A FIRST-OF-ITS-KIND SMART PUMP INTEGRATION IN CRITICAL CARE

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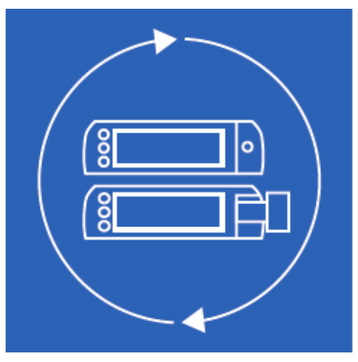
Abstract Topic: Critical care organisation, quality management, costing and outcomes

Introduction

Integrated smart infusion pumps create a closed-loop system for IV medication administration, enabling automated programming and real-time documentation.[1-3] This bidirectional interoperability is a powerful advancement in healthcare technology integration, directly supporting the continuous efforts of healthcare systems to enhance patient care and safety while optimising clinical workflows. [1]



At Royal Free London, maintaining smart pump integration was essential during their fleet replacement; non-integrated alternatives were clinically unacceptable due to patient safety risks.

Objectives

Primary:

Upgrade **400 infusion pumps** across **54 critical care beds**, including those for patient transfers and MRI, ensuring no disruption to patient care.

Secondary:

Increase **auto-programming workflow utlisation** with the new pumps to enhance compliance with electronic prescriptions and improve safety via enhanced programming feedback and error detection.

Methods: Implementation Approach

Planning & Preparation

- Software upgrades
- Hardware configuration
- Network optimisation
- Drug library review and editing for auto-programming

Rigorous Testing

- Non-clinical validation of device functionality
- Pre-empting connectivity and programming issues

Comprehensive Training

- B. Braun (pump), Oracle (EPR), and Critical Care Nurse Technologists led sessions
- **270 nurses trained in 5 weeks**

Phased Rollout

- 36-hour, 2-day phased implementation
- Real-time support during rollout

Results

Our meticulous planning and execution led to a seamless transition with significant improvements across key areas:

Implementation Timeline:

- **2 days** for successful replacement of all pumps.

Patient Care:

- **Zero disruption,** ensuring continuous care throughout the transition.

Feedback Rating:

- **Highly positive** from both clinical and technical staff.

Enhanced Efficiency & Patient Safety:

The new system dramatically increased auto-programming utlisation, demonstrating enhanced efficiency and patient safety, evidenced by a **15,233% increase in auto-programming frequency per day.**

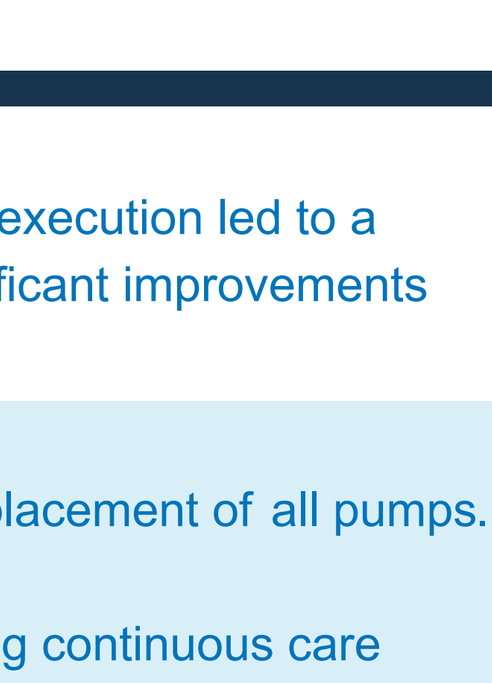


Figure 1: Daily auto-programming frequency.

Conclusion

This project successfully demonstrates the critical role of **multidisciplinary collaboration, meticulous preparation, and a well-structured implementation strategy** for safe and effective technology upgrades in critical care. The new smart pumps have significantly improved **workflow efficiency** and **enhanced patient safety.** This successful initiative provides a valuable blueprint for other healthcare organisations undertaking similar critical care technological advancements.

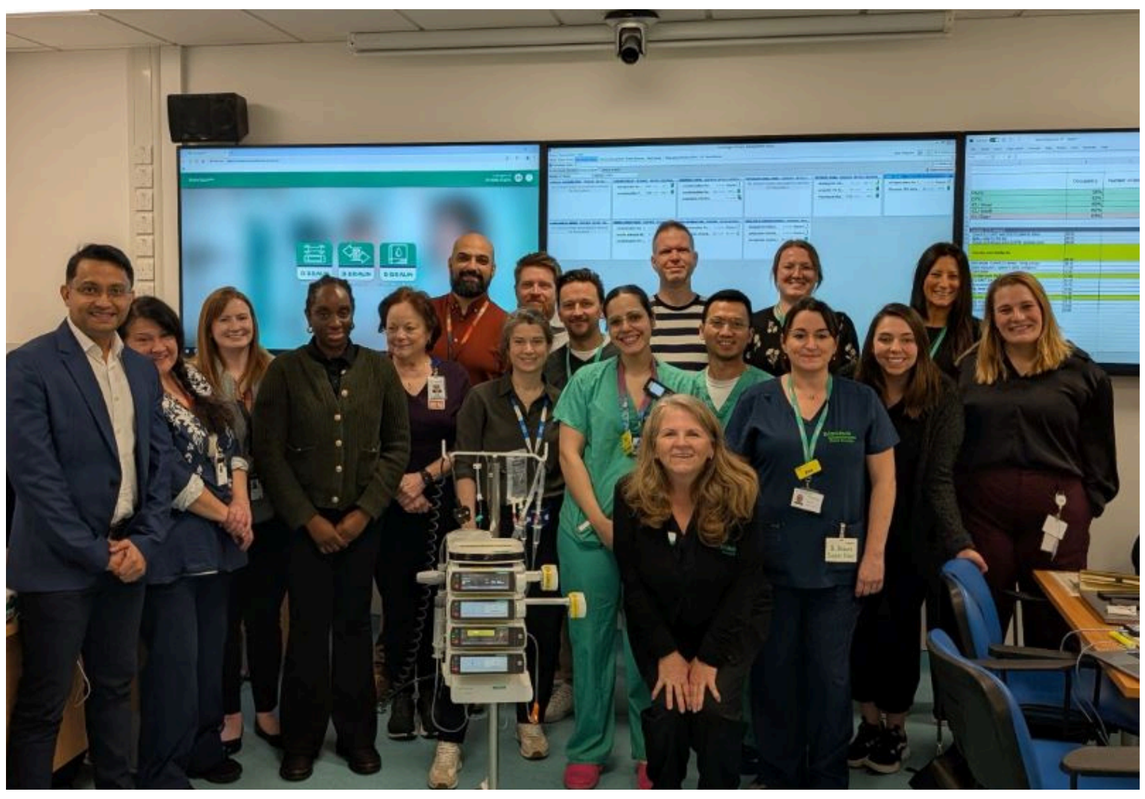


Figure 2: The multidisciplinary implementation team

References

1. Bartos D, et al. Journal of Informatics Nursing. 2024;7(3).
2. Razzano L, et al. Biomedical Instrumentation & Technology. 2018;52(1):38–43.
3. Joseph R, et al. American Journal of Health-System Pharmacy. 2023;80(12):994-1002.