect bilirubin, VLDL, eGFR) and show a 'calculated' badge.
- Auto-verification (from lab settings) verifies normal results automatically and leaves abnormal/critical ones for review.
- Sensitive tests (viruses, tumors, cultures, histopathology) are never auto-verified.

10. Inventory & reagents

- Add items with a reorder level. Record movements (receive/issue/damage/adjustment) with lot and expiry.
- Automatic alerts for low stock and expired lots — in the list and on the dashboard.

11. Doctor & patient portals and email onboarding

- Onboarding: register the doctor/patient from 'Patients' or 'Referring doctors' (email required). Then click 'Invite' to send a portal invitation.
- The invitee receives a welcome email with a link to set a password and activate their account (linked to their record) — no password is ever emailed.
- Doctor portal: submit test orders for their patients, follow their results, and write recommendations the patient sees.
- Patient portal: see released results and the treating doctor's recommendations. They can still download their report via QR without an account.

12. Export, charts & settings

- Excel/CSV export of lists (respects the filter). Tables are searchable, sortable and paginated.
- Dashboard: charts for orders, revenue and result distribution. Settings: logo, currency, report header.
- The audit log records every sensitive action with the user and time.

13. Delta, reflex, QC & instrument integration

- Delta check: an alert when a result differs greatly from the previous one (catches sample mix-ups).
- Reflex tests: add a test automatically based on a result (abnormal TSH -> FT4).
- Quality control (QC): QC materials and targets, Westgard rules, and a Levey-Jennings chart.
- Instrument integration: import HL7/ASTM results and match them to orders by accession automatically.

14. Disease surveillance & early warning

- A smart dashboard monitoring infectious diseases (malaria, dengue, typhoid, hepatitis B/C, HIV, brucellosis, syphilis, TB, cholera) from your results automatically.
- Shows the weekly positivity rate and raises an outbreak alert when positives exceed the recent baseline.
- A decision-support tool for early detection — it does not replace formal epidemiological assessment.

15. Turnaround-time analysis (TAT)

- Measures result time across stages: registration -> collection -> receipt -> entry -> verification -> release.
- Reveals the slowest stage (bottleneck), TAT by priority, the share within the target time, and the slowest tests.

16. Inventory forecast & reorder

- Estimates each item's consumption from issue movements, predicts days-to-depletion, and suggests a reorder quantity before it runs out.
- Highlights items that need ordering now (out, or running out within the supply lead time) — important given import difficulty.

17. Automatic interpretive comments

- The system adds interpretive comments on the order page: anemia and its pattern, diabetes classification, kidney stages, liver, thyroid, lipids.
- Decision support based on the values and reference ranges — it does not replace specialist review.

18. Culture & antibiogram

- Record culture and susceptibility results (S/I/R) from the order page for each isolate.
- The system builds the cumulative antibiogram: %-susceptibility of each organism to each antibiotic to guide therapy and track resistance (AMR).

19. Real-time QC & quality indicators

- PBRTQC: monitors analytical drift in real time from patient results (EWMA) without QC materials.
- Quality indicators per ISO 15189/IFCC: sample rejection, TAT compliance, critical values, auto-verification.

20. Blood bank

- Manage donors and blood-unit inventory with transfusion-transmitted-infection screening and expiry dates.
- Cross-matching and issue with automatic ABO/Rh compatibility — shows only available compatible units.

21. Quality management (ISO 15189)

- Document/SOP control with versions and review dates, and equipment, calibration and maintenance.
- Nonconformity and corrective/preventive actions (CAPA), and staff competency records — accreditation readiness.

22. Imaging & digital microscopy

- Archive and structured review of microscope images (malaria smear, peripheral blood film) from the order page.
- A ready hook for an AI engine that plugs in when hardware is available — until then review is manual.

23. Radiology & teleradiology

- Create a radiology study (X-ray/CT/MRI/ultrasound/mammography) from the order page, and upload images, DICOM or PDF files.
- The radiologist opens the 'Radiology worklist' from anywhere, reads the study, and writes a structured report (technique, findings, impression, recommendation).
- Workflow: draft -> preliminary verification -> final verification & release (with a later addendum). A PDF report is issued and the patient notified.
- DICOM files are stored and their metadata read automatically; the interactive viewer/PACS server is enabled later with no data change.

24. Home sample collection

- A public form (no login) lets the patient request home collection: name, phone, address and requested tests.
- Reception triages the request, links it to a patient (or creates one), sets the appointment and assigns a phlebotomist.
- On confirmation a normal test order is created automatically (tests + the home-collection fee) with its invoice, so the sample enters the usual cycle on arrival.
- Status tracking: new -> scheduled -> collected -> arrived at the lab, with patient notification at each step.

25. Remote medical consultations

- From their report verification page (QR), the patient clicks 'Request a consultation to explain the result' to open a secure private-link chat with no account.
- The consultation fee is added to the invoice automatically. The lab manager assigns the consultation to a specialist, who replies with text or attachments (images/audio).
- An asynchronous chat (works on weak networks) with notification to the other party. Live video is enabled once a video service is configured.
- Reception can open a consultation on the patient's behalf from the order page.

26. Insurance & claims (NPHIES)

- Payers, coverages and claim creation from orders, with automatic FHIR bundle building in NPHIES format.
- Live submission is enabled once NPHIES_BASE_URL and the key are set; before that, bundles are built and saved ready.

27. Lab owner & subscription (labs platform)

- The lab owner registers via 'Register your lab' (a 14-day free trial); their account is created and the lab appears in the city directory.
- Each lab's data is fully isolated: the owner and their team see only their own lab's patients, orders and results — never another lab's.
- The 'My lab & subscription' page shows remaining trial/subscription days and status. The catalog and identity settings are global (not edited by the lab).
- Patients and doctors find the lab via the 'Labs directory' by choosing the state and city.

28. Tips

- The 'Release' button saves, verifies and releases together — enter the values first.
- Don't see a link? Your role lacks the permission. Reference ranges are edited in the catalog for your analyzer.