

# Impact of Barcode Scanning Medications upon Removal from Automated Dispensing Cabinets (ADC) and Discrepancy Reduction in the Hospital Setting

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### Owensboro Health Regional System

- Owensboro Health reaches a 18-county area, serving nearly 500,000 in Western Kentucky and Southern Indiana.
- System is comprised of 3 Hospitals
  - Owensboro Health Regional 477 Beds
  - Owensboro Muhlenberg Community 135 Beds
  - Owensboro Twin Lakes Medical 75 Beds



# Disclosure

Dr. Gibson has no relevant financial interests to disclose





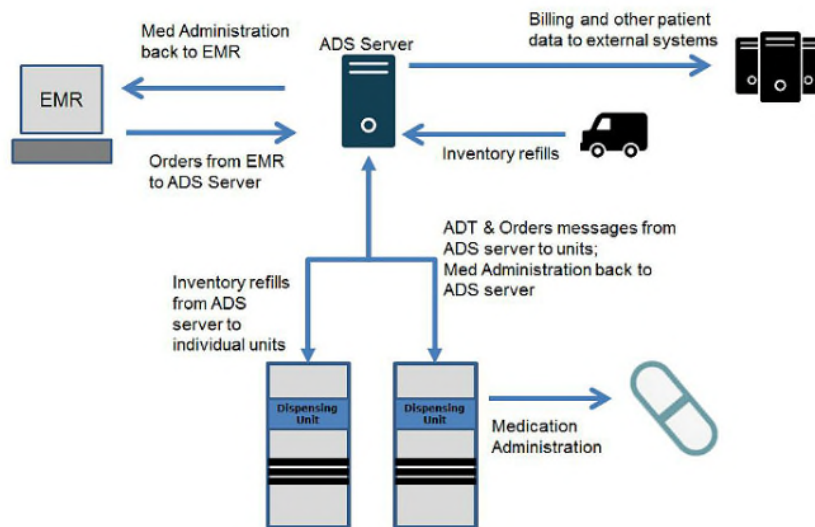
# Learning Objectives

- Identify the purpose of utilizing ADC (automated dispensing cabinet) technologies, such as barcode scanning for medication removal
- Identify the impact of implementing barcode scanning at the ADC to reduce discrepancies
- Develop implementation practices for your hospital setting

# ADC Technology

- ADC (Automated Dispensing Cabinet) are widely used in hospital settings

- Pyxis (Carefusion)
- Omnicell
- AcuDose
- Cerner RxStation
- Capsa Healthcare



\*ADS-Automated Dispensing System

## Benefits Include:

- Increased charge capture
- Lower inventory costs
- Reduction of stock-outs
- Increased satisfaction from users (more organized inventory)
- Increased patient safety via barcode verification (BMV)

# Barcode Scanning Technology

- Pyxis – Medstation ES 4000
  - Owensboro Health Twin Lakes Center (OHTLMC)
    - 12 Integrated Pyxis Stations
      - 9 Pyxis Medstation
      - 3 Pyxis Anesthesia Medstation
- 2D Barcode Scanner Technology
  - Available on Pyxis Medstations ES 4000
    - Scanning of medications on Refill and Load\*
    - Scanning of medications on Remove and Restock
  - Pyxis Anesthesia Medstations ES 4000
    - Scanning of medications on Refill, Load\*
    - Scanning NOT available on Remove



*\*As of March 2022, barcode scanning was only being utilized for pharmacy technicians for Refill and Load transactions*

# Benefits & Utilization of Barcode Scanning

- **Increased Charge Capture**
  - Ordered medication matches dispensed medication
  - Reduce medication discrepancies
- **Lower Inventory Cost**
  - Reduce Medication discrepancies
- **Reduction of Stock-Outs**
  - Reduce medication discrepancies
- **Increased Satisfaction from End User (Accurate Inventory)**
  - Reduce medication discrepancies
- **Increased Patient Safety**
  - 5 Medication rights
  - Reduce medication discrepancies

# Pyxis Discrepancies



- Pyxis Discrepancies were being monitored daily by inpatient pharmacy (printed reports)
- Increase in discrepancies noted and reported since Pyxis upgrade (11/2020) and subsequent EMR upgrade (8/2021)
- Discrepancies can lead to diversion, stock-outs & loss of charge captures
- Medication discrepancies can occur for multiple reasons
  - Refill/Load amount does not match actual refill quantity
  - Remove amount does not match actual remove quantity
  - Inventory function utilized instead of removing
  - Canceled remove but still removed



# Process Improvement (PI)

- Pyxis discrepancies were continuing to trend up, with no resolution or improvement with pharmacy interventions
  - Reported at daily check in
  - Emails sent to directors, managers and supervisors (daily)
  - Discussed at monthly diversion meetings
  - Shared with compliance team (unable to account for discrepancies in medication inventory)
- January 2022-Inpatient Pharmacy PI Project planning initiated
  - Contacted Pyxis to see what support or technologies were available
  - Researched what other hospitals were doing
  - Met with leaders to determine current state, root cause analysis, barriers, etc.

# GOALS

- Decrease number of Pyxis medication discrepancies
  - Accurate inventory
  - Accurate charging
  - End user satisfaction
  - Diversion prevention
  - Patient safety (5 rights)
- Follow best practices using technologies available
  - Barcode Scanning
    - Bedside Medication Verification already in place (95% or >)
    - Pyxis Barcode Scanning upon Refill and Load by pharmacy techs already being utilized
    - \*Opportunity\* Pyxis Barcode Scanning upon removal

# Buy In/Improvement Initiatives

- Barriers and Concerns:

- Additional Steps for Nursing
  - “Takes too long to scan”
  - “What if its an emergency?”
  - “If pharmacy filled it right, I wouldn’t need to scan”
- BMV is already utilized
  - “Why do I need to scan the medication again?”

- Solutions:

- Process Investigation completed to determine time added to nursing workflow
  - On average 3 additional seconds
  - Barcode scanning upon removal is best practice
- Pharmacy Technicians only have the ability to scan one unit of medication (if 10 vials of Zofran are refilled, only 1 vial is scanned)
  - Everyone can make a mistake

# Implementation

- Go LIVE date set
- Nurse and Pharmacy staff education
- Pharmacy configured Pyxis Medstations to include “Scan on Remove” in addition to “Scan on Refill/Load”
- Pharmacy configured each medication to now include “Scan on Remove” in addition to “Scan on Refill/Load”
- No scanning exceptions were permitted
- Pyxis reports built to aide in weekly reporting
  - Hospital wide discrepancies by Pyxis care area
  - Total number of Pyxis dispenses by Pyxis care area



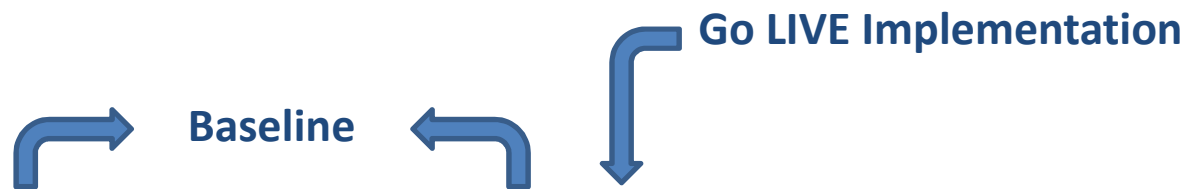
# Monitoring

- Baseline data collected and goals established
  - Data was collected utilizing Pyxis reports and manually entered for data calculations
  - Time period for baseline data was 6 weeks
  - Goal was to decrease discrepancies by 50% from baseline
- Weekly report out on progress/goals/barriers
  - Prize for care area with the fewest number of discrepancies
- Effectiveness of Barcode Scanning on medication removal
  - Data collection was completed weekly by pharmacy staff
  - Monitoring and reporting occurred for a total of 22 weeks post implementation

# Top Banana Award



# Weekly Data

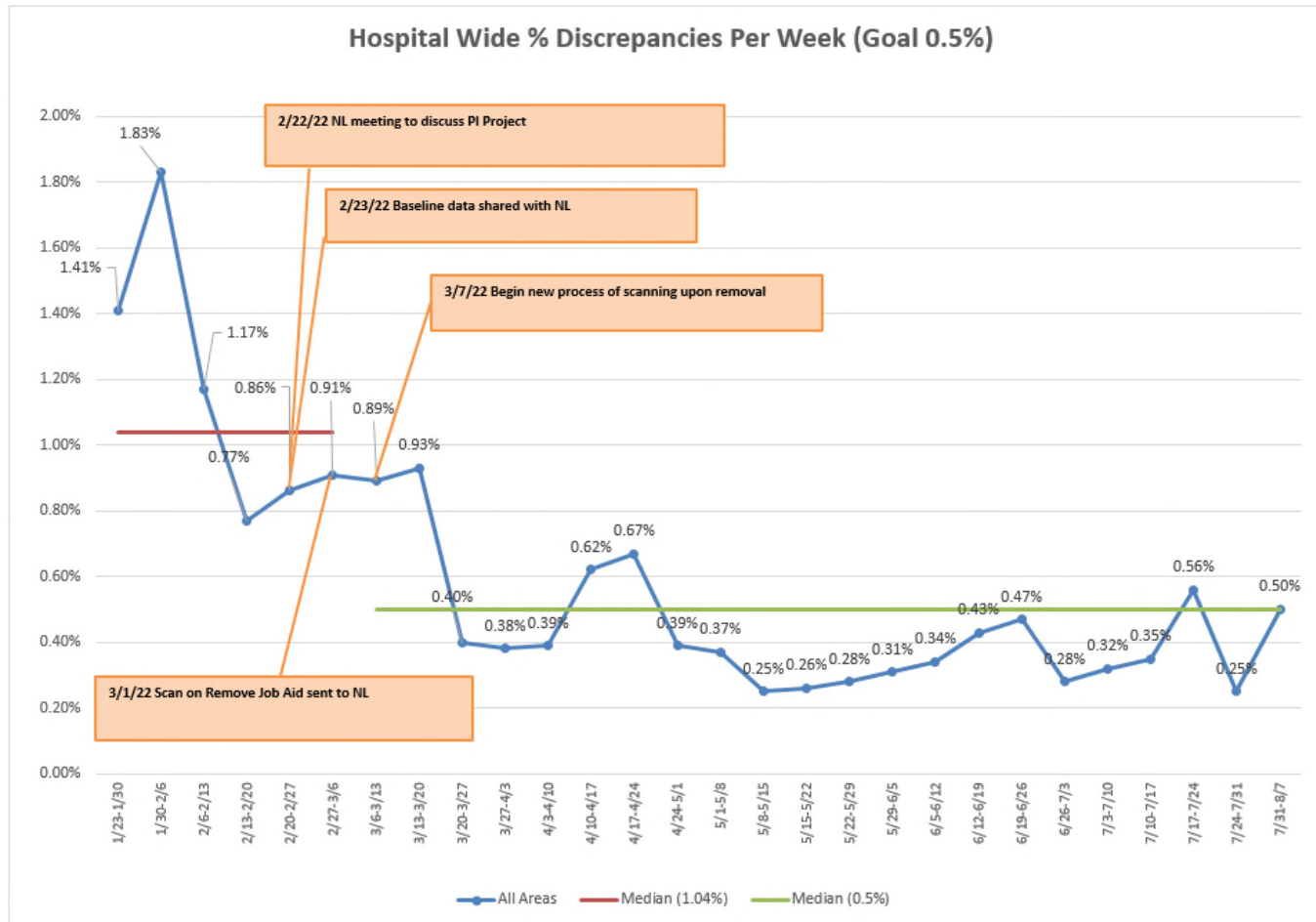


Week	1/23-1/30	1/30-2/6	2/6-2/13	2/13-2/20	2/20-2/27	2/27-3/6	3/6-3/13	3/13-3/20	3/20-3/27	3/27-4/3	4/3-4/10	4/10-4/17	4/17-4/24	4/24-5/1
# of ADC Discrepancies	40	46	35	24	23	28	18	15	10	11	11	18	17	10
Total # of ADC Dispenses	2844	2511	2987	3108	2679	2993	2436	2768	2483	2899	2832	2881	2548	2588
% Discrepancies	1.41%	1.83%	1.17%	0.77%	0.86%	0.91%	0.89%	0.93%	0.40%	0.38%	0.39%	0.62%	0.67%	0.39%
Week	5/1-5/8	5/8-5/15	5/15-5/22	5/22-5/29	5/29-6/5	6/5-6/12	6/12-6/19	6/19-6/26	6/26-7/3	7/3-7/10	7/10-7/17	7/17-7/24	7/24-7/31	7/31-8/7
# of ADC Discrepancies	11	8	8	8	10	8	10	11	7	8	9	15	6	12
Total # of ADC Dispenses	2965	3204	3102	2897	3186	2330	2343	2356	2470	2537	2549	2663	2441	2379
% Discrepancies	0.37%	0.25%	0.26%	0.28%	0.31%	0.34%	0.43%	0.47%	0.28%	0.32%	0.35%	0.56%	0.25%	0.50%

Baseline Average was 1.15%

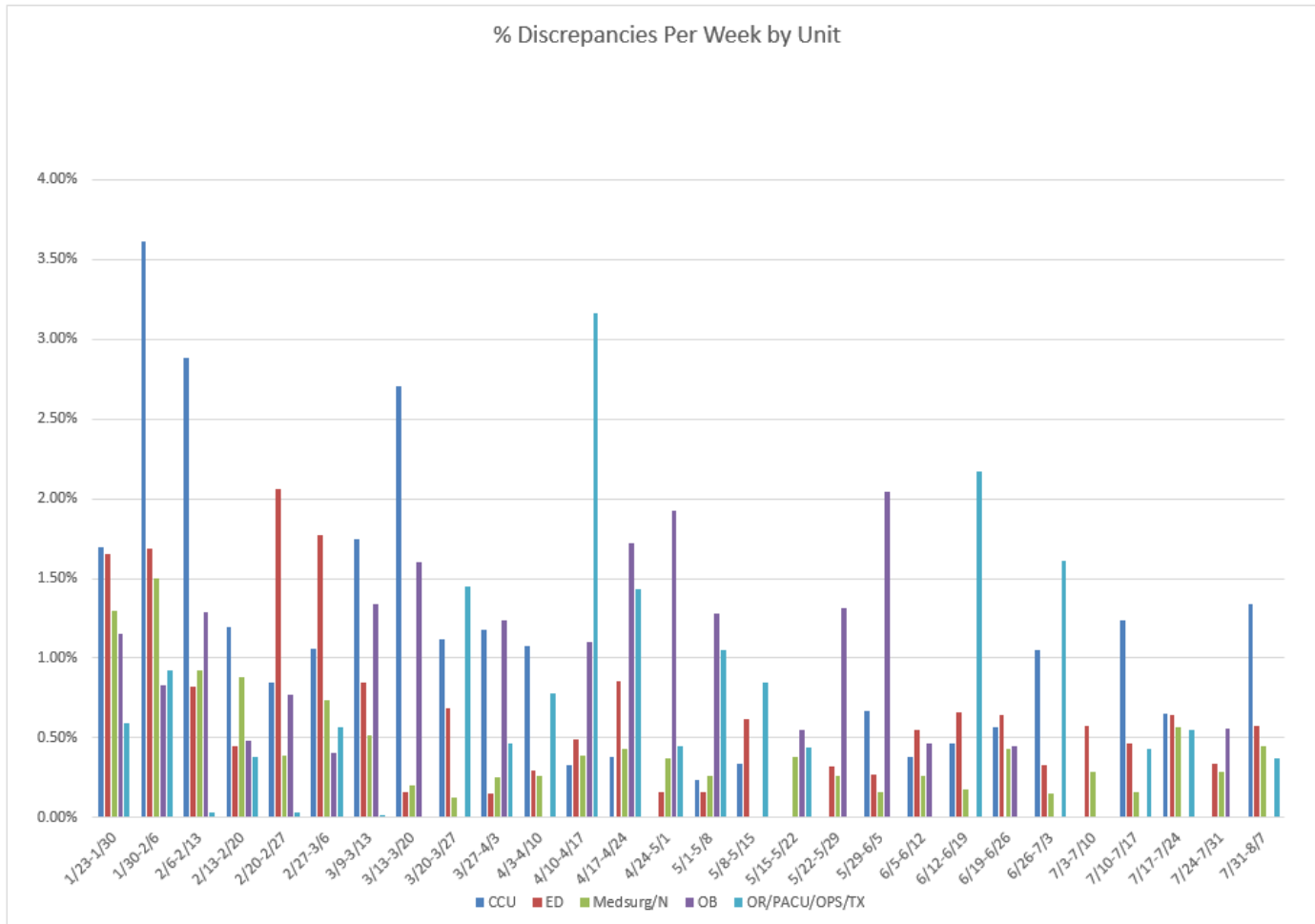
- Set Goal of 0.50%

# Discrepancies Per Week (Trend)

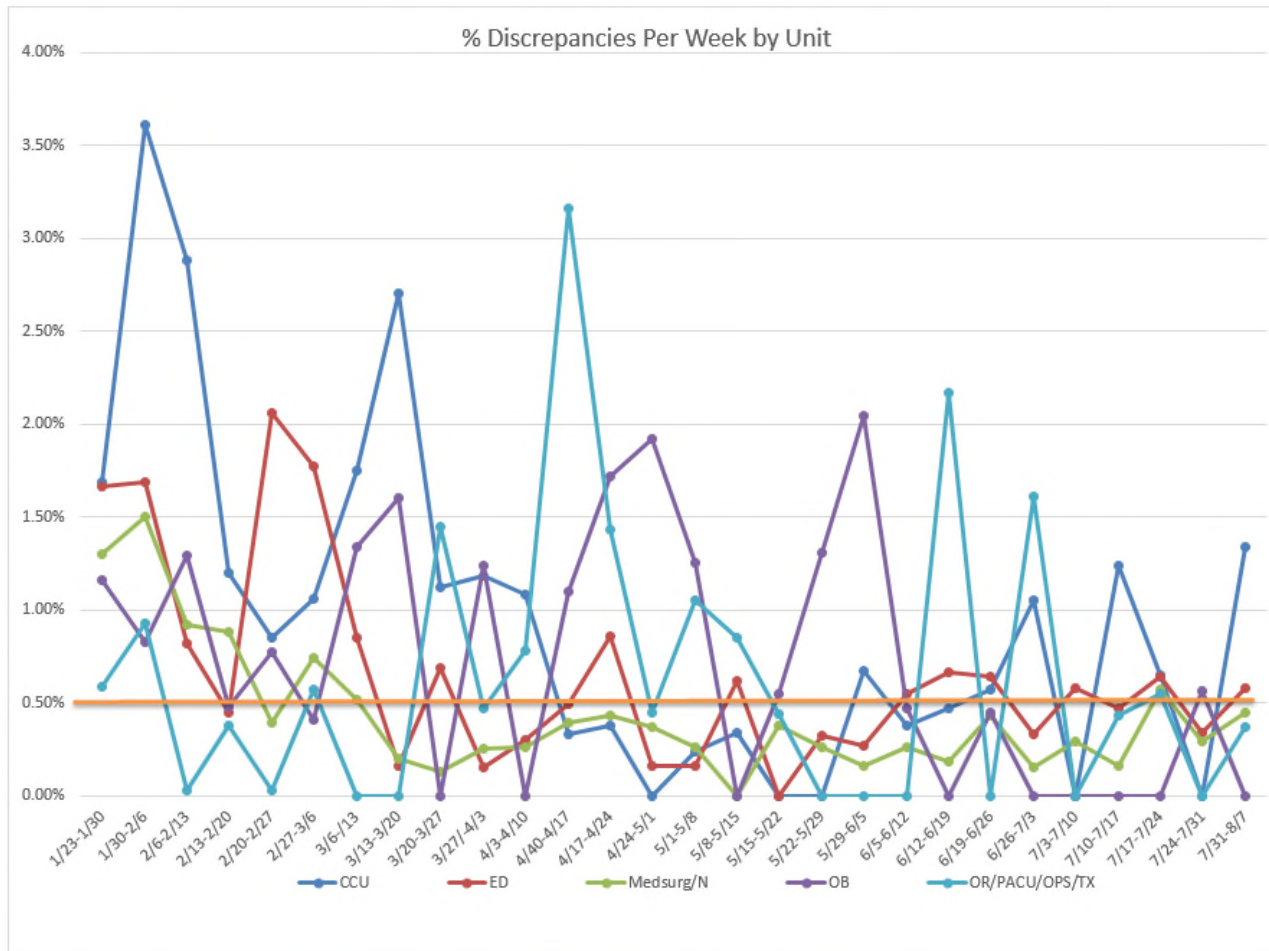




# Discrepancies Per Unit



# Discrepancies Per Unit (Goal)



# Results

- A total of 73,766 ADC removals were included in this study:
  - 17,122 (23%) in the pre-implementation period
  - 56,644(77%) in the post-implementation period
- The rate of ADC discrepancies significantly decreased from 1.16% (pre) to 0.44% (post) implementation of the barcode scanning technology upon removal
  - Relative risk [RR], 0.34
  - 95% CI [29.60–32.59], pre implementation and CI [10.51-11.40], post implementation
  - The mean number of discrepancies significantly decreased from 9.52 to 3.53 ( $p < 0.00001$ )

# Conclusion

The implementation of barcode scanning technologies while removing medications from the ADC had the following impacts:

- Decreased the number of discrepancies significantly.
- These use of these technologies prevented unnecessary loss of charges, lack of medication availability and aided in diversion prevention.
- Close monitoring of the discrepancies weekly, allowed for a greater focus on barriers and previously unidentified issues.
- End users, nurses, were included in the resolution of their discrepancies, allowing in a greater accountability of the action that resulted in the discrepancy.
  - It was found that most often the user failed to remove the medication from the correct location
  - Did not complete all required steps in the scanning process.
  - Removed multiple medications at once and did not scan them in the order that they were removed.
- When decisions are being discussed or made for ADC processes in the hospital setting, review of all available technologies of those devices should completed with interdisciplinary team members.
- It is imperative to not only recognize how these technologies can increase patient safety, reduce medication discrepancies, loss of inventory, more accurate inventor, but to utilize these technologies.



# Questions

## Contact Information

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