

An architectural rendering of a modern, multi-story glass skyscraper. The building features a complex facade with various rectangular and square window patterns. A large, semi-transparent blue rectangular box is overlaid on the left side of the building, containing white text. The foreground shows a landscaped area with green grass, shrubs, and palm trees, with a few cars parked or driving on a road. The sky is clear and blue.

# **Closed Loop Medication Management BEST PRACTICES**

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# Objectives

- To understand The “Rights” of Medication Administration
- To understand the impact of medication error
- To understand the impact of Closed Loop Medication Management on hospital costs and patient outcomes
- Steps of closed loop medication management
- Barcode Medication Administration
- Automated Dispensing Cabinet Supports the medication management



# The “Rights” of Medication Administration

Nurses give meds. It is one of the most routine, daily duties for nurses working in a direct care setting. It is sometimes a boring job, and can take hours from start to finish. And when you turn around, it's time to give some more.

It's not just the actual giving of the medications that eats up all the time. There is tracking down the MAR (medication administration record), double checking hand written prescriptions, collecting the various medications and the equipment for giving them, and making sure all the patients are on the floor to receive them.

Despite all of the above, it may seem that giving patients medicine is not a particularly difficult task—but it is one with life and death implications. According *the U.S. Food and Drug Administration (FDA)* medication errors cause at least one death every day and injure approximately 1.3 million people in the U.S. every year. And those are just the reported mistakes.



# The “Rights” of Medication Administration

The FDA says these mishaps can occur an every stage of the medication delivery system including:

- ☐ Prescribing
- ☐ Repackaging
- ☐ Dispensing
- ☐ Administering
- ☐ Monitoring



***The FDA lists the most common causes for these errors as:***

- ☐ Poor communication.
- ☐ Ambiguities in product names, directions for use, medical abbreviations or writing.
- ☐ Poor procedures or techniques, or patient misuse because of poor understanding of the directions for use of the product.



# The “Rights” of Medication Administration

Many of these problem areas can fall within the realm of nursing administration of medications. It is for just these reasons that standards for medication administration were developed.

*Standards are those actions that ensure safe nursing practice.*

The standards, in this case, are called the “rights” of medication administration and over the years there have been **five**, then **six** and now in many places **eight** “rights.”

All medication errors can be linked, in some way, to an inconsistency in adhering to these “rights” of medication administration. The “rights” are taught from early on in nursing education and training, they are reinforced in the workplace and the FDA, drug companies and healthcare organizations issue signs, posters that hang in every facility where medications are given, reminding the providers to check and recheck what they do.



# The “Rights” of Medication Administration

**1. Right Client** – Med errors often occur because one patient gets a drug intended for another. It is difficult to remember every patient’s name and face. To identify a client correctly, the nurse must check the medication administration form against the client’s identification bracelet and ask the client to state his or her name to ensure the ID band is correct.

**2. Right Medication** – This is a multi-step process. The medication should be checked against the medication order and the medication label. Nurses should only administer medications they prepare and verify. If an error occurs, the nurse who give the medication is the one responsible for the error. If a client questions the medication a nurse is about to give it is important not to administer it until it can be rechecked against the prescriber’s order.

**3. Right Dose** – The unit dose system is designed to minimize errors. If a medication must be prepared from a larger volume or strength than needed or when the prescriber orders an amount different than what the pharmacy supplies, the chance for a mistake multiplies. When performing medication calculations or conversions, have a colleague, another qualified RN check the calculated dose.

**4. Right Time** – The nurse must understand why a medication is ordered for certain times of day and whether that time schedule can be altered. Every institution has recommended time schedules for medications ordered at frequent intervals.





# Con't:

**5. Right Route** – If a prescriber's order does not designate a route of administration such as orally or by injection or IV (intravenously) the nurse must consult the prescriber. If the prescribed route is not the recommended route the nurse should double check with the prescriber.

**6. Right Documentation** – This is a fairly new addition to the traditional "Five Rights" but has been widely adopted by facilities and caregivers. Many medication errors result ***from inaccurate documentation***. The documentation should clearly reflect the patient's name, the name of the ordered medication, the time the drug was given and the medications dosage, route and frequency. If any of this information is missing the nurse must contact the prescriber to verify the order. After giving the medication the MAR must be completed per facility policy.

*The final two "Rights" listed are new and are still in the process of being adopted by many facilities although they are highly recommended.*

**7. Right Reason** – Confirming the rationale for the ordered medication, what is it treating?

**8. Right Response** – Make sure the drug has the desired effect? Is the patient now able to sleep, has pain diminished, is the blood pressure lower? And be sure to document monitoring the patient.



# Medication administration errors

- In 1999, the Institute of Medicine reported that medical errors result in 44,000–98,000 preventable deaths and more than 1,000,000 injuries each year in US hospitals. Medication errors can occur at any stage of the medication process, including ***prescribing, transcribing, dispensing, and administration***.
- Research has indicated that closed-loop medication administration systems reduce non-intravenous MAEs to 39% and also reduce the administration of the wrong dose as well as omission errors. However, personal digital assistant (PDA) or hand-held point-of-care devices have been adopted in only 27.19% hospitals in China due to difficulties with application, high implementation costs, and maintenance fees.





# Medication administration errors



Medication error (ME) is broadly defined *as any error in the prescribing, dispensing, or administration of a drug*. ME is the single most preventable cause of patient harm. Medication administration error (MAE) is defined as “*any difference between what the patient received or was supposed to receive and what the prescriber intended in the original order*”. MAE is one of the risk areas of nursing practice and occurs when a discrepancy occurs between the drug received by the patient and the drug therapy intended by the prescriber.

The significant impact of medication administration errors affect patients in terms of *morbidity, mortality, adverse drug events, and increased length of hospital stay*. It also increases *costs for clinicians and healthcare systems*.

Due to this, assessing the level and associated factors of medication administration error has a significant contribution for *improving the quality of patient care*.



# Medication administration errors

In the UK, 26 % of MAE were potentially serious, with fatal events which led patients to aspiration pneumonia and intracranial hemorrhage. In Germany, 70 % of all intravenous medications administered had at least one clinical error, and a quarter of these were serious errors likely to result in permanent harm to patients.

The most common factors which contribute to MAE are failure to ***check the patient's identification prior to administration, the storage of similar preparations in similar areas, and environmental factors like nurse interruptions whilst undertaking a drug round***. Other factors which contribute to MAE are characteristics of the *nurse (age, sex, years of experience, year in the specific unit, nurse-to-patient ratio and educational status)*, route, and time of drug administration. Inaccurate documentation and poor communication during change of shifts in the hospitals also contribute to MAE .



# Closed Loop Medication Management

- **What is Closed Loop Medication Management (CLMM)?** Closed Loop Medication Management system is a fully electronic medication management process that integrates automated and intelligent systems to completely close the inpatient medication management and administration loop, and seamlessly document all the relevant information.
- All the steps of the medication cycle are supported electronically – *ordering, verifying, preparing and administering* – with decision support where relevant. So it's all about ***safety***,
- “Closed loop medication management requires four things: ***an active medication order***; an ***electronically-identified provider*** (nurse); ***a bar-coded drug***; and an ***electronically-identified patient***.



# Closed loop medication process

Ames Research



# Why is Closed Loop Medication Management needed

**Why is Closed Loop Medication Management needed?** CLMM improves paper centric medication management workflow by *standardizing the process, reducing variation, identifying and eliminating unnecessary steps* and reducing opportunity for errors among the care team members. The closed-loop process *provides access to a consistent and real-time patient clinical information at the point of care.*



# Benefits of Close Loop Medication

<b>Integration:</b>	<ul style="list-style-type: none"><li>• Integrate physician, nurse and pharmacist workflows</li><li>• Achieve connectivity and reporting from the point of prescription to bedside medication administration</li><li>• Eliminate all manual order transmission and transcription activities</li></ul>
<b>Real- Time Information</b>	<ul style="list-style-type: none"><li>• Provide consistent real-time patient and clinical information to all caregivers</li><li>• Flag real-time medication variations on Electronic Medication Administration Record</li></ul>
<b>Compliance:</b>	<ul style="list-style-type: none"><li>• Improve adherence and compliance to medication procedure and policies</li></ul>
<b>Safety :</b>	<ul style="list-style-type: none"><li>• Prevent medication Error and adverse Drug Events</li><li>• Maintain medication history</li><li>• Improve patient safety and quality of care</li></ul>
<b>Scheduling :</b>	<ul style="list-style-type: none"><li>• Schedule tasks and reminders for medical staff</li><li>• Eliminate shifts and 24-hour chart checks</li></ul>
<b>Others</b>	<ul style="list-style-type: none"><li>• Simplified process</li><li>• Time saving and reduction in cost</li></ul>



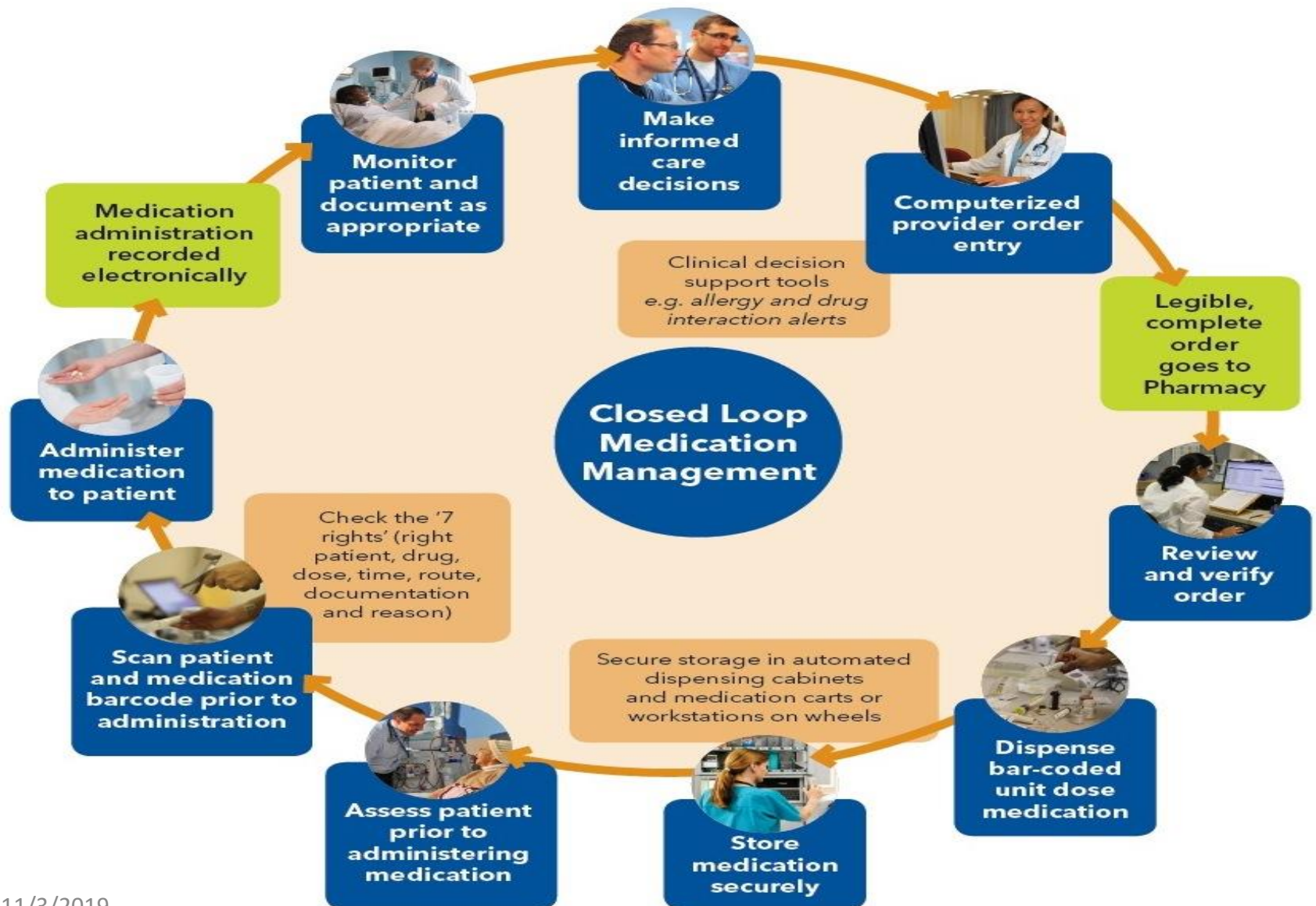


# Steps of closed loop medication management

- ✓ Care providers will enter orders directly into the computer, so they're transmitted directly to the pharmacy for verification and dispensing.
- ✓ At the pharmacy end, we'll break down medications into single doses, which are bar-coded. We won't have bottles of medicines anymore; we'll have individual, pre-measured doses
- ✓ Patients will also have bar-codes on their armbands. Each medication order will be linked to the patient's bar-code and the medication bar-code.
- ✓ This is to make sure that the right patient gets the right dose of the right medication, at the right time and by the right route
- ✓ Scanning the bar-codes will result in the right documentation being entered into the clinical information system.



# Steps of closed loop medication management



# Barcode Medication Administration

Bar code medication administration is a barcode system designed to:

- Prevent medication errors
- improve the quality and safety of medication administration
- Generate online patient medication records



## BCMA Workflow

Barcoded Medication	<ul style="list-style-type: none"><li>• Each medication is labeled with unique barcode</li></ul>
Order Entry and Verification	<ul style="list-style-type: none"><li>• Physician electronically enters medication order</li><li>• Order is sent to pharmacy for verification</li></ul>
Dispensing	<ul style="list-style-type: none"><li>• Pharmacist dispenses barcoded unit dose of the medication to the patients floor</li></ul>
Administration	<ul style="list-style-type: none"><li>• Nurses scan barcode of the patient wristband and then the medication barcode</li><li>• Ensure Electronic verification that meeting the 8<sup>th</sup> right</li></ul>
Documentation	<ul style="list-style-type: none"><li>• Automatically document administration if scanned dose matches to pharmacist-approved medication order &amp; patient is due for current dose</li><li>• If not matches the application will issue warning</li></ul>



# Automated Dispensing Cabinet Supports the Process



**Automated dispensing machines—decentralized** medication distribution **systems** that provide computer-controlled storage, dispensing, and tracking of medications—have been recommended as one potential mechanism to improve efficiency and patient safety, and they are now widely used in many hospitals.

- Nurses have increased access to drugs in patient-care areas and can facilitate administration in a timely way
- The medications are locked up in patient-care units, and controlled substances and other drugs are electronically tracked.
- The stocking and distribution of medications are tracked to improve inventory control.
- Save significant time in the daily workflow of nurses



# Automated Dispensing Cabinet Supports The Process

- When ADCs are interfaced with the pharmacy computer, they support the clinical review of medication orders by a pharmacist before administration.
- ADCs can be interfaced with other external databases, such as the facility's admission/discharge/transfer system and billing systems; as a result, the efficiency of drug dispensing and billing is enhanced.
- ADCs can be interfaced with barcode technology to automate the restocking process and to track dispensing of medications.
- If ADCs are linked to point-of-care barcoding systems, an electronic match between the prescribed and selected medication is ensured.



## Highlight on closed Loop Medication management

Stage in Medication Process	<ul style="list-style-type: none"><li>• Ordering /prescribing</li><li>• transcribing/and verification</li><li>• Dispensing and delivering</li><li>• Administrating</li><li>• Monitoring and reporting</li></ul>
Impact on Medication Process	<ul style="list-style-type: none"><li>• Enhance patient safety</li><li>• Improve efficiency</li><li>• Reduce medication error</li><li>• Increase patient identity confirmation before administration</li></ul>
Components of CLMM	<ul style="list-style-type: none"><li>• An active medication order</li><li>• An electronically identified provider (nurse)</li><li>• A barcode drug</li><li>• An electronically identified patient</li></ul>
Addressing Medication Errors	<ul style="list-style-type: none"><li>• Automating emergency department care process</li><li>• Automating bed side care process</li><li>• Automating perioperative care process</li><li>• Prevent medication error during patient journey</li></ul>
Technology in use	<ul style="list-style-type: none"><li>• Computerized provider order entry</li><li>• Drug information system</li><li>• Barcode technology</li></ul>





# Conclusion

- Successful implementation and adoption of the closed loop medication administration system are more likely to happen only when the developers and implementers understand the complexities and unpredictability of the nurses' workflow. For instance, an inability to ensure the compatibility of the system with nursing workflow may lead to unintended consequences.
- Clearer guidance is required from hospitals on the use of the systems by physicians, nurses, and other medical staff. Without clear policies, well-developed systems that are well implemented and designed may hinder nursing workflow and impact patient safety and care.



# Conclusion

Closed-loop may reduce the medication turnaround time when compared to the paper-based medication management systems. This improvement may be attributable to increased accessibility of medications using ADCs and an eMAR flagging due and overdue tasks to nursing staff in real time. Additionally, pharmacy verification offers pharmacy staff the ability to access medication orders in real time, aiding in the timely supply of medications sourced through the department.



# Did you know?

23-56%

- reduction in the number of reported adverse drug events <sup>1,2</sup>

45-77%

- reduction in observed adverse drug events <sup>1,2</sup>

10%

- decrease in errors causing harm <sup>1</sup>

1 hour

- reduction in the total time nurses spent documenting medication administration per shift <sup>2</sup>

71%

- reduction in number of steps in medication administration, from 17 to 5 steps <sup>3</sup>



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The background features a series of overlapping, wavy bands in various shades of blue and teal. The colors range from a deep navy blue to a bright, vibrant cyan. The waves flow from the top left towards the bottom right, creating a sense of movement and depth. The text "THANK YOU!" is centered in the middle of the image, in a bold, white, sans-serif font.

**THANK YOU!**





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