A review of the adoption of Closed Loop Medicines Management in NHS Trusts

Improving patient safety through digital systems

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01. Introduction

Closed Loop Medicines Management (CLMM) can be described as the integration of digital IT systems that seamlessly support all stages of medicines management. This includes the real time electronic transfer of information across prescribing, dispensing, supply, procurement, and administration.

Key components of CLMM include **Closed Loop Medicine Prescribing (CLMP), Administration (CLMA), and Supply (CLMS).**

- CLMA is use of digital technologies (which can include the use of EPR, EPMA, scanners, automated drug cabinets) to provide additional validation that supports the cross checking of the five rights of medication administration. The checking functionality should be used to confirm it is the right medicine, by the right route, at the right dose, given to the right patient, at the right time. The process should either generate an alert if there is a mismatch or if all checks are correct an administration record should be recorded where applicable.
- CLMS refers to the part of the closed loop medicines management system related to the ordering and dispensing of medication. In CLMS system data is captured and shared in real time, allowing for accurate tracking and control of medications throughout the entire medicines supply chain.

With over 237 million medication errors reported annually in the NHS in England [1], evidence shows that CLMA can significantly reduce adverse drug events and transcription errors [2]. CLMM is therefore a vital tool in improving patient safety and operational productivity.

"An acute Trust reported a 78 % reduction in prevented dispensing errors after CLMS implementation."

02. Aim

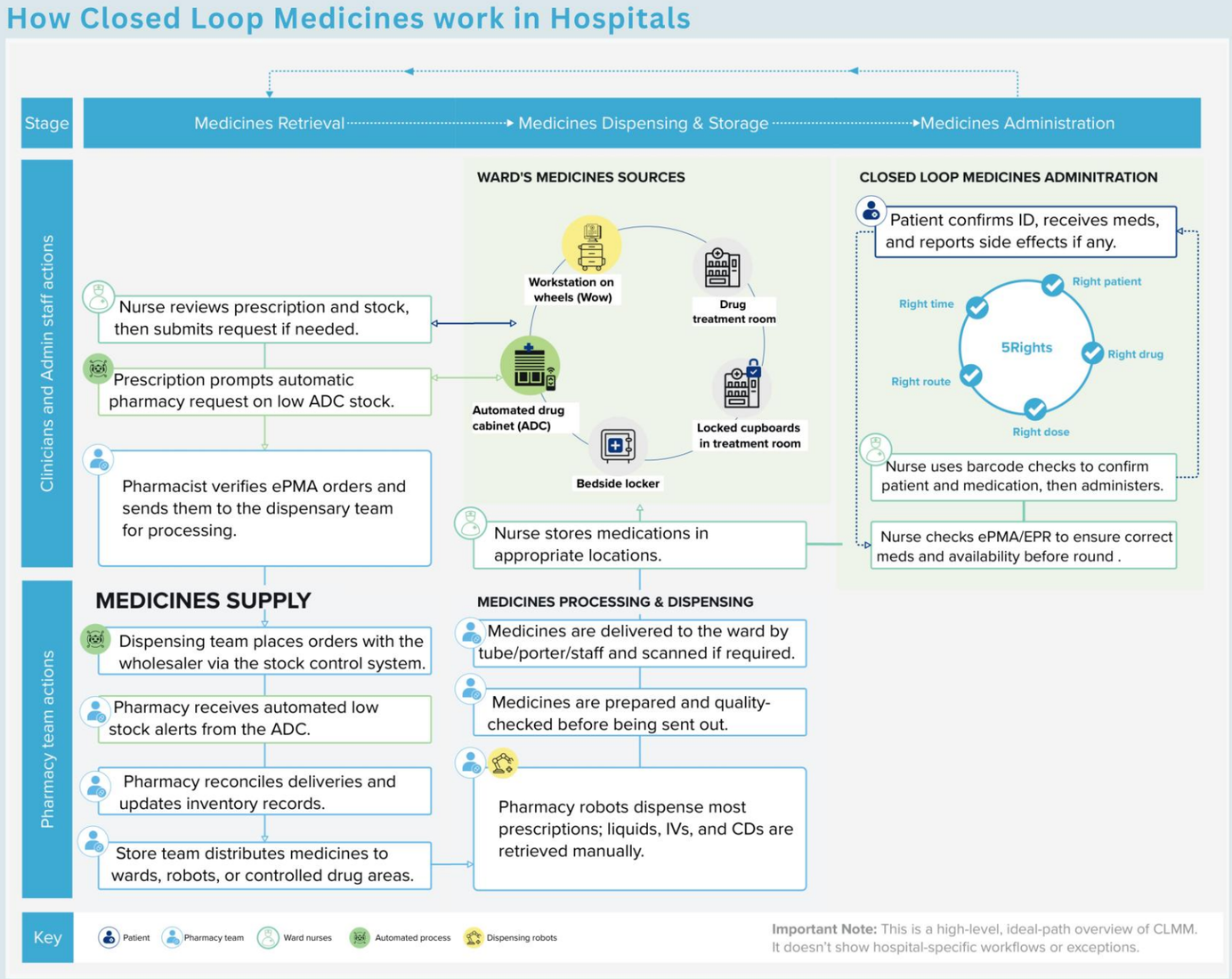
The aim of the project was to explore the benefits, challenges, and enablers experienced by NHS Trusts in the Global Digital Exemplar (GDE) programme following the adoption of Closed Loop Medicine Administration (CLMA) or Closed Loop Medicine Supply (CLMS). With the aim of using the information to inform the approach to support implementation across other NHS Trusts.

03. Method

- Literature review and desktop research.
- Semi-structured interviews (1 hour) with 11 GDE organisations
  - Participants received written information and gave consent
  - Could decline in taking part in the interview or withdrawing sharing information captured in the interview.

Interviews explored themes on patient safety, error reduction, use of data, workflows for implementation, challenges on implementation and lessons learnt.

How Closed Loop Medicines work in Hospitals



04. Results

Participation

11 GDE Trusts → 9 implemented CLMA, 2 implemented CLMS

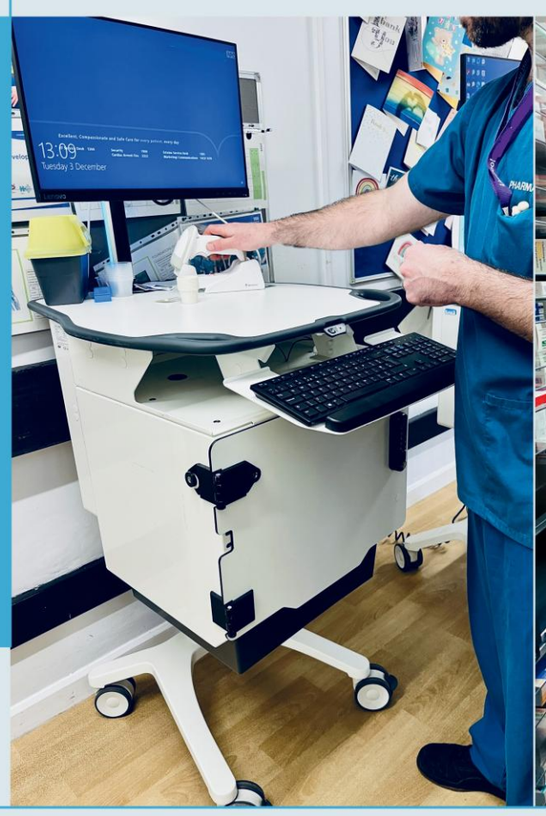
Interview Themes

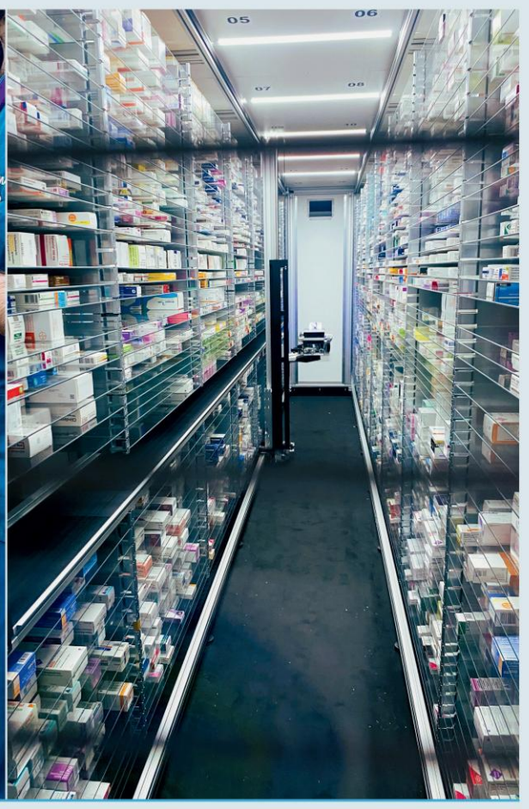
Benefits

- **Improved patient safety and care:** All Trusts reported a reduction in medication errors either related to administration or dispensing.
- **Better data quality and availability:** All Trusts reported the use of these systems provided faster access to information which allowed drug recalls to be enacted quicker, as well as use of data to review trends. Trusts use the data to support quality improvement projects.
- **Improved stock management:** The removal of manual paper-based processes and the use of automated stock management systems significantly improved the accuracy of stock inventory.

Challenges

- **Interoperability:** Trusts frequently reported challenges with system interoperability, particularly the inability of EPR systems to integrate with pharmacy dispensing and procurement systems.
- **Barcode issues:** Trusts highlighted the challenges around barcodes on medications, these included reused, missing, or unreadable barcodes.
- **Workforce:** Trusts reported the need for adequate staffing post implementation to support with ongoing maintenance requirement including drug catalogue and systems updates.





05. Discussion

No NHS Trust has yet achieved full implementation of an end-to-end Closed Loop Medicines Management (CLMM). The primary barrier is poor interoperability between the multiple digital systems in use within organisations. Another key challenge is the absence of 2D barcodes on some medicine packaging. which results in the loss of the benefits of the data held within the 2D barcodes, namely product identifier, batch number and expiry date. The absence of the 2D barcode presents challenges as stock management processes including the re stocking of dispensary robots and closed loop medicine adminstration require the information that is held in the 2D barcode.

Since the UK's departure from the EU, the Delegated Regulation (EU) 2016/161 no longer applies in Great Britain [3]. Barcodes are not mandated in the UK limiting the functionality of systems like CLMA and increasing the risk of error when manual overrides are needed. Despite these issues, digital systems have clear safety benefits, providing a secondary validation to support the "five rights" of medicines administration. To realise the full benefits of end-to-end CLMM, requires a review of the regulatory guidance on barcoding, this would involve collaboration between manufacturers, regulators, and Trusts. Similarly, digital system suppliers must work together to address interoperability challenges. Further research is needed to explore the productivity gains from full CLMM implementation and automation. This review has helped to inform national strategic plans to invest in CLMM to achieve the anticipated benefits.

References

[1] Elliott RA, Camacho E, Jankovic D, et al Economic analysis of the prevalence and clinical and economic burden of medication error in England BMJ Quality & Safety 2021;30:96-105.
[2] Truitt et al. (2016). Effect of the Implementation of Barcode Technology and an Electronic Medication Administration Record on Adverse Drug Events. Hosp Pharm. . 51 (6), 474–483. (accessed January 2024)
[3] Medicine and Healthcare products Regulatory Agency Labelling and packaging of medicinal products for human use following agreement of the Windsor Framework - GOV.UK (www.gov.uk) (Accessed July 2024).