



# Medication Safety

## Bar Code Medication Administration

Providence Medical Center

1200 Providence Road

Wayne, NE 68787

Valerie Hangman BSN, RN, CPHQ      [vhangman@providencemedical.com](mailto:vhangman@providencemedical.com)

Telephone: (402)-375-3800

Fax: (402)-375-7990

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Medication Safety-Bar Code Medication Administration

“Safety is not a choice, it’s an obligation” Anonymous Author

### Leadership and Planning

Providence Medical Center has long had the mission of “Quality Healthcare in the Spirit of Christ”. Patient safety is crucial to providing quality healthcare and numerous committees at PMC support safe care for our patients and impact our vision to be the provider and employer of choice in our service area. Medication safety is one of those committees. Administration and the board have supported safe quality care at PMC by adding non-financial initiatives to our strategic plan. For many years our strategic plan focused on financial goals only, but now in addition to a financial focus there are pillars for quality, people, and service in our strategic plan. Danielle Gearhart, the CEO at PMC, supports our committees to improve care and safety for patients, stating “patient’s expect safe care”.

### Process of Identifying Need

The typical hospitalized patient is exposed to at least one medication error daily (Aspden, Wolcott, Bootman, Cronenwett, 2018) and any medication used in error could cause harm or death. The mission of our medication safety committee, listed in our charter attachment A, is to prevent patient harm and reduce the potential for medication errors through analysis of internal and external data, literature review, and proactive initiatives to improve the medication use process. Every day patients are made partners in their care. The medication administration process of nurses asking for birthdates, pharmacists reviewing home med lists with the patient and family, and the patient asking questions about the name or purpose of the medication they are being given are parts of this partnership. Encouraging our patients to ask questions and participate in the medication process and educating our patients about medication use and side effects makes them part of their care and safety.

Medication use has numerous steps, and each step has its own interventions to prevent error and ensure safer care. The medication process starts with a home med list and progresses to provider medication reconciliation and ordering, transcribing, dispensing, administration, documentation, and follow-up. At PMC we have implemented numerous technological interventions to prevent medication errors during the various steps, including use of interfaces to access external medication lists, computerized provider order entry, electronic medication dispensing cabinets, electronic medication administration record within the electronic health record, interfaced intravenous pumps and bar code medication scanning. With technology in medication administration comes many safeguards not previously available. Prior to technology medication administration relied on patient memory to produce a home med list, legible provider handwriting for orders, ability to interpret provider handwriting, accurate transcription of orders to a paper medication administration record and staff memory of the rights of medication administration. As patients become sicker and unable to participate in care and staff are required to take higher patient loads, any interventions to prevent errors should be utilized.

Eight years ago, when PMC implemented Cerner as our new electronic health record, we also implemented bar code medication administration (BCMA). BCMA helps our facility to assure the basic safe medication practices, 5 rights of medication administration, referenced in the critical access hospital regulations. In one study, the use of BCMA was associated with reducing medication administration errors by up to 93% (Johnson, Carlson, Tucker, Willette, 2018) and depending on which study you reference medication errors and adverse drug events can cost billions of dollars. A patient's loss of trust of a staff member or hospital after an error and the effects an error has on a staff members mental health are the unseen costs of errors or events. Even though BCMA was a whole new way of giving meds at PMC the benefits outweighed the learning curve and risks of the new to PMC technology. Monitoring the use of

BCMA via percentages to assure that this vital technology was being used appropriately would help us avoid some of the seen and unseen costs of medication errors and events.

### Process Improvement and Results

The human body relies on a heart to function. PMC relies on the values of H.E.A.R.T., honesty, excellence, accountability, respect, and teamwork to guide our everyday work. As a team our medication safety committee has monitored medication error percentage, near miss percentages and adverse drug reactions for many years and pharmacy has worked with nursing to improve all aspects of medication administration. PMC chose to implement BCMA when implementing Cerner to use technology to further our value of excellence.

In implementing a new electronic health record there were many cycles of Plan, Do, Study, Act that PMC went through related to medications. Some of these cycles included how to enter home meds on the medication list, what order sentences were built for the provider to use to enter orders and what devices and barcodes were used when scanning meds. After improving processes related to home med lists and order entry PMC chose to focus in 2019 on our process and data related to BCMA. The plan was to use a Cerner generated BCMA report to monitor percentages to assure staff accountability in use of this important technology. However early validation of the Cerner generated report for BCMA showed that inaccurate data was being included in the report. After review of the Cerner listserv, we noted that this was a known issue they were working on it with a new report to come soon. The new Cerner report came and so did COVID, creating other more pressing issues.

In late 2022 the PMC medication safety committee again turned their focus to BCMA percentages. A goal of 95% use of dose error-reduction systems, such as BCMA, was set at PMC to be in line with the Institute for Safe Medication Practice best practices from 2020-2021.

Initial data in 2022 for our organization showed only 91.79% compliance with BCMA for medication scanning and only 93.08% compliance with BCMA for patient scanning. This data was about the same as percentages for the year before, see attachment B. Percentages for patient and medication scanning ranged from 67.10% to 94.40% for departments. Percentages for individual staff ranged from 0% to 100% for patient and medication scanning. PMC chose to work to improve scanning in all areas of the hospital, excluding radiology. Radiology exclusion was based on limited equipment availability, construction and opening of new area during implementation of BCMA review, no previous experience in radiology with medication administration documentation through BCMA and limited medication verification availability needed for BCMA.

Initially department directors were given instructions on how to run the BCMA reports and were asked to report data at quarterly medication safety committee meetings. However, we found that when left to remember to run reports, little education on how to read reports, minimal direction on what info to report and no designated person monitoring accountability of data reporting, then BCMA monitoring did not occur. We allowed directors to take accountability for generating data, but in the beginning of 2023 with minimal data submitted, we chose to take another path when it came to BCMA reporting. Pharmacy and Quality worked together to discuss options for generating, monitoring, and reporting BCMA data. The director of quality reviewed reports in depth as well as the raw data file used to generate the report. By becoming an expert in the reports used to generate BCMA statistics the director of quality became the subject matter expert in BCMA and helped to assure our value of accountability.

PMC has found, through years of data review, that when asking a department director to hold their staff accountable the data must be accurate, easy to use, easy to explain, comparable and ideally have opportunity for improvement. We had already validated that reports were

accurate, so we then moved on to easy to use. Previously department directors were asked to run and then interpret their own reports. Knowing that time is always an obstacle we used pre-selected settings to generate reports on the first of the month, every month. A separate report generated for each director with the specified time frame and included the staff the director was responsible for supervising. Running reports by including the staff member allowed us to catch administrations for that staff member no matter what location, encounter type or medical service the patient was registered to. We found that this was important as critical access staff often work across departments.

After generating the report, the system then emailed the director to tell them that their report was ready and included the instructions on how to export the report for review and display. Instead of spending an hour every month just figuring out how to run the reports and waiting for the system to generate them, we used the system to accomplish in 10 seconds what a director would have needed an hour to figure out. The time saved in generating the report could then be put into review, investigation, and improvement.

The next step of easy to explain data was widely facilitated by the director of quality. Cerner generated reports displayed overall percentages of medication and patient scanning, but also had much more, such as percentages by encounter type, medical service, and per staff member, see attachment C. Directors were encouraged to review the raw data for their staff with lower percentages first. They utilized the raw data report to assess which medications were not scanned or if there were trends within certain patient groups as well as any time related trends such as day of the week or time of the day.

Peer to peer and department to department comparison was also something the various reports could provide. Sections of the reports were broken down not only per location, encounter

type and medical service, but also per staff member for any staff member included in the report. With staff working across departments such as in inpatient and emergency or in outpatient and in surgery the first question was which staff members were included in each director's report. After that hurdle was crossed, we then found that data per encounter type in the overall report gave us a general idea of which areas might need help. Directors were tasked with reviewing data in their departmental reports, identifying areas for improvement, assessing interventions for improvement, working with pharmacy or their staff on changes needed and giving feedback to their staff.

Numerous opportunities for improvement were soon identified related to the report and the medication process. Identification of trends related to unscannable medications, such as patch removal orders were quickly identified. In order to assure accurate numbers, trust of our staff and progress with our BCMA initiative we chose to request a copy of and alter the Cerner report to be able to exclude certain things that were not scannable, or provider administered. Pharmacy worked diligently to assure that all meds that should be scannable were scannable and if needed updated orders and medication setup in the background.

Department directors communicated issues related to scanners and scanner docs to Information Technology (IT) for assessment. IT continues to troubleshoot issues and fix what they can, but technology at end of life is a barrier. Utilizing call light android phones has been identified as a possibility for use with scanning. However, updates to technology, testing of the process and internet issues continue to hinder progress. Interventions for improvement related to hardware continue to be explored.

During the beginning of our work on BCMA we soon identified that we needed a way for directors to report their trends/issues and plan/action. We chose to develop and implement a new

form which was a stripped-down version of our quality submission form, see attachment D. This form gave us a standard way for each director to show the trends/issues they had found when reviewing data and to record their plan/action. Directors used this form to record their lower performers and document information gained from conversations with the staff member. The running nature of this form allows directors to look month to month to see ongoing trends.

The PMC medication safety committee is now able to evaluate outcome metrics such as medication errors, medication near misses and adverse drug reaction numbers, as well as the process metrics related to BCMA, see attachment E. Data trends show that over time medication errors have increased slightly and near miss errors have also increased with adverse drug reactions decreasing. Trend increases for medication errors and near misses will continue to be monitored as no direct link within medication type, department, staff, etc. can be identified. It is possible that increases in numbers are due to closer monitoring of BCMA data thereby identifying errors/near misses we may not have caught previously. Decline in ADR trend also does not show a decline due to BCMA specifically but could be indirectly related to the focus on BCMA.

In second quarter 2023 PMC reached its goal of 95% for both medication scanning and patient scanning, see attachment F and G. Initial data in 2022 for our organization showed only 91.79% compliance with BCMA medication scanning, but gradually rose and met our goal at 95.50% for 2<sup>nd</sup> quarter of 2023. Initial data in 2022 for our organization showed only 93.08% compliance with BCMA for patient scanning, but also gradually rose and met our goal at 95.45% for 2<sup>nd</sup> quarter of 2023. Based on trends for medication and patient scanning we expect percentages to continue to rise for 3<sup>rd</sup> quarter 2023. Staff specific numbers which ranged from 0-100% in 2022 now are anywhere from 37-100%. Department specific numbers which ranged from 67.10-94.40% in 2022 are now 67.03-97.97%. While all departments and all staff have not



met the 95% goal for both patient and medication scan, we have easily identified the staff and areas of opportunity.

Currently we are asking for directors to submit data monthly to our director of quality, but as time goes by this data submission will progress to quarterly when goals are being achieved. The data in attachment F, comparing department to department, is displayed at quarterly medication safety committee meetings and directors are asked to report trends and actions. In discussing data, directors have found that they share many pain points related to BCMA, mainly related to the actual bar code scanners. Identifying these common threads allows administration to know what areas of focus to ask our information technology department to prioritize.

#### Lessons learned, replicability, sustainability

Time is always a barrier! In facilitating report generation and conducting director education on how to review data to evaluate for opportunity and workflow changes, we implemented fixes to time during the actual medication administration to the patient. Technology can be a barrier. Glitches with hardware, software and Wi-fi internet can cause ongoing issues. While some of these issues can be fixed with new devices and a new interface, some aren't as easy such as Wi-fi. IT continues to explore fixes such as mapping our Wi-fi to identify where the problem areas are so they can be fixed.

One lesson we learned is that sometimes you need a new form even though you have one you think is perfect. The form we developed for monthly reporting of data, generated from electronic health record, was first used for reporting BCMA data. Since its implementation we have also used it to report other electronic health record generated data such as blood transfusion documentation data. With the simple standardized format directors feel comfortable using it to

report data quickly and accurately. Another lesson is never underestimate the power of a little competition. This could be competition between staff or departments. No staff member wants to see or hear that they are the lowest, so a little peer pressure goes a long way. No director wants to see their department have the lower percentages either, so they push their staff to identify and fix the issues.

Any facility that uses BCMA and has a report could use our process to improve BCMA percentages. This process to review, compare, improve, trend and report can be used over and over with any electronic health record reports for chosen metrics. However, improvement is only as good as the people involved and their dedication to push for change and technology can only do so much for us if we aren't accountable and use it as intended.

In order to sustain change and assure accountability we need to reward those that meet the goals set. Administration and human resources are working towards an evaluation system to incorporate quality metrics in yearly job reviews. Adding metrics with goals when evaluating job performance will help to standardize evaluations. Standardizing evaluations may assist in reducing the favoritism that has been identified in staff satisfaction surveys, thus setting PMC up to be the employer of choice in our service area. BCMA adds a layer of protection not only to the medication safety process, but also assists PMC in assuring that we are providing to our patients Quality Healthcare in the Spirit of Christ.

## References

Aspden P, Wolcott J, Bootman JL, Cronenwett LR, eds. "Preventing Medication Errors: Quality Chasm Series." Institute of Medicine (US) Committee on Identifying and Preventing Medication Errors, July 2006. <http://www.nationalacademies.org/hmd/~media/Files/Report%20Files/2006/Preventing-Medication-Errors-QualityChasm-Series/medicationerrorsnew.pdf>. Accessed March 19, 2018

Johnson, CL, Carlson, RA, Tucker CL, Willette, C. "Using BCMA software to improve patient safety in Veterans Administration Medical Centers." *Journal of Healthcare Information Management*, 2002 Winter;16(1):46-51. <http://www.himss.org/using-bcma-software-improve-patient-safety-veterans-administration-medical-centers>. Accessed March 19, 2018.

**Providence Medical Center Medication Safety Committee Charter**  
**Revised: 02.15.2023**

**Vision: Universal precautions for medication safety**

**Mission: Prevent patient harm and reduce the potential for medication errors through analysis of internal and external data, literature review, and proactive initiatives to improve the medication use process.**

**Structure:**

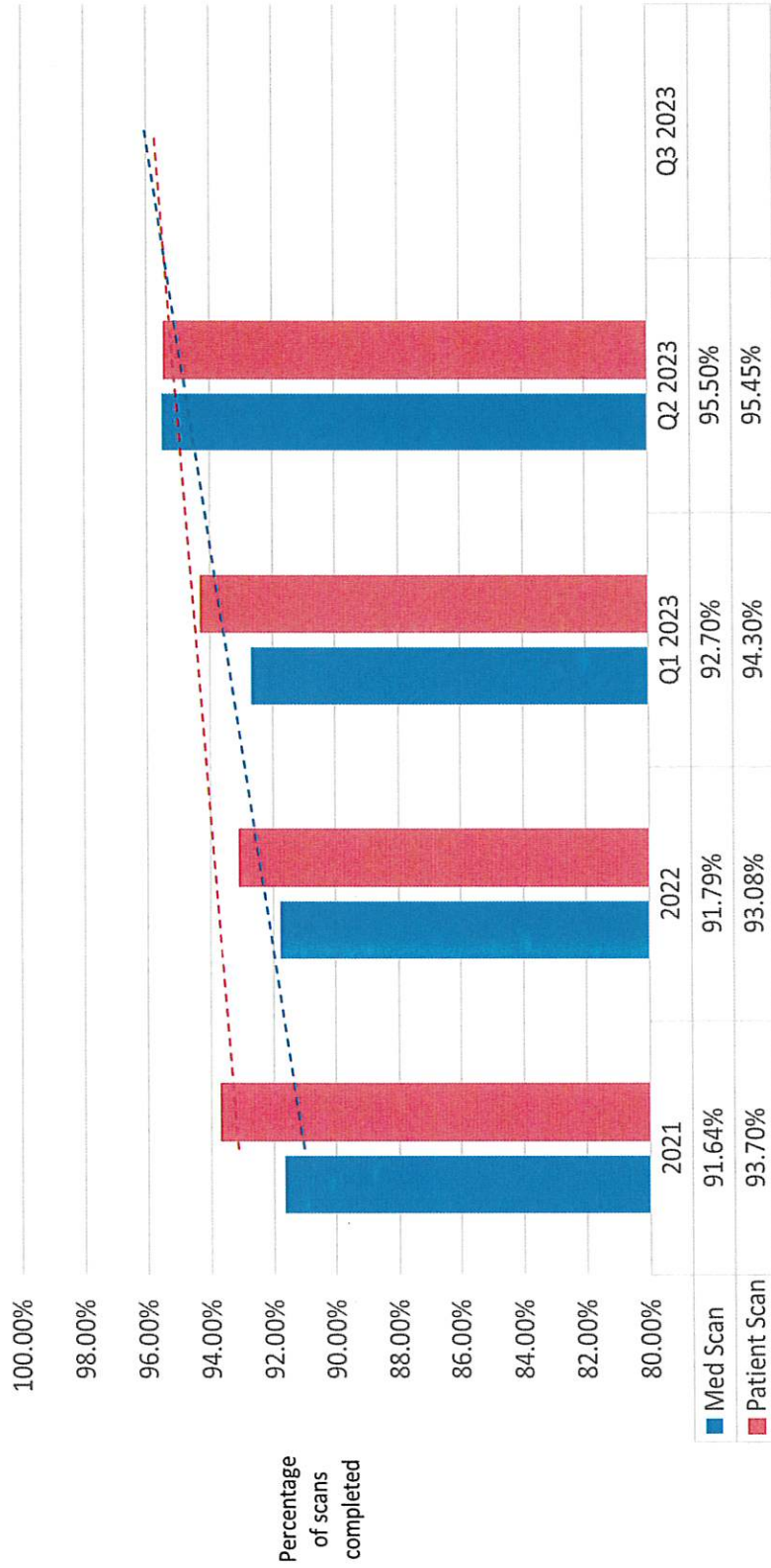
- **Format:**
  - Meetings will be held at a minimum quarterly with the meetings Feb, May, August, and November. Reporting to the subsequent Pharmacy and Therapeutics Committee.
  - Location: TBD by chair
  - Agenda and Packet Distribution: 5 days in advance
  - Minutes: will be recorded and distributed electronically to membership for approval at the following meeting.
- **Leadership:**
  - Director of Pharmacy will chair
  - Director of Quality Assurance and Performance Improvement will be vice-chair
- **Reporting:**
  - Committee will formally report to the Pharmacy and Therapeutics (P & T) Committee, with minutes taken to the Safety Committee by the pharmacy representative.
- **Membership:**
  - The Committee will have interdisciplinary representation of staff and leadership involved in the medication use process from a variety of patient care areas including Pharmacy, Nursing, Safety/Risk Management, and Informatics at a minimum.
  - Membership may be revised to include representatives from areas/disciplines most affected by medication use practices and ad hoc members from other disciplines will be added as needed.

**Goals for 2023:**

1. Monitor changes in standards or regulations related to medication use and address or recommend actions as needed.
2. Improve communication, education, awareness of safe medication management by:
  - a. Maintaining safe injection practices using the Safe Injection Champion program.
  - b. Offering at least one multidisciplinary educational program this year. Pharmacy invite to staff meetings or as otherwise determined by event reports.
3. Enhance the review and analysis of risk report data by:
  - a. Designing medication-related report modules for new systems starting with Bar Coded Medication Administration (BCMA). Goal for patient and medication scanning 95%.
  - b. Creating and implementing a report format to evaluate data using peer to peer comparison.
4. Utilize technology to enhance medication safety by:
  - a. Reviewing and revising Clinical Alerts (reviewed/revised/added) as they become available from Cerner.
  - b. Increasing use of Sigma Spectrum IQ infusion pump library to 80% or greater by end of 2023.

# Bar Code Medication Administration Scanning

Medication and Patient Scanning Organization



--- Patient Scan Trend  
 --- Medication Scan Trend

Time Frame

Attachment C

Raw data report from Cerner 2022

Total/Med Admin	Positive Med Scan %	Positive Patient Scan	Positive Med Scans	Positive Patient Scans	Total Administrations
Total	91.79%	93.08%	35837	36343	39043
PMC ED	85.00%	83.94%	3916	3867	4607
PMC Employee Health	0.00%	0.00%	0	0	7
PMC Labor OP	88.24%	94.12%	15	16	17
PMC Laboratory	88.89%	100.00%	8	9	9
PMC Med Surg	94.62%	95.42%	26383	26606	27884
PMC Nursery	92.86%	90.48%	156	152	168
PMC OP Services	82.61%	88.04%	76	81	92
PMC Obstetrics	88.70%	88.93%	1130	1133	1274
PMC Onc/Hem/Inf	94.88%	95.81%	3057	3087	3222
PMC RT	98.55%	98.55%	68	68	69
PMC Radiology	75.51%	77.55%	74	76	98
PMC Spec Clin	58.29%	76.46%	837	1098	1436
PMC Stepdown	56.00%	90.67%	42	68	75
PMC Surgery	88.24%	96.47%	75	82	85
<b>Encounter Type</b>					
Day Surgery	81.40%	93.01%	757	865	930
Emergency	84.03%	83.04%	3221	3183	3833
Inpatient	95.24%	95.80%	23430	23567	24600
Observation	90.81%	90.79%	4309	4308	4745
Outpatient	83.49%	89.56%	4120	4420	4935
<b>Medical Service</b>					
Acute	95.10%	95.11%	11926	11927	12540
Emergency Medicine	84.03%	83.04%	3221	3183	3833
Employee Health	0.00%	0.00%	0	0	7
Hospice/Respite	97.42%	97.89%	416	418	427
Newborn	92.86%	90.48%	156	152	168
Observation	90.81%	90.79%	4309	4308	4745
Obstetrics	88.65%	88.89%	1125	1128	1269
Onc/Hem/Inf	94.93%	95.84%	3014	3043	3175
Outpatient	84.62%	87.63%	253	262	299
Screening Mammo	100.00%	100.00%	2	2	2
Skilled	96.19%	97.56%	9023	9151	9380
Specialty Clinic	58.77%	78.59%	777	1039	1322
Specialty Clinic	100.00%	100.00%	9	9	9
Surgery Inpatient	95.79%	97.13%	500	507	522
Surgery Outpatient	81.40%	93.01%	757	865	930
TCU (Transitional Care)	96.60%	96.60%	284	284	294
Wound Care	53.72%	53.72%	65	65	121

# Data Review

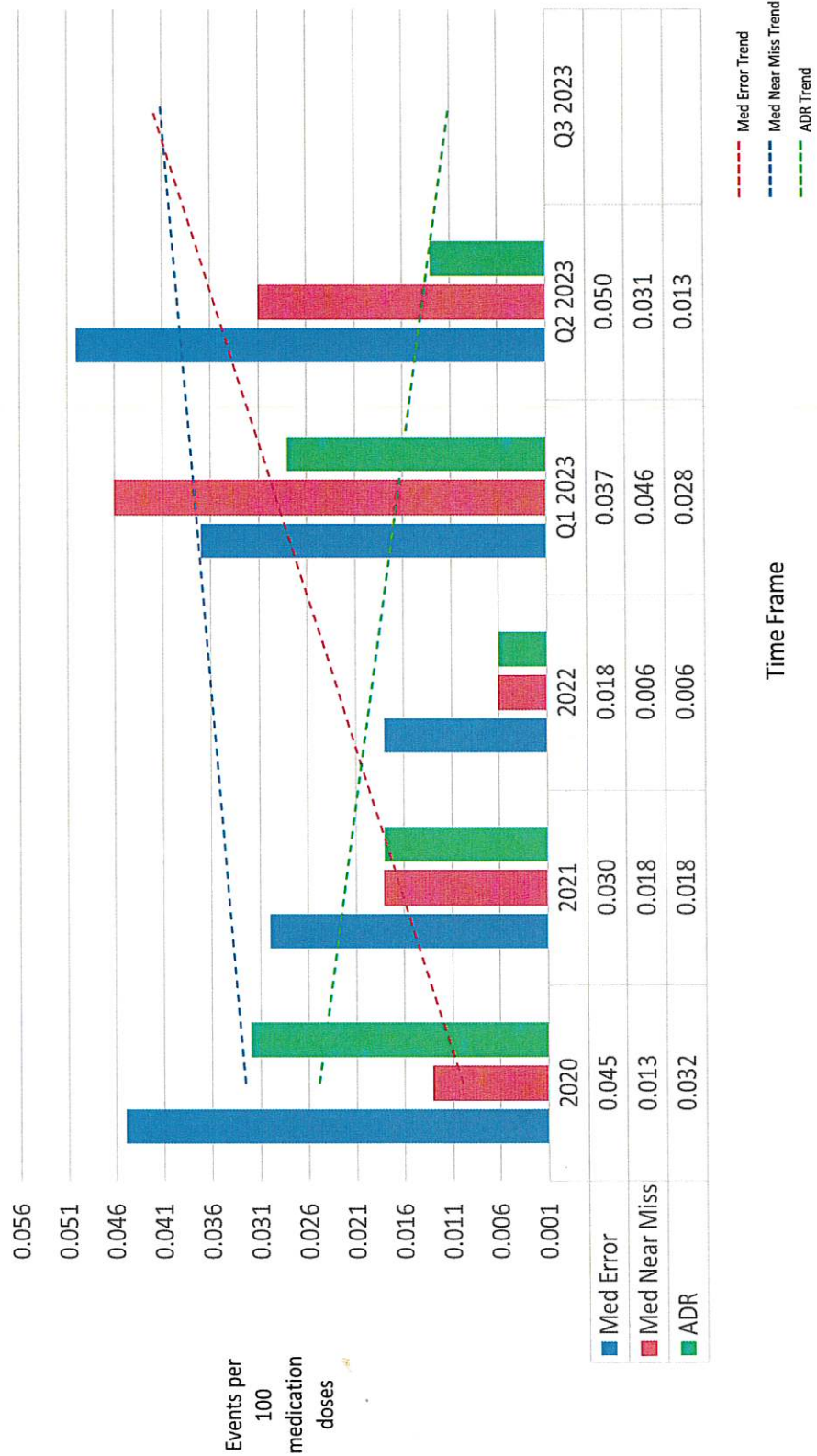
## Data reviewed:

<b>January</b>
Trends/Issues:
Plan/Action:
Submitted/Distributed to and Date:
<b>February</b>
Trends/Issues:
Plan/Action:
Submitted/Distributed to and Date:
<b>March</b>
Trends/Issues:
Plan/Action:
Submitted/Distributed to and Date:
<b>April</b>
Trends/Issues:
Plan/Action:
Submitted/Distributed to and Date:
<b>May</b>
Trends/Issues:
Plan/Action:
Submitted/Distributed to and Date:



# Organizational Medication Outcome Rates

Errors, Near Misses and Adverse Drug Reactions (ADR)

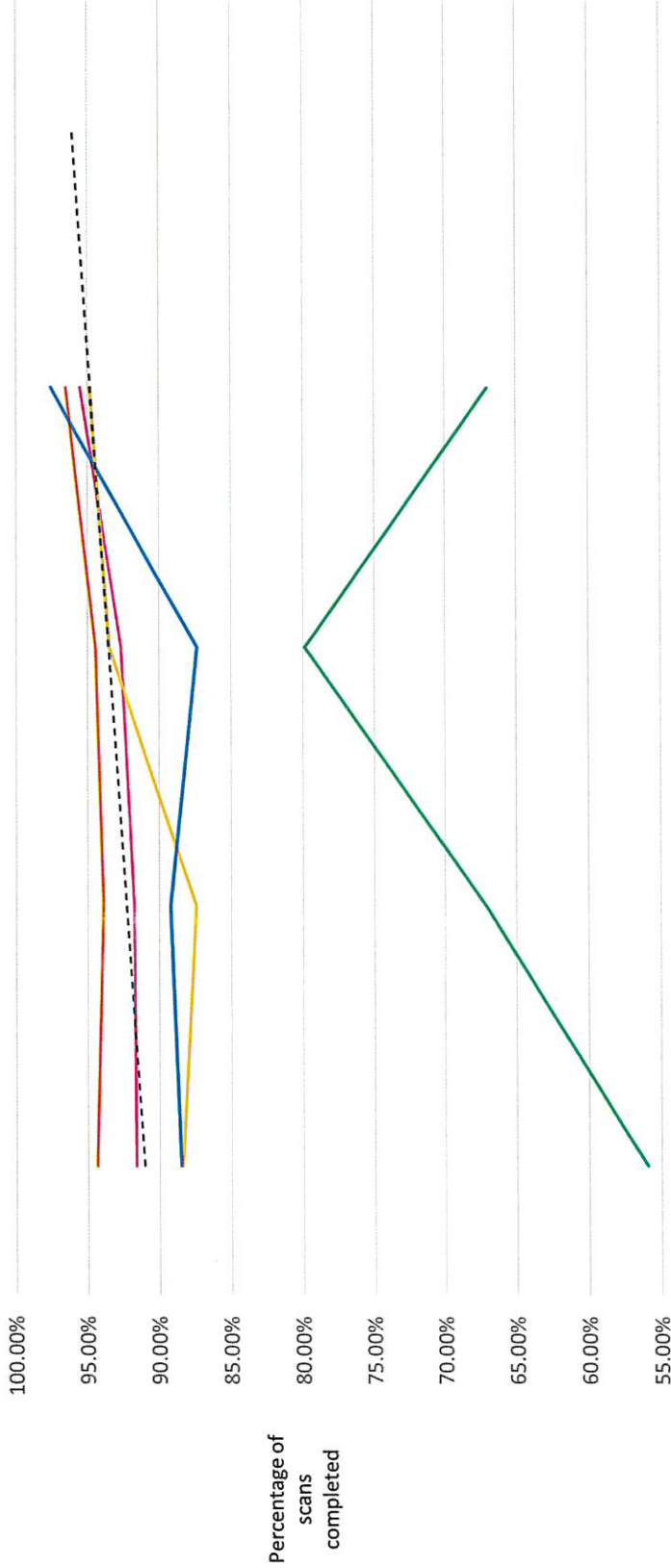


Time Frame



# Bar Code Medication Administration Scanning

Medication Scanning per Department



	2021	2022	Q1 2023	Q2 2023	Q3 2023
Organization	91.64%	91.79%	92.70%	95.50%	95.50%
Emergency	88.41%	87.44%	93.48%	94.86%	94.86%
Inpatient	94.37%	93.91%	94.45%	96.53%	96.53%
Outpatient	88.50%	89.22%	87.34%	97.56%	97.56%
Surgery	55.94%	67.10%	79.85%	67.03%	67.03%

Time Frame

Organization Trendline -----

Attachment G

Cerner Report data

Overall raw data 2021

Med and Patient Scanning % KPI					
Med Admin Beg Dt/Tm: 2021-01-01 00:00:00,2021-12-31 23:59:59					
Total/Med Admin Location	Positive Med Scan %	Positive Patient Scan %	Positive Med Scans	Positive Patient Scans	Total Administrations
Total	91.64%	93.70%	48303	49385	52708

Overall raw data 2022

Med and Patient Scanning % KPI					
Med Admin Beg Dt/Tm: 2022-01-01 00:00:00,2022-12-31 23:59:59					
Total/Med Admin Location	Positive Med Scan %	Positive Patient Scan %	Positive Med Scans	Positive Patient Scans	Total Administrations
Total	91.79%	93.08%	35837	36343	39043

Overall raw data Quarter 1 2023

Med and Patient Scanning % KPI					
Med Admin Beg Dt/Tm: 2023-01-01 00:00:00,2023-03-31 23:59:59					
Total/Med Admin Location	Positive Med Scan %	Positive Patient Scan %	Positive Med Scans	Positive Patient Scans	Total Administrations
Total	92.70%	94.30%	7127	7250	7688

Overall raw data Quarter 2 2023

Med and Patient Scanning % KPI					
Med Admin Beg Dt/Tm: 2023-04-01 00:00:00,2023-06-30 23:59:59					
Total/Med Admin Location	Positive Med Scan %	Positive Patient Scan %	Positive Med Scans	Positive Patient Scans	Total Administrations
Total	95.50%	95.45%	11189	11183	11716

# Medication Safety-Bar Code Medication Administration

Providence Medical Center (PMC) Wayne, NE



## Background

- The typical hospitalized patient is exposed to at least one medication error daily (Aspden, Wolcott, Bootman, Cronenwett, 2018)\*.
- PMC implemented bar code medication administration (BCMA) when implementing Cerner 7 years ago, but accountability for department reporting and improvement had not been fully standardized.

## Aim

- Improve patient safety during medication administration by ensuring accountability when using BCMA for patient and medication scanning.
- Utilize BCMA technology to aid in assuring the “rights” of medication administration as staff are asked to take on higher patient loads and sicker patients.
- Goal to have 95% compliance with BCMA medication and patient scanning by end of 2023.

## Plan

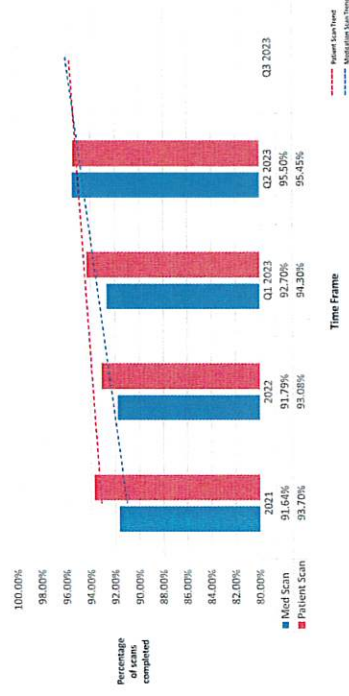
- Review and update medication safety policy.
- Develop charter for medication safety team.
- Review and validate BCMA reports within Cerner.
- Identify, evaluate and improve areas not meeting goal for BCMA.
- Increase director data reporting of BCMA to identify trends and actions related to departments or staff.

## Medication Safety Measures

- Process-Organizational percentage of BCMA scans completed for patient and medication.
- Process-Departmental percentage of BCMA scans completed for patient and medication.
- Process-Staff member percentage of BCMA scans completed for patient and medication.
- Outcome-Medication error rate, medication near miss rate, adverse drug reaction (ADR) rate.

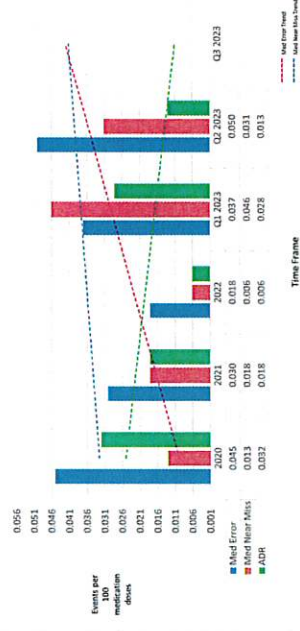
## Organizational BCMA Rates

Organizational Bar Code Medication Administration Rates  
Medication and Patient Scanning Percentages



## Errors, Near Misses, ADR Rates

Organizational Medication Outcome Rates  
Errors, Near Misses and Adverse Drug Reactions (ADR)



## Next Steps

- Continue to monitor and share data at medication safety committee.
- Partner with human resources to utilize staff specific data in the evaluation and compensation process.

## Medication Safety Team

- Director of Pharmacy
- Director of Quality
- Chief Nursing Officer
- Clinical Informatics
- Directors of Inpatient, Outpatient, Surgery and ER
- Safety/Risk Specialist

\* Aspden P, Wolcott J, Bootman JL, Cronenwett LR, eds. "Preventing Medication Errors: Quality Chasm Series." Institute of Medicine (US) Committee on Identifying and Preventing Medication Errors. July 2006. [http://www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2006/Preventing\\_Medication\\_Errors\\_Quality\\_Chasm\\_Series/medicationerrorswpf.pdf](http://www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2006/Preventing_Medication_Errors_Quality_Chasm_Series/medicationerrorswpf.pdf). Accessed March 19, 2018