Digital Medicines

Efficiency Today, Sustainability Tomorrow

Lessons from the Health Services Safety Investigations Body ePMA related reports

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Medicines Optimisation for a sustainable future

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NHS Wales medicines pathway

From tasks to systems

Overview

Why does efficiency and sustainability matter? - Four patient stories. One repeating pattern.

The pattern - Visibility. Continuity. Transfer. Reliability.

The foundations - ePMA. EPS. Electronic discharge. Shared records. Decision support.

The challenge - Efficiency helps — but does not automatically create sustainability.

The next phase - Connect the pathway. Optimise medicines use. Assure the data.

The ask - One connected medicines story: visible, trusted and actionable.

Why does efficiency and sustainability matter?

Three real cases; one repeating pattern.

Efficiency today

Less friction in prescribing, administration, dispensing and communication.

Sustainability tomorrow

Less avoidable harm, duplication, waste, variation and unnecessary demand.

The bridge

Connected medicines data, clinically meaningful workflow and shared accountability.

Patients do not experience healthcare as organisations. They experience one medicines story.

Story 1: Meet Patient P

HSSIB Report 1

Time-critical Parkinson's medicine in the Emergency Department

P

Patient context

Patient aged 85 with Parkinson's.
Usually self-administered Parkinson's medicine at home.
Needed two doses, four times daily, at set times.

What happened

Attended ED after outpatient appointment and recent fall.
Spent 3 days in ED; 52 hours total, including 44 hours in corridor care.
Medication information conflicted across family account and GP summary care record.

Clinical outcome

18 doses were expected in ED.
7 missed and 3 given late; only 8 doses were on time.
Symptoms deteriorated; swallowing was lost; patient died 4 weeks after admission.

Medication journey

Home self-admin → ED arrival not flagged → ePMA + paper confusion → Missed / late doses → Ward transfer deterioration

The safety-critical data

Dose, timing, route, time-critical status and source confidence.

The usability gap

Information existed, but it did not surface as a clear next safe action.

System finding

ePMA or process in general, did not alert staff that time-critical medicine needed prescribing/administering.

Pathway issue

No clear ED responsibility for identifying and prescribing time-critical medicines.

Digital medicines must make time-critical action visible, not merely store medicine data.

Source: HSSIB. Medication not given: administration of time critical medication in the emergency department. Published 05/12/2024.

Story 1: The patient in the corridor

Time-critical medicines, ED pressure, and information that did not surface.

1 **Parkinson's patient in ED**

2 **Medicines missed or late**

3 **Swallowing deteriorates**

4 **Pneumonia and death**

What failed?

Not the existence of medicines or clinical knowledge.

The gap

The right information was **not** visible at the right time.

The lesson

Digital systems need to surface time-critical action.

Patient Image generated by AI

The real lesson

The medicine existed. The knowledge existed. The “system” failed to connect them.

Medicine exists → **Knowledge exists** → **Staff care**

The intervention is not “more data”
it is **visible**, **meaningful**,
***actionable information*.**

Digital medicines solutions should not just store data;
they should make the next safe action easier.

5-minute exercise: Spot the risk

Group Activity (2/3)

Patient discharged after a hospital anticoagulant change

Hospital system

Apixaban started
Warfarin stopped

→

GP system

Warfarin still active
Repeat remains available

→

Community pharmacy

Warfarin repeat issued
Apixaban supplied

What could go wrong?

Prompt: Where is the risk — prescription, reconciliation, supply, patient understanding, or the gaps between them?

Story 2.A : Meet Patient V

HSSIB Report 2022

Safe discharge failed — two anticoagulants continued at home

V

Patient context

75-year-old woman admitted on a Friday evening.
Diagnosed with incurable lung and kidney cancer.
History included paroxysmal atrial fibrillation and hypertension.

Clinical context

Presented with difficulty swallowing, vomiting and worsening shortness of breath.
Usual medicines included dalteparin 15,000 units daily for AF and crizotinib chemotherapy.
Repeat dalteparin prescription had been issued before admission.

Clinical outcome

Dalteparin was stopped on the hospital ePMA system and apixaban 2.5mg twice daily was started.
Discharge summary listed apixaban but did not state that dalteparin had been stopped.
Dalteparin repeat was dispensed after discharge; Ann took both anticoagulants at home.

Medication journey

Dalteparin active → **Hospital change** → **Apixaban started** → **Repeat dispensed** → **Dual anticoagulation**

The safety-critical data

Medication status, stopped reason, replacement intent, repeat supply and counselling.

The usability gap

The discharge communication did not make the anticoagulant switch explicit across settings.

System finding

The ePMA record changed, but the medicines story did not travel safely to GP, pharmacy and patient.

Pathway issue

A repeat prescription ordered before admission was supplied after discharge from a different record of truth.

Every system acted on partial information. The patient experienced the whole risk.

Source: HSSIB. Electronic Prescribing and medicines Administration systems and safe discharge. Published 12/10/2022.

Everything is lined up for harm

From fragmented failure to clinical risk

Clinical risk

Duplicate anticoagulation
GI bleed / intracranial bleed
Loss of confidence in medicines

System pattern

Each organisation may have acted rationally from its own record.

Core Insight

Every system worked exactly as designed. That is the problem.

This is not just a prescribing error. It is an information failure across a fragmented pathway.

From local task completion → to pathway safety

Story 2.B : Meet Patient Q

HSSIB Report 2

Anticoagulation suspended before a procedure — but not safely restarted

Q

Patient context

Patient aged 87, admitted with shortness of breath and nose bleeds.
History included atrial fibrillation and cardiovascular disease.
Usual medicine included apixaban to reduce stroke risk.

Clinical context

Large pleural effusion and pneumonia identified.
Apixaban paused for nose bleeds and while awaiting a pleural procedure.
Procedure was delayed; ongoing pause was not reassessed as expected.

Clinical outcome

Apixaban was not given for 10 days.
After the procedure, restart was intended but did not happen.
Two days after the procedure the patient had a stroke and later died.

Medication journey

Apixaban active → Paused for bleeding → Procedure delayed → No prompt to re-review → Restart missed

The safety-critical data

Active intent, pause rationale, review date and restart responsibility.

The usability gap

A “suspended” status was visible, but the system did not create a forcing function to review.

System finding

ePMA did not prompt staff to re-review paused anticoagulation.

Pathway issue

The reasoning and restart plan did not persist across teams and documentation.

Continuity of clinical intent matters as much as transfer of medicine data.

Source: HSSIB. Medication not given: anticoagulation before and after a procedure. Published 13/03/2025.

Story 2: Clinical Intent

Continuity of intent across systems is the safety-critical issue.

Example 1 – Patient V - Hospital changes anticoagulant → another supply continues → patient takes both → GI bleed

Example 2 – Patient Q -Hospital suspends anticoagulant → waits 10 days for procedure → apixaban not restarted→ Stroke

Not enough

A medication item being visible somewhere.

What matters

A shared view of active intent, status and review responsibility.

Sustainable impact

Avoid harm,
bed days and rework.

The problem was not the need for anticoagulation.
The problem was that clinical intent did not persist across the pathway.

Continuity here would be maintaining the clinical intent over time and across systems

Meet Patient D

HSSIB Report 3

Insulin started in hospital — but the support did not arrive at home

D

Patient context

Patient aged 53 with type 2 diabetes.
Admitted after a fall at home.
Diabetes regimen changed from metformin to insulin during admission.

Discharge context

Education was provided to support insulin self-administration.
Discharged home on day 7; district nursing support arranged for wound/catheter care.
Different teams documented different expectations about insulin administration.

Clinical outcome

Patient was unable to remember insulin information and had not self-administered.
At day 22, high blood glucose was identified and the patient was readmitted.
Two different insulin pens also caused confusion.

Medication journey

Metformin changed → Insulin education → Discharge home → Referral unclear → No insulin taken

The safety-critical data

Medication change, patient capability, supply, care plan and referral status.

The usability gap

Multiple providers used different EPRs that did not interact or share referral status.

System finding

No feedback mechanism confirmed whether the insulin support referral had been actioned.

Pathway issue

Support for wound care was delivered, but support for insulin administration did not follow.

Transfer moves information. Continuity preserves action and accountability.

Source: HSSIB. Medication not given: discharge from an acute hospital to the community. Published 14/08/2025.

Story 3: The insulin care that never arrived and doses missed

A discharge failure becomes a second episode of care.

Hospital

Insulin started – two different pens

Discharge

The intended change not carried through

Home

Patient without intended treatment

Readmission

Deterioration -> Admitted 17 days later

The NHS paid twice for the same episode of care.

This is where sustainability becomes concrete: waste is not only unused medicines, it is:

- **preventable harm (Safety) (Caused by Fragmented information)**
- **avoidable rework (Time)**
- **repeated demand. (Resource)**

The first wave of digital medicines

We spent the last decade creating information. The next phase is using it.

ePMA
prescribe + administer

EPS
authorise + transmit

Electronic discharge
communicate change

Shared Medicine record
connect care

Decision support
prompt safer action

VALUE comes from joining these foundations safely

Paper → Digital task → Shared pathway → Learning system

Digitisation improves tasks. Sustainability improves the system.

ePMA – Secondary Care Electronic Prescribing and Medicines Administration
EPS – Electronic Prescription Service
SMR – Shared Medicines and Allergy Record

Why efficiency alone is not enough

An efficient system can still produce waste, duplication, variation and inequity.

Waste

e.g. over-ordering / unused medicines

Duplication

e.g. repeat supply + changed therapy

Transfer risk

e.g. intent lost at boundaries

Variation

e.g. different pathways, different outcomes

Shortages

e.g. poor demand signals

Inequity

e.g. access depends on geography or literacy

The challenge?:

not simply "make the task easier or faster",
But also to "make the pathway safer and more sustainable".

A pattern emerges

These are not technology failures. They are information failures.

Incident	What failed?	What was missing?
Parkinson's	**Visibility**	Seeing the right information at the right time and place
Anticoagulants	**Continuity**	Maintain clinical intent (Sustained intent and Accountability NOT just movement)
Insulin	**Transfer**	Move information across boundaries
Allergy / ADR	**Reliability**	Trusting the information

Transfer moves information. Continuity preserves intent.

From Digitisation to Orchestration/Optimisation

Moving from systems that digitise steps to systems that optimise the whole medicines lifecycle and that work together

Paper
Record decisions

→

Digital
Capture decisions

→

Integrated
Share decisions

→

Intelligent
Optimise decisions

Optimise what exists

Use ePMA, GP, dispensing and shared record data to identify waste and duplication.

Connect the pathway

Design for the full medicines lifecycle, not individual organisational hand-offs.

Predict and prevent

Forecast demand, mitigate shortages and target clinical review.

What this could mean for NHS Wales

Practical, near-term, sustainable use of medicines data.

Medicines waste

Flag over-ordering, duplicate supply and high variation.

Transfer of care

Show active intent, status and reconciliation confidence.

Shortages

Use prescribing and dispensing signals for demand forecasting.

Population health

Find inequity, high-risk cohorts and review opportunities.

What do you measure now?
How do you measure?

What if medicines systems were measured by avoided harm and waste, not just transactions completed?

Impact of Interoperability Standards

Medication information failures are not only safety issues — they create avoidable demand, bed days and cost.

Scale of medicines use

~£1Bn
annual expenditure

81m
GP items

52.4m
hospital Rx

Risk at transitions

99,000
transition medication errors per year

estimated

=

Impact on patients and capacity

20,350
patients affected

1,750
experiencing harm

1,980 additional bed days
costing £957,000

Applying interoperability standards

estimated 40% reduction in transition error rate

800 bed days avoided

£383,000 released value

The digital medicines opportunity is not "more transactions" — it is reducing avoidable harm across the whole pathway.

Camacho, E.M., Gavan, S., Keers, R.N., Chuter, A., Elliott, R.A., 2024. Estimating the impact on patient safety of enabling the digital transfer of patients' prescription information in the English NHS. BMJ Quality & Safety 33, 726–737.. https://doi.org/10.1136/bmjqs-2023-016675

The responsibility that comes with it

More connected data creates more opportunity — and more accountability.

Data quality

Who owns accuracy, provenance and correction?

Interoperability

Can another system safely interpret what was meant?

Clinical safety

Are workflows and hazards locally assessed?

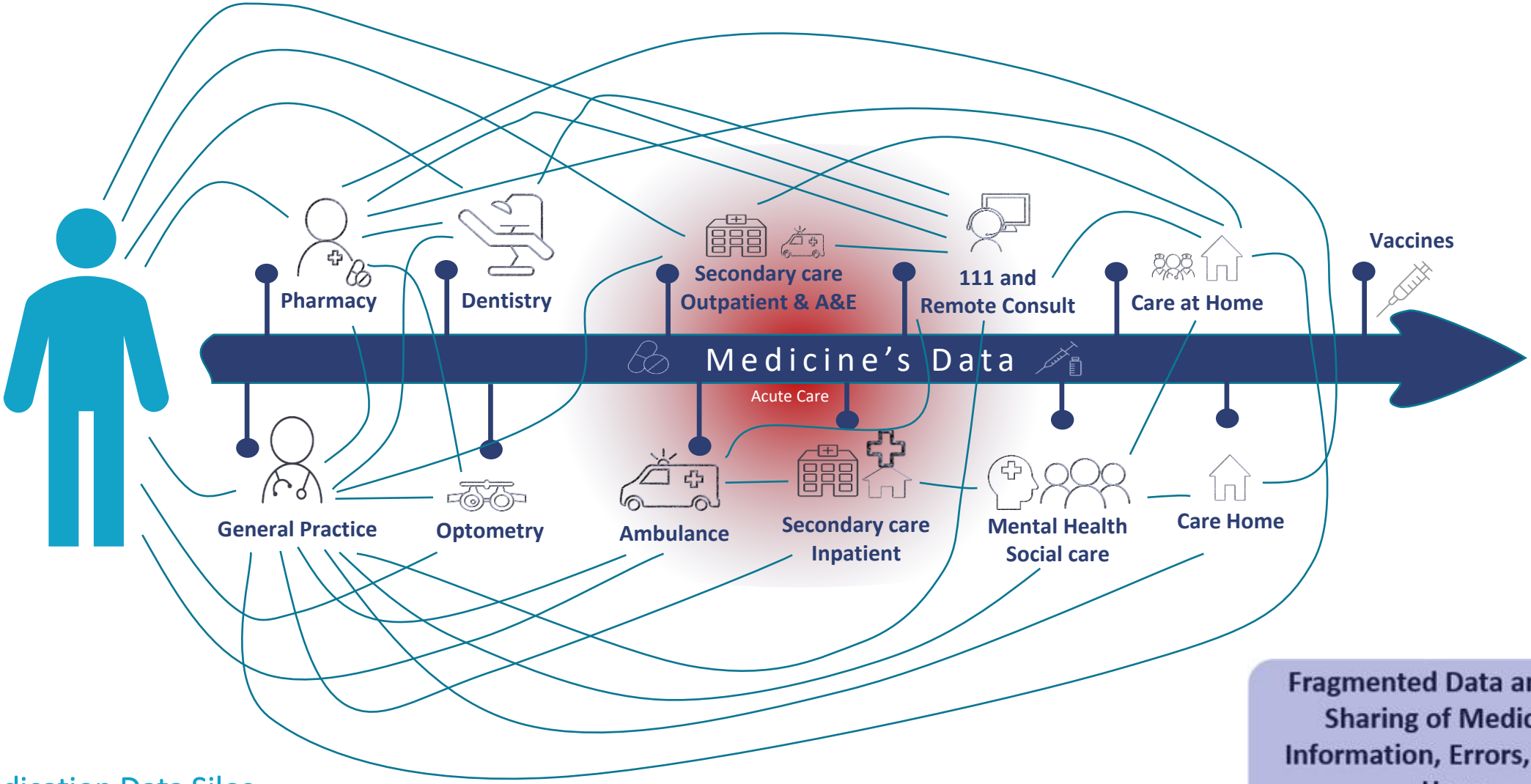
Equity

Who benefits, who is excluded, who is unseen?

The next phase is not “more data”. It is trusted data, governed decisions and clinically usable design.

To consider - how do we assure that shared medicines data is usable, trusted and safe in workflow?

Medication Care Journey: In Reality



Fragmented Data and Poor Sharing of Medicines Information, Errors, Patient Harm

Medication Data Silos

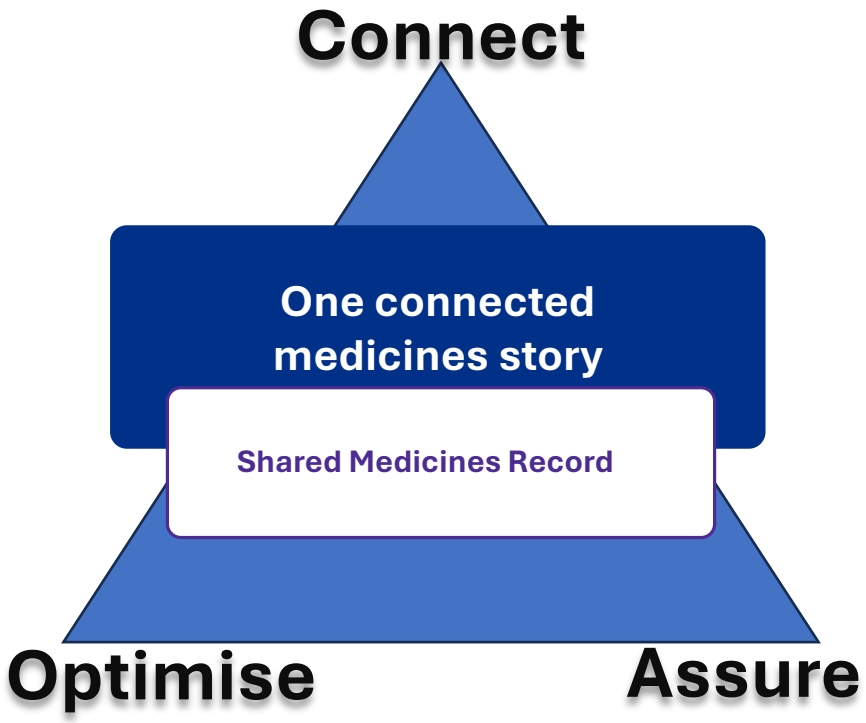
Source: James Goddard

A simple digital medicines blueprint

A practical way to hold the whole story together.

Prescribing and Review

Patient Access (Managed)



Medication administration

Clinical decision support and Optimisation

Supply Chain and Logistics

Digital Medicines Blueprint

Six domains, shared priorities, one connected medicines story

Our aim

SMR is the foundation stone of our digital medicines approach—enabling safer, personalised and connected medicines care across NHS Wales.

Why SMR is foundational

- Single source of truth for medicines, allergies & intolerances
- Enables safe, joined-up care across all settings
- Real-time access to accurate, up-to-date information
- Secure, governed sharing of data
- Foundation for better decisions, outcomes and efficiency

Prescribing

- Electronic prescribing
- EPS integration

Medicines Administration

- eMAR & medication chart
- Barcode & closed loop

Shared Medicines & Allergies Record

SMR
Medicines
Allergies & Intolerances
Single shared core

Prescribing Decision Support & Optimisation

- Clinical decision support
- Optimisation & guidelines
- Analytics & insights

Patient Support & Access

- Patient access via App
- Medicines & allergy info
- Education & reminders

Supply Chain & Logistics

- Stock visibility & forecasting
- Logistics & distribution
- Supplier integration

Key priorities

1. Deliver the Shared Medicines Record.
2. Develop solution architecture for primary/community care and for medicines supply chain & logistics.
3. Re-procure and optimise the Hospital Pharmacy Stock System.
4. Deliver a single SACT ePMA and enable pharmacogenomics.
5. Build on ePMA and EPS, including Closed Loop Medicines, outpatients and Homecare.
6. Implement electronic prescribing for non-medical prescribers in primary and community care.
7. Establish medicines ordering and administration records for supported patients and carers.
8. Evolve the NHS Wales App with a pipeline of medicines features and continuous improvement.

FROM: FRAGMENTED MEDICINES INFORMATION

GP → ? → Hospital Inpatient → ? → Outpatients & A&E → ? → Community Pharmacy → ? → Care at Home

Silos • Missing information • Duplicated data • Errors • Delays • Patient harm

TO: CONNECTED MEDICINES STORY VIA SMR

GP → Hospital Inpatient → Outpatients & A&E → SMR → Community Pharmacy → Care at Home → Patient

One shared record • Real-time access • Safer care • Better outcomes • Empowered patients

CLINICAL INFORMATICS FRAMEWORK PRACTICES APPLIED ACROSS ALL DOMAINS

1. Discovery & Engagement
2. Benefits & Value
3. Information & Data Standards
4. Service Management & Development
5. Clinical Digital Safety & Assurance
6. Supporting Professional Development

Efficiency today, sustainability tomorrow

The point is not digitisation for its own sake. It is safer, smarter medicines use.

Efficiency today

Remove friction from individual medicines tasks.

Sustainability tomorrow

Use pathway data to prevent harm, waste and avoidable demand.

The ask

Measure digital medicines by the value it creates for patients and the system.

One connected medicines story: visible, trusted and actionable.

Thank you

References

Key sources used to shape the patient stories and NHS Wales framing.

• HSSIB. Electronic prescribing and medicines administration systems and safe discharge. 12 Oct 2022
Investigation report: Electronic prescribing and medicines administration systems and safe discharge

• HSSIB. Medication not given: administration of time critical medication in the emergency department. 5 Dec 2024
Medication not given: administration of time critical medication in the emergency department

• HSSIB. Medication not given: anticoagulation before and after a procedure. 13 Mar 2025.
Medication not given: anticoagulation before and after a procedure

• HSSIB. Medication not given: discharge from an acute hospital to the community. 14 Aug 2025.
Medication not given: discharge from an acute hospital to the community

• HSSIB. Electronic prescribing and medicines administration. Fourth investigation report. 28 May 2026.
Electronic prescribing and medicines administration: procurement and safety learning in acute hospitals

• HSSIB. Online Prescribing: Opportunities to improve patients safety. Fourth investigation report. 25 Jun 2026.
Online prescribing: opportunities to improve patient safety

• AWMSG/AWTTC. Welsh National Standards for Medication Review: Dec 2020.
Welsh national standards for medication review - All Wales Therapeutics and Toxicology Centre

• Welsh Pharmaceutical Committee. Pharmacy: Delivering a Healthier Wales and 2030 Goals.
Delivering-a-Healthier-Wales-2030-PDF-report.pdf

• BMJ Quality and Safety. Estimating the impact on patient safety of enabling the digital transfer of patients' prescription information in the English NHS Camacho, E.M., Gavan, S., Keers, R.N., Chuter, A., Elliott, R.A., 2024. 33, 726–737.
Estimating the impact on patient safety of enabling the digital transfer of patients' prescription information in the English NHS - Research Explorer The University of Manchester
Sourece Report:
Meds_Interoperability_full_report_Elliott_et_al_2023.pdf

• JMIR Medical Informatics. Barriers and Opportunities for the Use of Digital Tools in Medicines Optimization Across the Interfaces of Care: Stakeholder Interviews in the United Kingdom.
JMIR Medical Informatics - Barriers and Opportunities for the Use of Digital Tools in Medicines Optimization Across the Interfaces of Care: Stakeholder Interviews in the United Kingdom

• Scientific Reports. A simulation study to quantitatively assess the performance of electronic prescribing systems in English NHS Hospital Trusts | Scientific Reports
A simulation study to quantitatively assess the performance of electronic prescribing systems in English NHS Hospital Trusts | Scientific Reports