



ASSET 2026 Pharmacy Workshop Series

AI in Clinical Pharmacy and Pharmacovigilance

How can AI help us identify medication related risks earlier- without replacing clinical judgement?

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Learning objectives

By the end of this session, you should feel comfortable enough to:

- 1 Explain how AI can screen a prescription.
- 2 Describe how systems flag possible drug interactions and dose concerns.
- 3 Recognise medication errors and adverse drug reactions (ADRs).
- 4 Explain NLP, safety signals and clinical decision support.

Our goal: safer medicines and better-informed decisions.



Prescription screening

Prescription screening means checking an order for possible problems before it is supplied.

Patient details

Right patient, age and relevant clinical information.

Medicine details

Correct medicine, strength, form, route and instructions.

Safety checks

Allergies, duplicate medicines, unusual doses and missing information.

AI can highlight items for review; a pharmacist confirms what is clinically appropriate.



How AI can screen a prescription

A screening tool compares prescription details with patient information and safety rules.

Step 1

Read medicine, strength, dose, route and frequency.

Step 2

Compare with allergies, diagnoses, lab results and current medicines.

Step 3

Flag unusual or incomplete orders for a pharmacist to review.

Example: an alert appears because the prescribed strength is outside the usual range.



Prescription screening: mini case

A prescription appears to say “Take 10 tablets daily.” What should happen?

Possible concern

The quantity or directions may have been entered incorrectly.

AI's role

Flag the instruction as unusual and show why it was flagged.

Human action

Pause and clarify the prescription with the authorized prescriber.

Never guess what a prescription was intended to say.



Drug interactions

A drug interaction happens when one medicine, food or substance changes the effect of another.

Medicine + medicine

Two medicines may increase side effects or change effectiveness.

Medicine + food

Some foods can change how a medicine is absorbed or broken down.

Medicine + condition

A medicine may be risky with a particular health condition.

Not every interaction means a medicine must be stopped — context matters.



How AI can flag interactions

Systems can compare a patient's medicine list with interaction knowledge and clinical data.

Find combinations

Identify pairs or groups of medicines that may interact.

Estimate concern

Consider severity, dose, patient factors and available evidence.

Explain the alert

Show the possible effect and a recommended review step.

A pharmacist checks whether the alert applies to this individual patient.



Drug interaction: mini case

A patient takes two medicines that may both cause drowsiness.

Possible risk

The combined effect may make the patient very sleepy or less alert.

AI alert

The system highlights the combination and explains the concern.

Review

Check doses, timing, other medicines and advice from the care team.

AI should make the reason for an alert clear, not just show a warning symbol.



Dose optimization

Dose optimisation means choosing a dose that balances benefit and risk for a particular patient.

Patient factors

Age, body size, kidney or liver function and other conditions.

Medicine factors

Usual dose range, formulation, route and how the medicine behaves.

Treatment response

Symptoms, side effects and relevant test results.

A dose suitable for one person may not be suitable for another.



How AI can support dose review

Decision-support tools can bring together information that affects dosing.

Check

Compare the prescribed dose with trusted dosing guidance.

Estimate

Use patient details and lab results to flag a possible adjustment.

Monitor

Help the team notice when follow-up results need review.

Any dose change must follow approved guidance and authorised clinical review.



Dose optimisation: mini case

A patient's kidney function has changed since the last visit.

Why it matters

Some medicines can build up when the kidneys work less effectively.

AI support

Flag medicines whose dosing guidance may depend on kidney function.

Next step

A qualified clinician checks current results and decides what to do.

Use current, accurate patient data — never rely on an old result without checking.



Personalized dosing: what AI cannot assume

Missing data

A stale creatinine value or incorrect weight can produce a misleading recommendation.

Population mismatch

A model may perform poorly for patients unlike those in its training data.

Narrow therapeutic index

Small changes may matter; specialist protocols and monitoring remain essential.

Safe principle

Recommendations must show their basis, limits and required checks.



Medication errors

A medication error is a preventable mistake in the medicine-use process.

Prescribing

Wrong medicine, dose, route or unclear directions.

Dispensing

Wrong product, strength, label or quantity.

Administration

Medicine given to the wrong person or at the wrong time.

Finding errors early can prevent harm and improve the whole system.



How AI can help find errors

AI can look for patterns and unusual entries across medication workflows.

Detect

Spot duplicate orders, unusual doses or mismatched details.

Prioritise

Bring higher-risk alerts to the top of a review queue.

Learn

Help teams analyse recurring error patterns and improve processes.

A flagged record is a prompt to check — not proof that an error occurred.



Medication-error: mini case

The label says one tablet, but the electronic order says ten.

What might be wrong?

The order, label or data transfer may contain an error.

AI can

Compare the records and flag the mismatch.

People must

Stop the process and verify the correct instruction before supply.

Clear communication and reporting help prevent the same error happening again.



ADR detection

An adverse drug reaction (ADR) is a harmful, unintended response to a medicine.

Possible signs

Rash, unusual bleeding, severe nausea or unexpected changes in health.

Timing

A reaction may begin after starting a medicine or changing a dose.

Important

A symptom can have several causes; timing alone does not prove a link.

Suspected reactions should be assessed and reported through the proper process.



Medication error vs adverse drug reaction

Medication error

A preventable event in the medication-use process that may lead to inappropriate use or harm.

Adverse drug reaction (ADR)

A harmful, unintended response associated with use of a medicine.

Overlap

An error can contribute to harm, but an ADR can occur despite correct use.

Why distinction matters

The response may involve process correction, clinical care, reporting, or more than one.



How AI can support ADR detection

AI can help organise and review large numbers of reports and clinical notes.

Extract details

Find medicine names, symptoms, dates and outcomes.

Look for patterns

Identify similar reports across different patients.

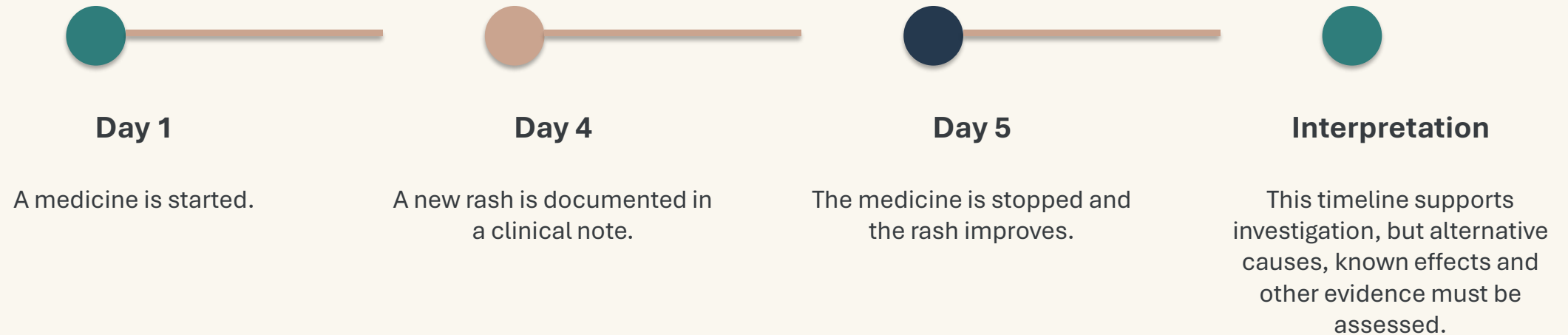
Support review

Help safety teams decide which cases need closer assessment.

AI can help notice a possible reaction; experts assess the evidence.



ADR detection: a clinical timeline



A timeline can strengthen suspicion, but causality requires a broader assessment.



ADR detection: mini case

Several reports mention a new rash after patients start the same medicine.

Signal to explore

The repeated pattern may deserve a closer safety review.

Check context

Review timing, other medicines, medical history and report quality.

Act responsibly

Document and report according to local policy and guidance.

A report is valuable even when the medicine is not yet proven to be the cause.



Safety-signal identification

A safety signal is information that suggests a possible new medicine-related risk or a change in a known risk.

Where signals come from

ADR reports, studies, clinical records and published research.

What a signal means

A reason to investigate — not final proof of harm.

Why it matters

Earlier review may help teams understand and manage risks.

Signal detection starts an investigation; it does not finish one.



How AI can help find safety signals

AI can scan many reports and highlight patterns that are hard to see manually.

Group similar cases

Find reports with related medicines, symptoms or outcomes.

Notice changes

Highlight a rise in reports or an unusual pattern.

Rank for review

Help safety experts decide what to examine first.

Data quality, reporting bias and background rates can affect the pattern.



Safety signal: mini case

Reports of an unexpected liver problem appear more often than before.

AI's contribution

Highlight the increase and group relevant reports.

Expert review

Check timing, alternative causes, study data and reporting trends.

Possible outcome

The signal may be confirmed, explained, or judged not supported.

A signal is a question worth checking — not a conclusion.



Natural Language Processing (NLP)

NLP helps computers work with human language, including clinical notes and safety reports.

Read text

Find medicine names, symptoms, doses and dates in written notes.

Organise information

Classify reports and make large text collections easier to search.

Summarise

Create a draft summary for a person to verify.

NLP can miss meaning, especially when language is unclear or context is important.



NLP in action

Example note: “After starting Medicine A, the patient developed nausea.”

Find

Medicine: Medicine A

Find

Possible adverse event:
nausea

Keep context

The wording says “after starting” — it does not prove causation.

A human checks the extracted information before it is used in care.



Clinical decision support

Clinical decision support (CDS) gives healthcare professionals information to help them make decisions.

Alerts

Possible interaction, allergy or dose concern.

Guidance

Relevant clinical recommendations or monitoring reminders.

Patient context

A clearer view of medicines, lab results and health information.

CDS informs decisions; the care team remains responsible for decisions.



A good clinical decision-support alert

The best alert is clear, relevant and gives a useful next step.

Specific

Name the medicine and the concern.

Explain why

Give a short reason and the key patient factor.

Suggest action

Review, monitor, clarify or consult trusted guidance.

Too many low-value alerts can cause alert fatigue — important warnings may be missed.



Bringing the topics together

One patient. One medicine list. Several safety checks.

Screen

Check prescription details and patient information.

Connect

Look for interactions, dose concerns and possible errors.

Detect

Review suspected ADRs and patterns that may become safety signals.

Support

Use NLP and CDS to organize information and guide human review.

The strongest workflow combines good data, useful tools and professional judgement.



Class activity: what would you check?

Read the scenario and identify what the system should flag.

Scenario

A patient has a new prescription, several current medicines and a recent lab result.

Discuss

What might prescription screening, interaction checks and dose review find?

Share

Which details must a pharmacist verify before a decision is made?

Think: What information is missing? What could go wrong if the alert is ignored?



Key takeaways

- 1 AI can flag possible problems, patterns and missing information.
- 2 Drug interactions and doses must be judged in the patient's context.
- 3 ADR reports and safety signals need careful expert assessment.
- 4 NLP organises text; clinical decision support helps guide review.

