

# IMPACT OF SMART PUMP INTEROPERABILITY: REDUCING ALERTS AND IMPROVING SAFETY

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## BACKGROUND

Interoperability between smart pumps and the electronic medical record (EMR) closes the loop on medication safety, helping ensure the five rights of medication administration.<sup>1</sup> Infusion orders are auto-programmed into the pump, reducing the need for manual programming and associated risk of error, while infusion rates and volumes are auto-documented into the EMR. Dose tracking software provides visibility to infusions in real-time with trending reports and alert triggers for programming outside soft dosing limits. While alert limit triggers help safeguard infusion delivery, if they are not driven by hospital evidence, they can contribute to alert fatigue and drug library noncompliance.<sup>2</sup>

## PURPOSE

This project evaluated the impact of smart pump interoperability on clinical practice by measuring and evaluating drug library alerts, overrides and compliance rates at an acute care hospital.

## METHODS

In Sept 2018, Huntington Beach Hospital implemented Infusomat® Space® wireless infusion pumps with DoseTrac® Infusion Management Software (B. Braun Medical Inc.). HIPAA de-identified infusion data were collected using secure file transfer and analyzed on drug library compliance, alerts, and overrides across 3 data collection periods: Baseline (Oct-Dec 2018), Post Epic EMR Integration (Oct-Dec 2019) and Post Drug Library Optimization (Apr-Jun 2020).

## INTERVENTIONS AND RESULTS

Key performance indicator (KPI) baseline data were collected prior to EMR integration. Interoperability went live August 2019 and included changes to the pump drug library limits within the Dose Error Reduction Software (DERS) to match the EMR formulary.

TABLE 1. KEY PERFORMANCE INDICATOR RESULTS

Key Performance Indicator	Baseline	Post EMR Integration	Post Library Optimization
Drug Library Compliance	96%	98%	97%
Alert Override Response Rate	12%	58%	9%
Override Frequency	1.45%	4.19%	0.33%
norepinephrine overrides	0	198	2
phenylephrine overrides	0	138	0

Note: Drug Library Compliance = deliveries in drug library / total deliveries, Alert Override Response Rate = total overrides / total alerts, Override Frequency = total overrides / total drug library deliveries.

EMR interoperability had a positive impact on drug library compliance, while adopting the EMR formulary limits resulted in an increase in soft limit overrides. Eighty percent of these overrides were associated with norepinephrine and phenylephrine due to the addition of soft minimum dosing limits. These vasoactive infusions are commonly weaned off below soft limits, making these alerts excessive and clinically non-credible.

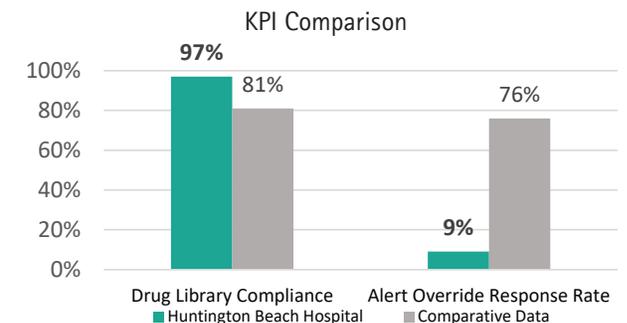
Subsequently, the drug library was modified to eliminate these soft minimum limits while maintaining the safeguard of upper limits within the DERS. This drug library optimization resulted in a 92% reduction in override frequency.

## OUTCOMES AND DISCUSSION

Smart pump interoperability was successful, achieving 91% auto-programming compliance in the ED and 77% hospital wide immediately after go-live.

Data analysis identified opportunities for drug library optimization; reducing overrides 92% and bringing alert override response rate to a remarkably low 9%, compared to rates of 74%-76% reported by Marwitz et al.<sup>3</sup> Minimizing overrides also helped sustain high levels of drug library compliance of 97-98%, versus 81% reported by Giuliano et al.<sup>4</sup>

GRAPH 1. KEY PERFORMANCE INDICATOR COMPARISON



Note: Comparative data source from national database of other pumps on the market.<sup>3,4</sup>

Smart pump interoperability impacted patient safety; one year post integration, there were no reported errors related to smart pumps. A limitation is these outcomes cannot be extrapolated to other hospitals and pumps.



## References

1. Razanno et al. Collaboration fuels success of infusion management interoperability initiative. *Biomedical Instrumentation & Technology*, Jan 2018; 52(1): 38-43.
2. Vitoux et al. Eliminating clinical workarounds through improved smart pump drug library use. *Horizons*, Fall 2015: 23-38.
3. Marwitz et al. High-alert medication administration and intravenous smart pumps: A descriptive analysis of clinical practice. *Research in Social and Administrative Pharmacy*, July 2019; 15(7): 889-894.
4. Giuliano et al. Intravenous smart pump drug library compliance: A descriptive study of 44 hospitals. *Journal of Patient Safety*, Dec 2018; 14(4): e76-e82.