

# Improving Smart Pump Drug Library Upload Success Using a Best Practice Approach

Nicole C LeFever, PharmD, Emory S Martin, PharmD, Jennifer Small, MSN, RN, John Drelick, PharmD; Steward Health Care  
Rachel R Vitoux, MBA, MSN, RN, CPHIMS; B. Braun Medical Inc.

IHI Forum 2022

## Problem & Aim

- Routine updating of smart pump drug libraries is recommended to support new protocols, improve therapeutics and optimize DERS use.<sup>1,2</sup> Outdated libraries (misaligned with EHR formulary, order sets, etc.) can result in serious patient harm due to dose miscalculations, incorrect limits, missed and false alerts.<sup>3,4</sup>
- Delays in successful pump library upload after wireless drug library deployment are significant and widespread due to technology limitations and poor processes.<sup>3,4</sup> Studies report delay medians ranging from 22 to 192 days,<sup>4</sup> and at least 6 days to update 50% of pumps, 15 days to update 80% of pumps and 140 days to reach 100%.<sup>3</sup>
- The aim of this QI initiative was to improve drug library upload success by developing an enterprise-wide best practice approach with the goal of achieving  $\geq 90\%$  of pumps updated within 7 days.
- Three acute care hospitals from 3 different U.S. regions participated in the initiative.

Figure 1. Pump visual indicator examples

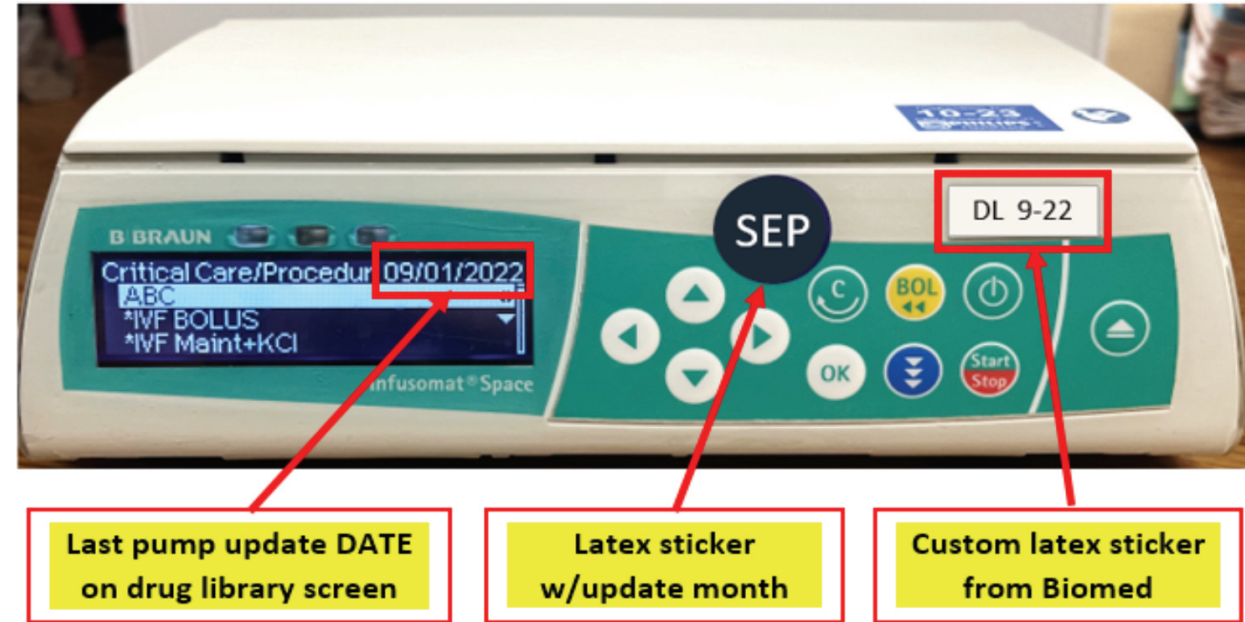


Figure 2. Real-time Status View software showing current drug library version

Pump S/N	State	Drug Name	Concentration	Rate (ml/hr)	Dosage	Time Left (Hrs)	Drug Library Id	Power Source
1596086	Run	*IVF Maintenance		10		2358	SH 2022.09.01.dl	A/C
1591916	Run	CARDIZEM DRIP	1 mg/ml	15	15 mg/hr	372	SH 2022.09.01.dl	A/C
1595930	Hold	DOPamine	1.6 mg/ml	0	8.03 mcg/kg/min	208	SH 2022.09.01.dl	A/C
1595949	Run	1/2 NS		175		67	SH 2022.09.01.dl	A/C
1595936	Run	propofol DRIP (mcg/kg)	10 mg/ml	17.47	30 mcg/kg/min	92	SH 2022.09.01.dl	A/C
1591920	Run	insulin units/hr	1 units/ml	2	2 units/hr	1043	SH 2022.09.01.dl	Batt
1591952	Standby	MAG suFATE 2g	0.04 g/ml	0	6 g/hr	2	SH 2022.09.01.dl	A/C
1591913	Hold	heparin ACS/STEMI unit/kg/hr	100 units/ml	0	10.1 units/kg/hr	0	SH 2022.09.01.dl	A/C
1596019	Standby	NORepinephrine CRIT CARE	0.032 mg/ml	0	0.01 mcg/kg/min	5431	SH 2022.09.01.dl	A/C
1596089	Standby	potassium chlor PERPH 20mEq	0.2 mEq/ml	0	0 mEq/hr	0	SH 2022.09.01.dl	A/C
1596018	Hold	desmedetomidine	4 mcg/ml	0	0.3 mcg/kg/hr	218	SH 2022.09.01.dl	A/C
1596089	Hold	heparin ACS/STEMI unit/kg/hr	100 units/ml	0	14.9 units/kg/hr	492	SH 2022.09.01.dl	A/C

## Actions Taken

### Enterprise Level

- Established an enterprise pump management subcommittee
- Developed a best practice approach for deploying drug library updates:
  - Standardization of the infusion drug library across a 34-hospital system
  - Quarterly updates on a standard day, ensuring early communication on plan
  - Designated a Pump Update Safety Lead at each facility (preference is nurse leader)
  - Developed and trained Safety Leads on the best practice approach [below]

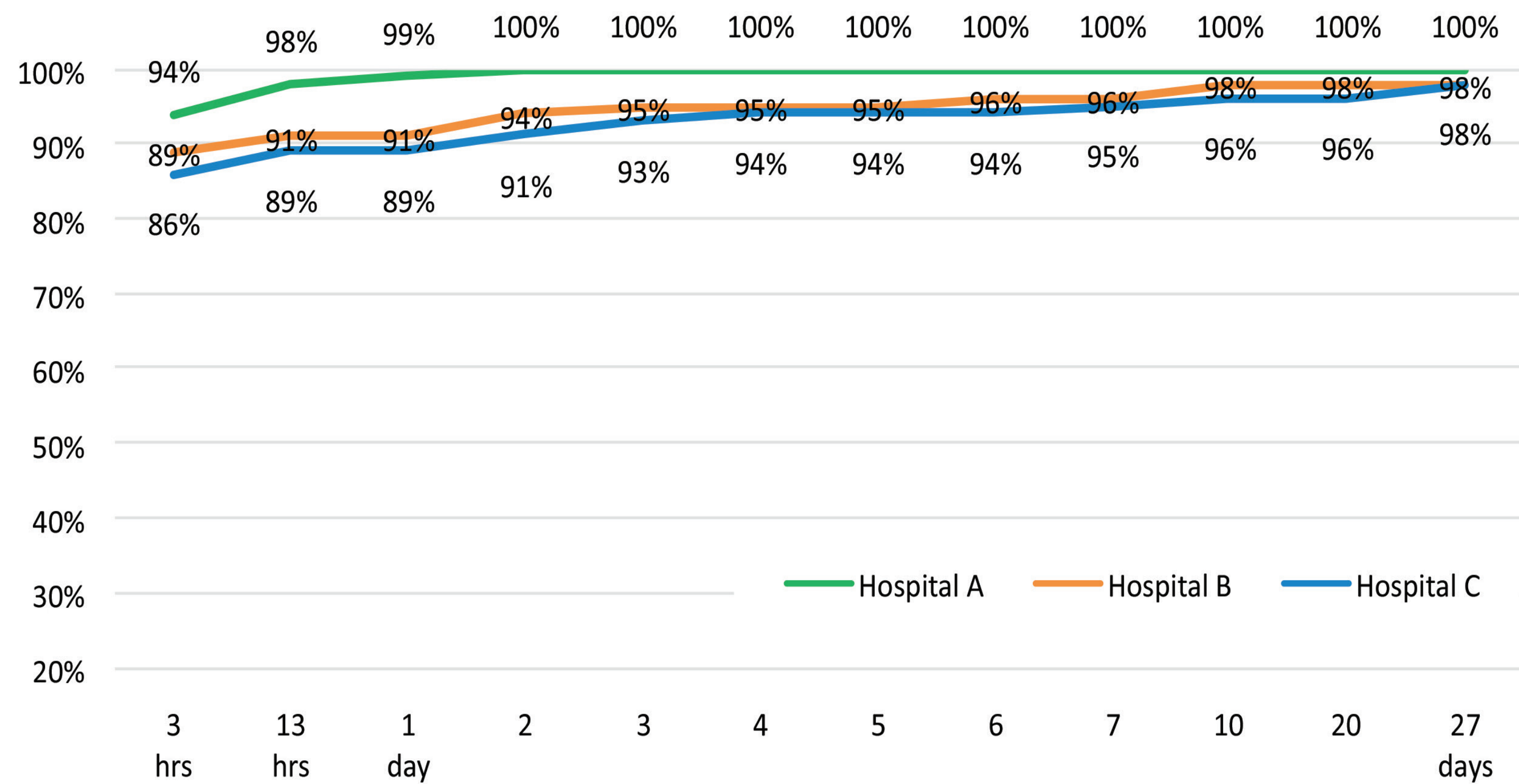
### Facility Level

- Early collaboration between Safety Leads and other facility stakeholders (i.e., nursing, pharmacy, biomed leadership)
- Safety Lead notified facility end-users on update details including daily reminders via department safety huddles, and distributed end-user *Tips for Success* guidance document and visual indicators (i.e. stickers)
- Local team lead by Safety Lead plugged in and powered off pumps not in use, swapped out pumps in use proactively or when bag finished, and affixed visual indicators (Figure 1) after successful upload confirmed
- Remaining pumps needing update were identified in Real-time Status View software (Figure 2)

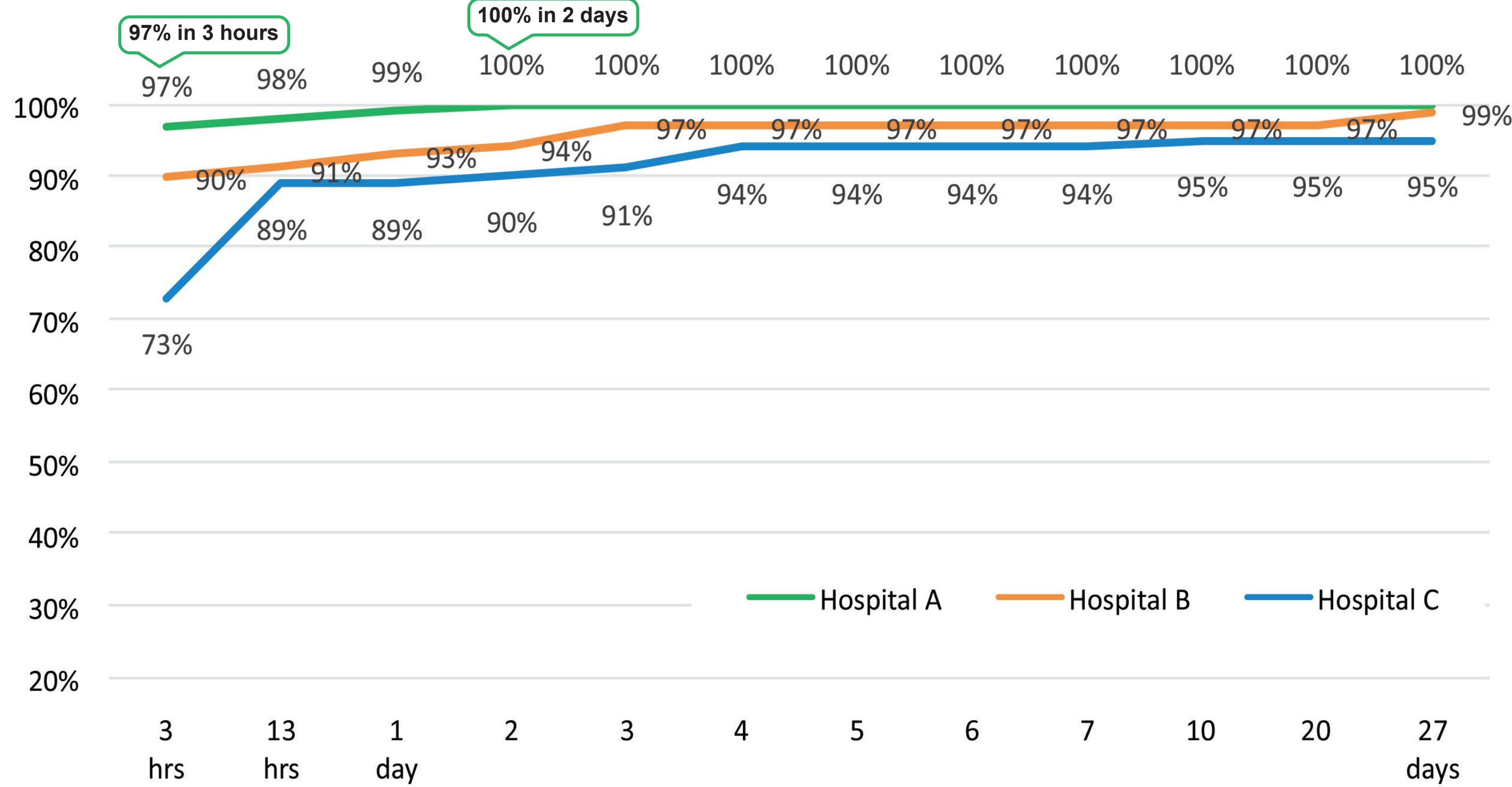
### Data Collection

- Data were collected following two separate drug library pushes in July and Oct 2021:
  - pre-intervention baseline and 2) after implementing a best practice approach
- Software was used to deploy the drug library file, monitor distribution in real time, and track pumps with the drug library 1) received on the WiFi card and 2) updated on the pump.

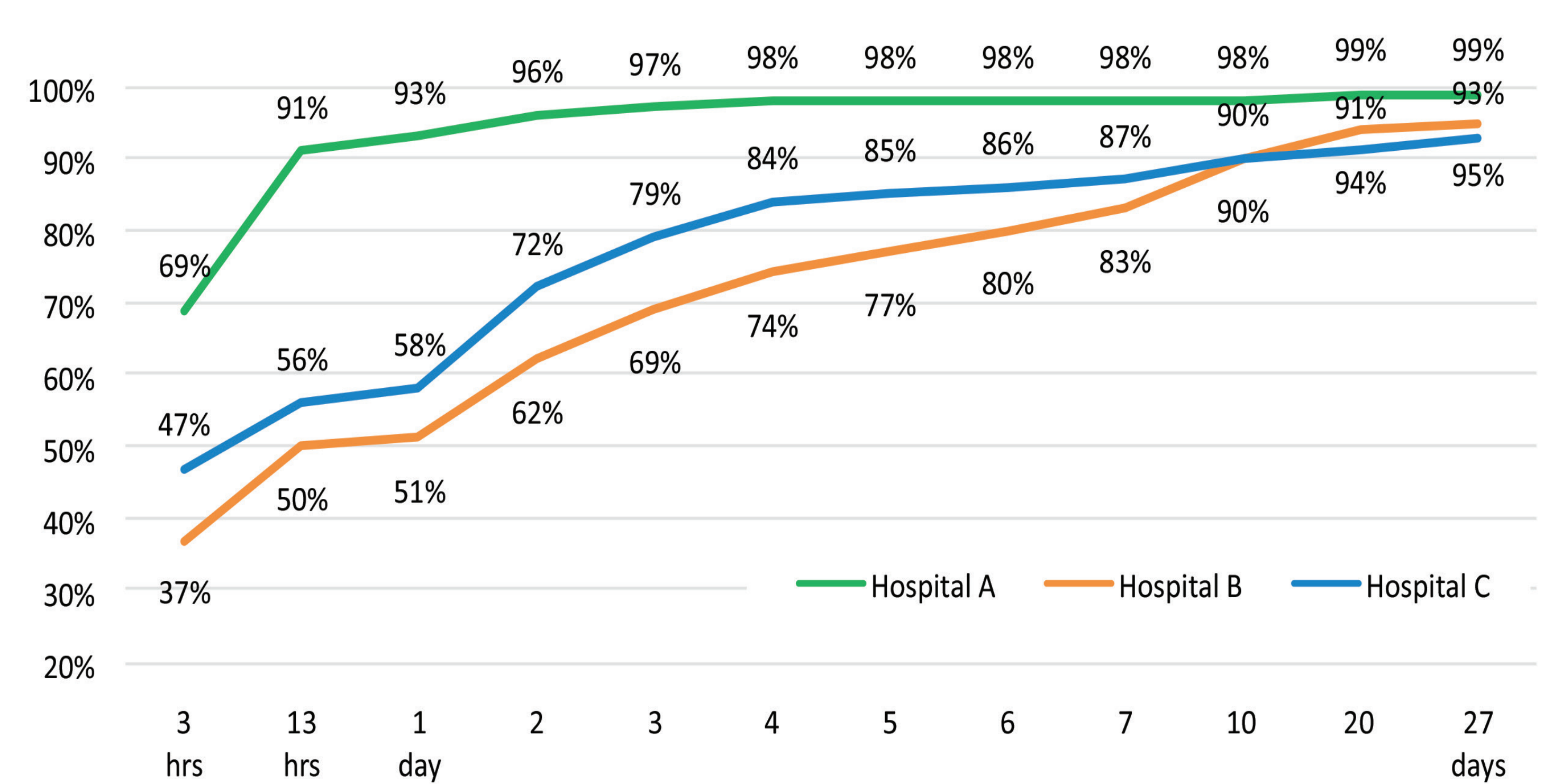
### Baseline Step 1: Library Received on WiFi Card



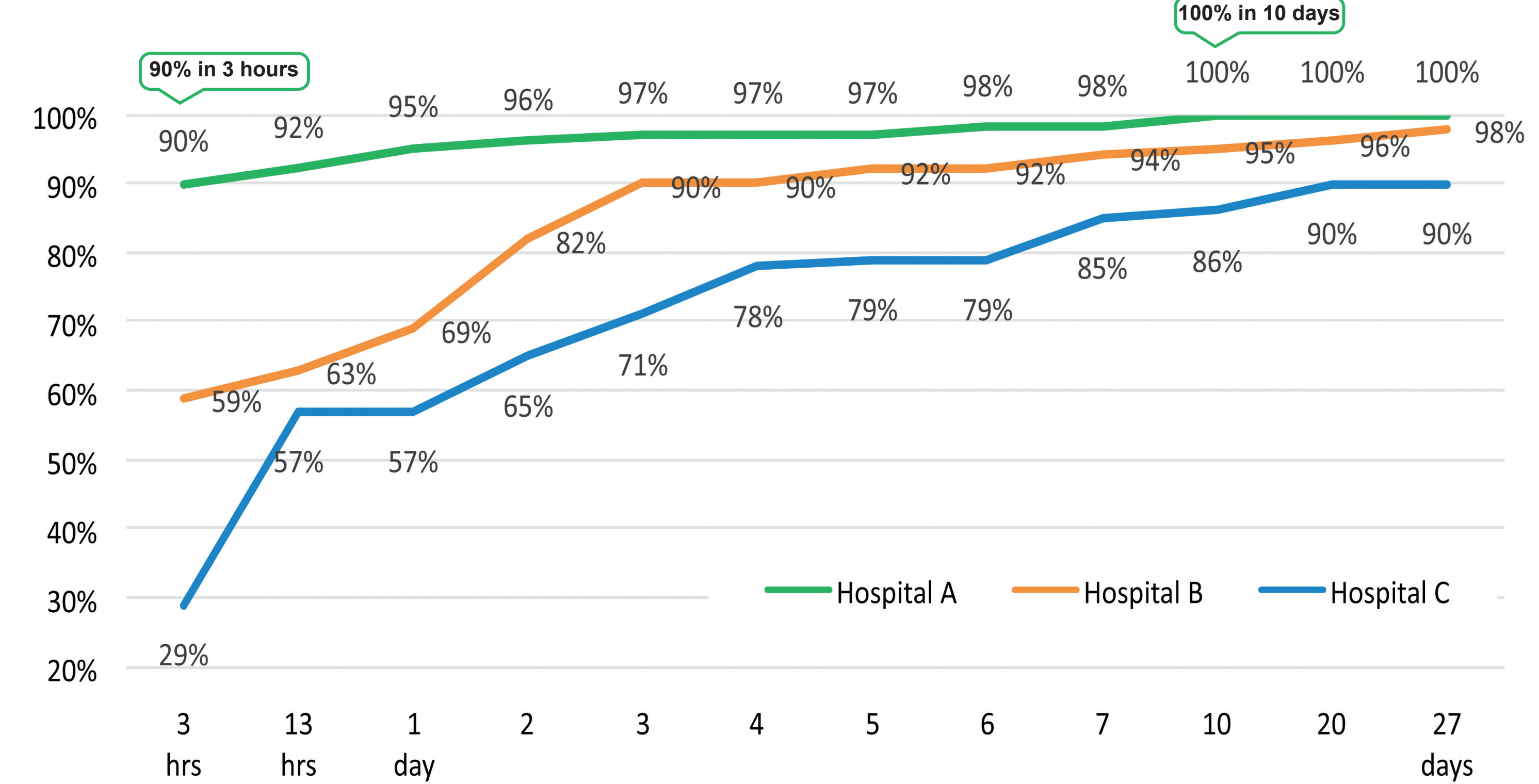
### Post Intervention Step 1: Library Received on WiFi Card



### Baseline Step 2: Library Updated on Pump



### Post Intervention Step 2: Library Updated on Pump



## Results

### Library Received on WiFi Card

- Hospital A** Baseline: 94% of WiFi cards received the updated library in 3 hours  
Post Intervention: **97%** of WiFi cards updated in **3 hours**; **100%** by **day 2**
- Within **2 days** of deployment, all 3 facilities achieved  $\geq 90\%$  of pump WiFi cards with updated library (range 90% - 100%) for both baseline and best practice pushes

### Library Updated on Pump (Goal $\geq 90\%$ day 7)

- Hospital A** Baseline: 69% of pumps received the updated library in 3 hours  
Post Intervention: **90%** of pumps received in **3 hours**; **100%** in **10 days**
- Hospital B** Baseline: 90% of pumps received the updated library by day 10  
Post Intervention: **90%** of pumps received by **day 3**
- Hospital C** Baseline: 90% of pumps received the updated library by day 10  
Post Intervention: **90%** of pumps received by **day 20** (best practice interventions were partially implemented, lacking nursing involvement)

### Drug Library KPIs (3 Sites Combined)

- Baseline (July): 97% drug library compliance, 0.26 alerts/delivery, 30.5% override rate
- Post Intervention (Nov): **97.3%** drug library compliance, **0.20** alerts/delivery, **22.3%** override rate

## Conclusions & Lessons Learned

Drug library updates were successful and markedly better than reported in the literature due to both technology and practice. Drug library compliance, alerts/delivery and override rate all improved and we have implemented this model across the enterprise.

### Technology

Rapid receipt of the drug library on the pump WiFi card occurred at both baseline and after implementing best practice approach due to pump software technology:

- Drug library is passively received and stored in memory on the pump WiFi card while infusing - without interruption - or while the pump is powered off (battery must be charged or pump plugged in)
- Drug library is passively transferred from WiFi card to pump during power down

### Practice

- Multidisciplinary engagement** is necessary throughout library development to deployment.
- Identify a facility Pump Update Safety Lead (ideally a nurse)** for leading the update, staging pumps and facilitating daily huddles.
- Nursing engagement and ownership is critical to success.** Hospital A excelled because they had a strong engagement of nursing leaders and front line staff. Hospital C struggled with this, resulting in a longer time to achieve the 90% goal.