Barcode Scanning and Infusion Pumps: The Journey to Safety with Wireless Devices

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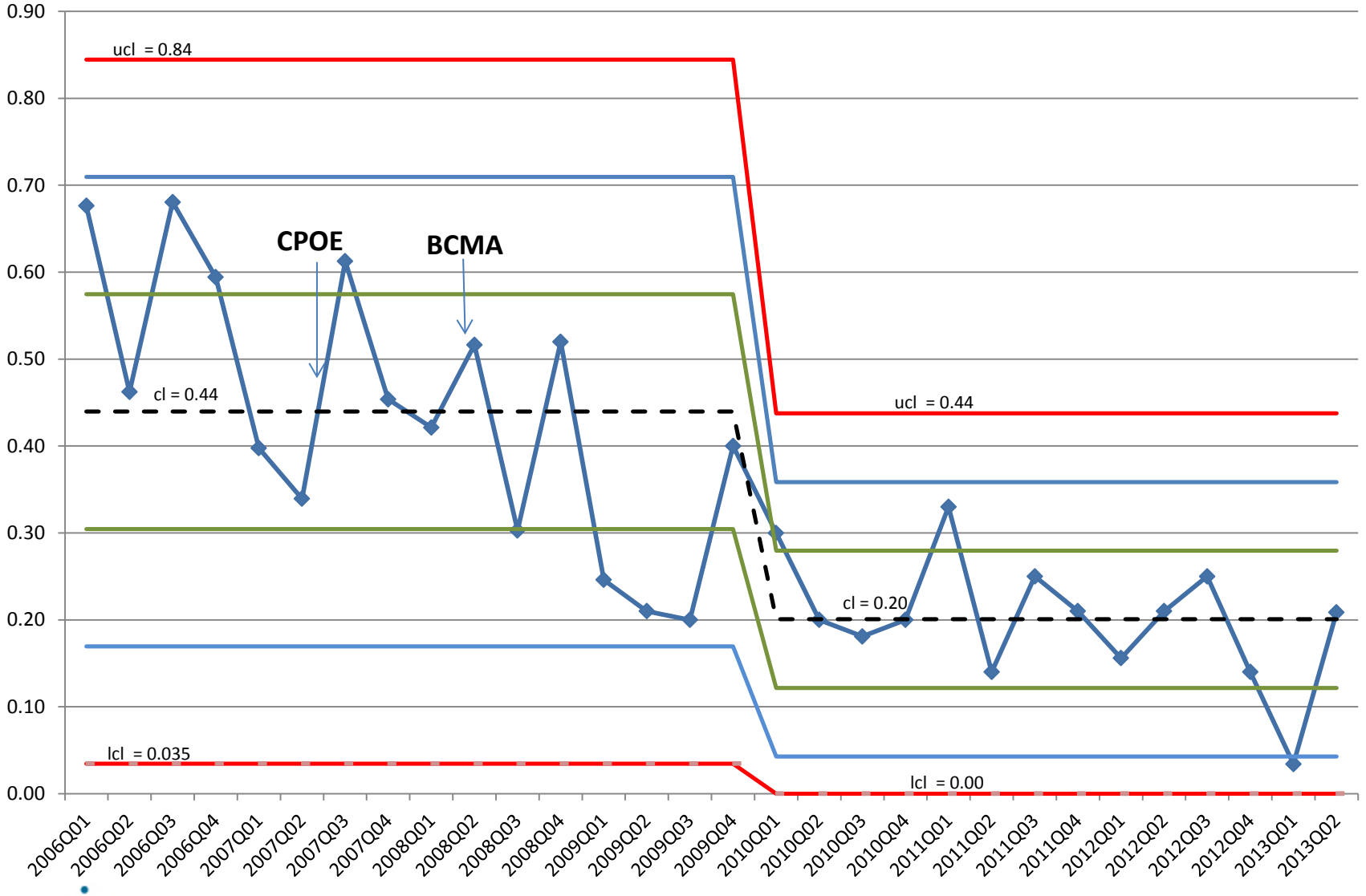
Objectives

- Define BCMA and the safety benefits of implementation
- Describe the IV pump implementation process at BCH
- Describe the clinical decision making process and the clinical implications for pump library build

Bar Coded Medication Administration Overview

- Staged implementation began in 2008 (tethered and non tethered)
- Barcode scanning implemented for medications and breast milk
- Decrease in ADEs directly attributable to initiation of BCMA documentation
- Automated reporting at Clinician, unit and program level
- Future- wireless scanning with smart pumps

3,4,& 5's Adverse Drug Events per 1000 Patient Days
Q1 2006 - Q2 2013



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Compliance Reports

Overall by Unit

Over 90% | 80 - 90% | Under 80%

Monthly Medication Scanning Compliance By Unit

From: 1/1/2013 To: 2/1/2013

Medical

Unit	Scans	Admins	Bed Days	Adm/BD	Scan %
06 East	2,014	2,163	280	7.73	93.1%
11 South ICP	4,738	5,110	342	14.94	92.7%
07 West	3,835	4,204	733	5.74	91.2%
09 South	9,017	9,944	849	11.71	90.7%
06 West	5,775	6,518	360	18.11	88.6%
09 East	8,431	9,757	1,121	8.7	86.4%
09 NorthWest	5,131	5,953	767	7.76	86.2%
06 North	5,533	6,664	413	16.14	83.0%
05 Bader	2,662	3,813	514	7.42	69.8%

ICU & Cardiac

Unit	Scans	Admins	Bed Days	Adm/BD	Scan %
11 MICU	7,992	8,509	305	27.9	93.9%
07 South	16,024	17,357	767	22.63	92.3%
07 North	5,239	5,695	612	9.31	92.0%
08 East	12,537	13,963	1,108	12.6	89.8%
08 South	15,001	16,900	818	20.66	88.8%

All Areas

Scans	Admins	Bed Days	Adm/BD	Scan %
135,439	165,920	18,022	9.21	81.6%

Surgical

Unit	Scans	Admins	Bed Days	Adm/BD	Scan %
10 NorthWest	5,727	6,250	1,124	5.56	91.6%
10 East	3,881	4,241	615	6.9	91.5%
10 South	6,250	6,921	687	10.07	90.3%

Emergency Department

Unit	Scans	Admins	Bed Days	Adm/BD	Scan %
Emergency Department	8,744	10,392	5,684	1.83	84.1%

Drill down by RN

Documenting Prsnl	% pt	% med	Scans	Admins	%
[redacted]	100.0%	100.0%	74	74	100.0%
	100.0%	100.0%	1	1	100.0%
	100.0%	100.0%	4	4	100.0%
	100.0%	100.0%	52	52	100.0%
	100.0%	100.0%	10	10	100.0%
	100.0%	100.0%	20	20	100.0%
	100.0%	100.0%	4	4	100.0%
	100.0%	100.0%	123	123	100.0%
	100.0%	100.0%	36	36	100.0%
	100.0%	100.0%	23	23	100.0%
	100.0%	100.0%	13	13	100.0%
	100.0%	100.0%	28	28	100.0%
	100.0%	100.0%	60	60	100.0%
	100.0%	100.0%	23	23	100.0%
	100.0%	100.0%	24	24	100.0%
	100.0%	100.0%	1	1	100.0%

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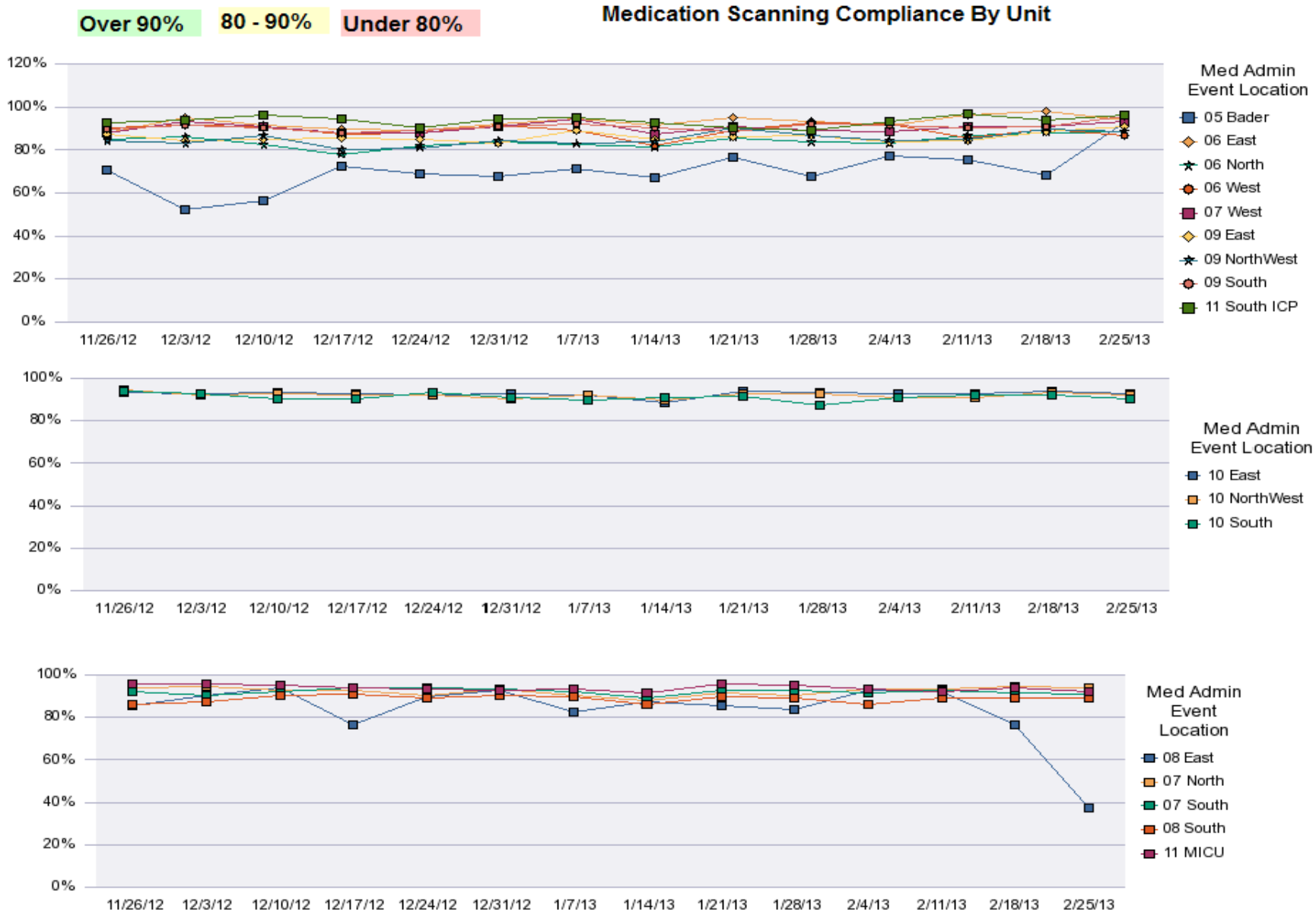
Compliance Reports



Patient Safety Improvements

- Serious Medication Errors reduced ~ 50%
- CPOE alone produced modest effect
- Bar coded med administration has had sustained effect
- Near miss alerts have increased staff buy-in
- Placement of patient ID improved across the organization
- Parent engagement in positive patient ID
- Increased real-time documentation
- Multi-disciplinary use of BCMA

Best Practices

- Barcode every med, every time
- Test every product for “scannability”
- Front line staff test and choose scanner
- Barcoding does not negate the need to continue to inspect medication for volume, color, etc.
- Barcoding requires all medications to be labeled (including those taken from the automated dispensing system in liquid form)
- Watch out for work arounds and work with front line staff to identify barriers
- Slow implementation allows for identification and mitigation of work arounds as well as one on one training and follow up
- Unit level and person level reporting of compliance works!

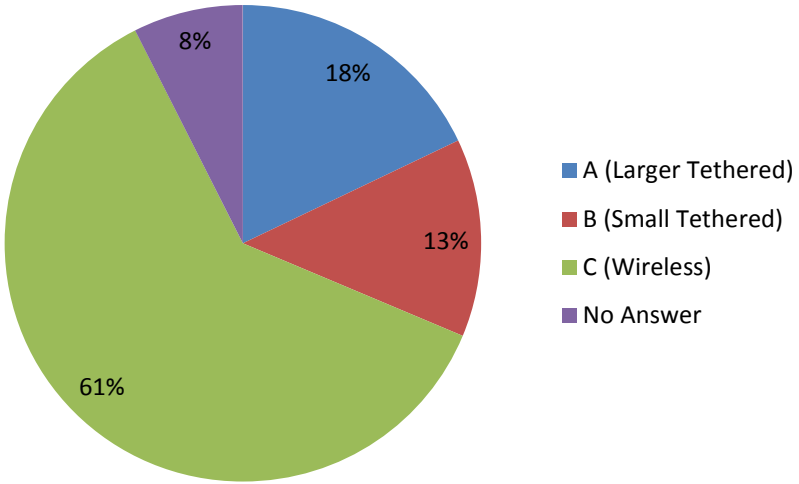
Pilot

Pilot Units:

- CICU
- NICU
- Medical
- Surgical
- Oncology
- Procedure area (Infusion)

Pilot Data

Barcode Scanner Preferences (n = 67)



Comments:

- "C is the best one!! Love that it is wireless! And its soooo quiet which is nice for working nights!!! Did I mention that I love that it's wireless!! So easy to get to the patient's barcodes because they are sneaky ninjas when they sleep"
- "Love C! Favorite part is that the scanner is wireless, so I'm not dragging the cow around the small room - it's also quick to scan med - don't need to scan multiple times to register"
- "The wireless scanner is a great tool and should be used here on 10NW. It is much easier to scan a patient without having to drag the computer over to the bedside. The ease of the scanner is very helpful and makes medication administration efficient and safe. The scanner itself is much faster and scans better than the old scanners. I highly recommend purchasing these wireless scanners"

Wireless Scanners

Wireless Scanners

Wireless Pumps

Solidified need for Wireless scanners with pump integration coming

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Wireless Infusion Pumps

- At BCH, the need to transition to new Infusion Smart Pumps was seen
- In the past, BCH used various IV and PCA pumps by various vendors to give patients IV medications and fluids
- This disjointed system was difficult for clinical staff, hard to maintain and did not work well with the Electronic Medical Record (EMR)
- It was evident that that transition to a one vendor pump support system was needed to maintain patient safety and future integration into the EMR

IV Pump Must Have's

- Pediatric Patient Population- Must have the ability to deliver weight based medications
- Wireless- Must have the capability for the Medication Library to be updated and changed quickly and easily
- One Vendor Solution
- Must have the ability to be to be connected to our EMR with a bidirectional interface

Pump Fair and Decision

- Multiple IV pump vendors were asked to demonstrate their product during a “pump fair”
- This Pump Fair was held in a common area that was easily accessible to staff
- Staff were asked to visit various demonstrations, interact with the infusion pumps and have their questions answered
- Staff were asked to complete a survey at the end of the fair to vote on which pump they would like to pilot
- Based on the results and need for integration into the EMR, the decision was made to pilot the selected infusion pump for 1 week throughout the institution

Pump Pilot

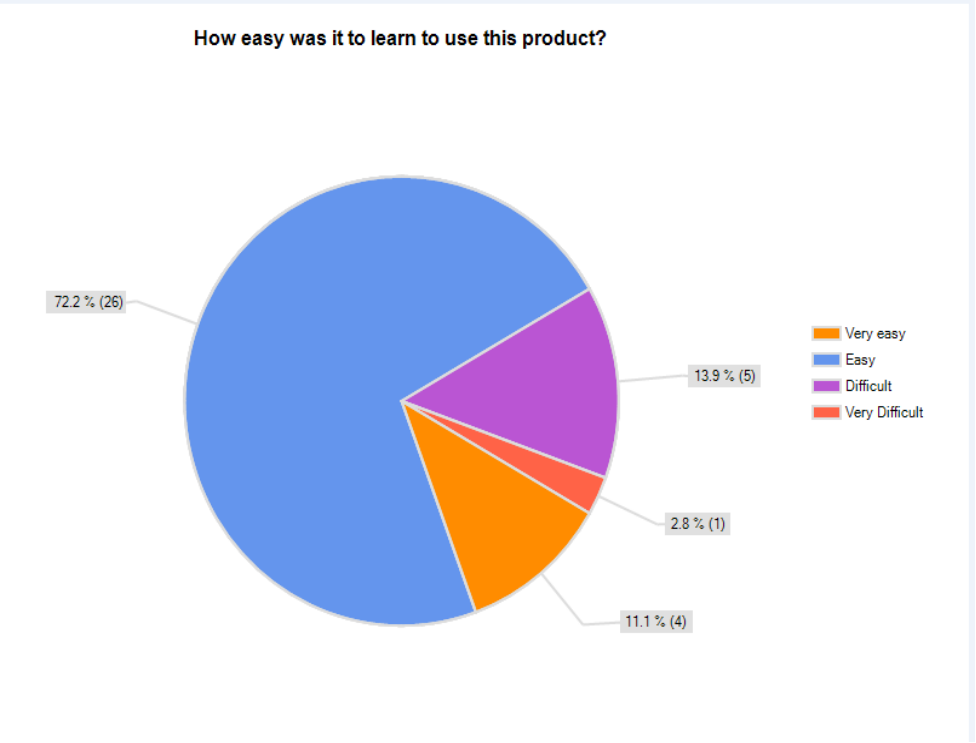
The pilot took place over 1 week throughout BCH.

A “Pilot” library was created and select patients were transitioned over to the new infusion pumps for this week.

The pilot units included:

- Operating Room
- Cardiac Intensive Care Unit
- Neonatal Intensive Care Unit
- 2 Inpatient Surgical Floors
- Oncology

Staff were asked to complete survey when they were trailing these pumps- various questions were asked, including ease of use.



Implementation Plan

- With BCH Leadership support, a task force was then created to plan and implement this smart pump technology
- This task force included members of the hospital from across all spectrums including:
    - Director of Pharmacy
    - Director of Clinical Education and Informatics
    - Director of Biomedical Engineering
    - Informatics Pharmacist
    - Informatics Nurse
    - Project Manager
    - Chief of Anesthesia
    - Members of Supply Chain and Products
    - Central Processing Department
    - Information Systems Department

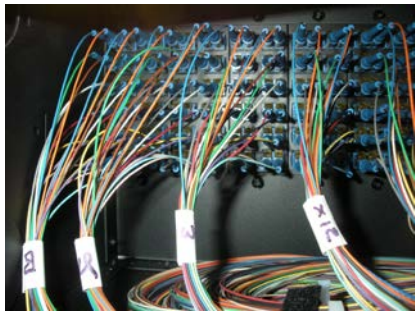
- Various subgroups of other team members were also formed to help with education, support, knowledge, configuration and implementation of the smart pumps

Working Towards Implementation

- With vendor support, the Informatics Pharmacist and Informatics Nurse were able to establish 2 pump libraries, for the entire enterprise based upon the Boston Children's Pharmacy formulary
- These libraries were based on the needs of the patient
  - General and ICU /ED/Heme/Onc.
- Specific questions and decisions were made together by Nursing, Pharmacy and Anesthesia in regards to the pump library
- The members of the team all looked at the proposed library to see any glaring differences. These groups were able to join in consensus on various aspects of the pump library

Working Towards Implementation

- Several weeks before pump go live, both pumps and poles arrived at the hospital
- Upon arrival, the IV pumps were inspected and programmed by vendor personnel
- Since the pumps depend on the wireless networking, ISD teams of Networking and Network Operating Systems helped with the creation, maintenance and implementation of servers that were needed for maintaining the libraries on the BCH network
- Various staff members of the hospital were on site and at the delivery docks to take care of any issues as they arose
- Extra members of Environmental Services, along with various members of different teams were brought in to help with the packing and unloading of the pumps and poles



Now… To Teach

- The Clinical Education & Informatics team took lead on the education development and education implementation
- The team decided upon a “Train the Trainer” approach
- Each unit designated super users throughout their unit that could help train other users on the infusion pumps
- All nursing super users were required to complete a web based educational module and attend an in-person class
- These super users, along with clinical unit educators, managers and some directors took a 3 hour super user class, where functionality was described, information was given and questions were answered
- Super user classes took place over 3 days from 6a-10pm
- The classes were all staffed and taught by members of the Clinical Education & Informatics team and had vendor support for any questions that could not be answered by the BCH team

Let's Get Pumped!

- 4 days before go-live, members of the Clinical Education & Informatics teams determined the need for how many pumps per patient based on patient census. The following two days were spent with building configurations of pumps based on patient need

- Various members of the hospital community came together to help with building of the patient specific pump configurations

- All pumps were plugged into a power source to maintain pump battery life

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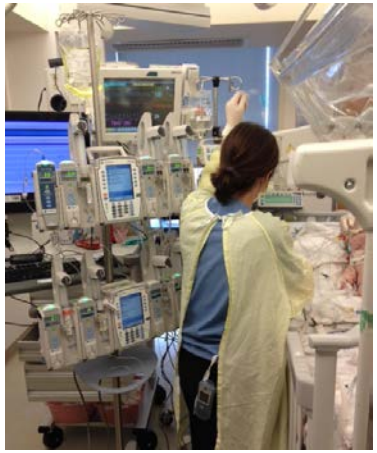
Let's Get Pumped!

- On day of go live, each patient was specifically delivered their IV Pump configuration

- Along with pump delivery; Code Cart Supplies along with tubing and accessories were delivered

- On the morning of go live, clinical teams were assembled and transitioned over the patients, one unit at a time, one patient at a time



- Vendor representatives were also on site to help with implementation. Only BCH Nurses and Clinicians received clearance to exchange and program the pumps

Implementation Success

- 95% of all inpatients had been transitioned to the new IV Pumps by the completion of Day 1
- By Day 5, all patients had been transitioned over to the new pump system
- Extremely careful planning and solid team work among multiple teams resulted in a successful conversion

6W	6E	6N	7N	7S	7W	8S	8E	9NW	9S	9E	10NW	10E	10S	11S ICP	11S MICU
600 A	634 0	615 A	7A 1A	7101	703 A	8101	800 A	901 A	9101	922 A	1001 A	1032 A	10101	ICP 1	MICU 1
601 A	636 A	615 B	7A 2A	7102	704 A	8102	800 B	901 B	9102	922 B	1001 B	1033 A	10102	ICP 2	MICU 2
602 A	636 B	616 A	7A 3A	7103	705 A	8103	801 A	902 A	9103	923 A	1002 A	1033 B	10103	ICP 3	MICU 3
603 A	638 A	616 B	7A 4A	7104	706 A	8104	801 B	902 B	9104	923 B	1002 B	1034 A	10104	ICP 4	MICU 4
604 closed	639 A	617 A	BAY3 1	7105	707 A	8105	802 A	903 A	9105	924 A	1003 A	1034 B	10105	ICP 5	MICU 5
605 A	640 A	617 B	BAY3 2	7106	708 A	8106	802 B	903 B	9106	924 B	1003 B	1035 A	10106	ICP 6	MICU 6
606 A	641 A	618 A	BAY3 3	742	708 B	837 (bs7)	803 A	904 A	9107	925 A	1004 A	1036 A	10107	ICP 7	MICU 7
607 A	642 A	618 B	BAY3 4	743	709 A	838 (bs8)	803 B	904 B	9108	925 B	1004 B	1036 B	10108	ICP 8	MICU 8
608 A	643 A	619 A	BAY4 5	744	709 B	839 (bs9)	805 A	905 A	9109	926 A	1006 A	1037 A	10109	ICP 9	MICU 9
609 A		620 A	BAY4 6	740	710 A	840 (bs10)	806 A	905 B	9110	926 B	1006 B	1037 B	10110	ICP 10	MICU 10
610 A		621 A	BAY4 7	741	710 B	836 (bs11)	807 A	906 A	9111	932 A	1007 A	1038 A	10111		MICU 11
611 A		622 A	BAY4 8	7107	711 A	8107 (bs12)	808 A	906 B	9112	934 A	1007 B	1038 B	10112		MICU 12
612 A		623 A	BAY5 9	7108	711 B	8108 (bs14)	809 A	907 A	9113	934 B	1008 A	1039 A	10113		
613 A		624 A	BAY5 10	7109	712 A	8109 (bs15)	810 A	907 B	9114	935 A	1009 A	1039 B	10114		
614 A		630 A	BAY5 11	7110	712 B	8110 (bs16)	810 B	908 A	9115	936 A	1009 B	1040 A	10115		
		631 A	BAY5 12	7111	713 A	8111 (bs17)	811 A	909 A	9116	936 B	1010 A	1042 A	10116		
		631 B	BAY6 14	7112	713 B	8112 (bs18)	811 B	910 A	9117	937 A	1011 A	1043 A	10117		
		632 A	BAY6 15	7113	714 A	8113 (bs19)	812 A	911 A	9118	937 B	1012 A	1044 A	10118		
		632 B	BAY6 16	7114	714 B	8114 (bs20)	812 B	912 A	9119	938 A	1015 A	1045 A	10119		
		633 A	BAY6 17	7115	715 A	8115 (bs21)	814 A	914 A	9120	938 B	1016 A	1046 A	10120		
		669 0	BAY7 18	7116	715 B	8116 (bs22)	815 A	915 A	9121	939 A	1017 A	1047 A	10121		
			BAY7 19	7117	754 0	8117 (bs23)	817 A	916 A	9122	939 B	1018 A	1071 0	10122		
			BAY7 20	7118		8118 (bs24)	818 A	917 A	9123	940 A	1019 A		10123		
			BAY7 21	7119		8119 (bs25)	819 A	918 A	9124	941 A	1020 A		10124		
			BAY7 22	7120		8120 (bs26)	820 A	919 A	9165	942 A	1021 A		10127		
			BAY7 23	7121		8121 (bs27)	821 A	920 A		943 A	1021 B				
			BAY7 24	7122		8122 (bs28)	822 A	949 0		944 A	1022 A				
				7123		8123 (bs29)	823 A			945 A	1022 B				
				7124		8124 (bs30)	823 B			946 A	1023 A				
							824 A			971 0	1023 B				
							824 B				1024 A				
							829 A				1024 B				
							829 B				1025 A				
							830 A				1025 B				
							831 A				1026 A				
							831 B				1026 B				
							832 A				1050 0				
							832 B								
							833 A								
							833 B								
							834 A								
							834 B								
							854 1								
							870 2								

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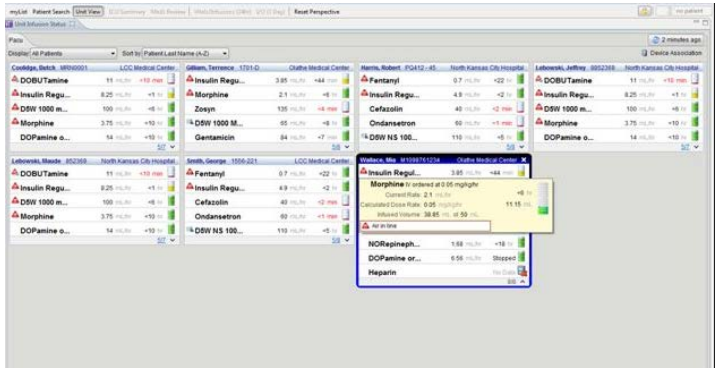
Lessons Learned

- It takes a Village
- Understand Nursing and Clinical Workflows
- Understand IT infrastructure of Servers and Networking
- Have fun and don’t forget to breath!

What's Next?

Infusion Management!

- **Seamless flow of information from the order in the EMR-> Infusion Pump for Auto Programming -> with information flowing back to the EMR for viewing and documentation in the patients record**
- **Bidirectional, closed loop medication administration using BCMA Wireless Scanning**
- **Ability to associate from patient-> device -> order and ingredient**
- **Provide graphical and relational representation of the impact of the infusion(s) as it relates to other clinical parameters monitored throughout the EMR**
- **Single patient, nursing unit and pharmacy view of associated infusions for pro-active infusion management**



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Questions?

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