Measuring the Success of a Hospital Wide Implementation of a Drug Library in Paediatrics

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Background

- Dose error reduction systems (DERS) via use of smart pump technology are aimed at preventing under or overdoses and require consideration of medication practices across divergent clinical areas.
- Continuous quality improvement data play a significant role in success and monitoring of smart pump implementation. Drug library (DL) settings and clinical workflow interoperability are dependents to compliance, along with feedback from pump users, to remove barriers that lead to DL work arounds[1].
- In April 2021, a DERS was launched hospital-wide, following agreement with key stakeholders. This was supported by an extensive multimodal education programme, which considered the clinical workflow needs of critical care and general ward areas, and the transfer of patients between them.
- Concurrently, the RCPCH[2] published their support for specific standardised infusions for children over 2kg which contained some, but not all, of the infusion requirements of BCH clinical practices.

Method

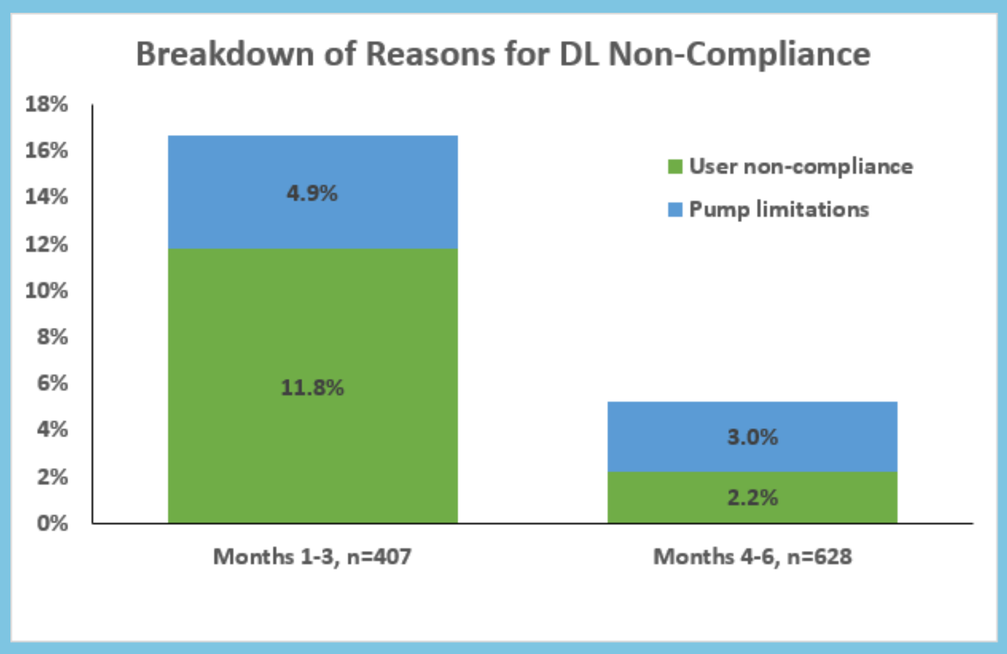
- Data were collected by ward pharmacists between June 2021 and January 2022 using an opportunistic approach.
- The data collection time period was spilt into two 3 months periods and was analysed using Excel.
- A refresher email and presentation of progress was delivered to key users after the first 3 months of data collection.
- Feedback was sought from the user where there was non-DL programming to ascertain barriers to compliance.
- Incident reports involving smart pumps were monitored.

Results

- Patient weights ranged from 0.55kg to 113kg, with 64/1035 (6.1%) infusions used in those under 2kg.
- Examples of non-DL compliance included limitations of the DL to allow clinical practice, programming affecting workflow/perception of more steps to use DL, confidence in individual's ability in pump programming and personal reluctance to change long-established personal practice.
- Outside of the theatre area, titratability of infusions in patients under 1kg was the main barrier to success. Following user feedback and further data collection, a proposed under 2kg DL profile is likely to eliminate this barrier.

BCH Drug Library Contents

- Acetylcysteine
- Adrenaline
- Alprostadil
- Amiodarone
- Calcium chloride
- Calcium gluconate
- Clonidine
- Dexmedetomidine
- Dinoprostone
- Dobutamine
- Dopamine
- Fentanyl
- Furosemide
- Heparin
- Insulin
- Ketamine
- Labetalol
- Midazolam
- Milrinone
- Morphine
- Nicardipine
- Noradrenaline
- Octreotide
- Potassium Chloride
- Propofol
- Remifentanil
- Rocuronium
- Salbutamol
- Sildenafil
- Sodium Nitroprusside
- Thiopental
- Vancomycin
- Vasopressin



Graph 1: Comparison of months 1-3 with months 4-6. N=1035

- The most common infusion with user DL non-compliance was potassium chloride. User feedback demonstrated that further education was required to be able to confidently comply with the DL as local practice required the need for extra steps in programming by further selecting volume to be infused over time.
- Reported incidents included wrong strength selection (2 occasions - morphine/milrinone) and wrong drug selection (2 occasions - noradrenaline rather than adrenaline and ketamine rather than midazolam). These programming errors were detected using established checking processes at clinical workflow points.
- DL programming non-compliance decreased between period 1 and 2 (16.7% to 5.3%), a rate reduction of 11.4% ($P<0.0001$).

Recommendations

- Addition of an under 2kg DL profile to allow infusion titration at lower weights.
- Further addition of drug entities to DL.
- Continuous quality improvement data collection with regular feedback to clinical areas.

Conclusions

- Implementation of DERS via smart pump technology have the ability to detect, warn and minimise medication errors, provided there is widespread user engagement and feedback, to ensure barriers to compliance are understood and removed.

1. Institute for Safe Medication Practices (ISMP). *ISMP Guidelines for Optimizing Safe Implementation and Use of Smart Infusion Pumps*. ISMP; 2020. https://www.ismp.org/node/972
2. Royal College of Paediatric and Child Health (RCPCH). https://www.rcpch.ac.uk/sites/default/files/2021-05/Standard%20Infusions%20JMC%20Paper%20v0.2.pdf

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