Let's Talk Informatics

Closed Loop Medication Management

- Audience audio and video options have been disabled.

- To interact in the Q & A portion of the presentation, type your question in the chat window **and select the "all panelist" option to direct your question**.

- Today's session is being recorded and registered guests will be emailed a link to access from EventBrite.

- Want to stay informed about future sessions? Get on our mailing list here: **letstalkinformatics@nshealth.ca.**

Let's Talk Informatics

Closed Loop
Medication Management

Jeanne Smith, David Evans and Rebecca Lewis
February 24, 2022

Acknowledgement

We acknowledge we are gathered today
in Mi'kma'ki (*Mig-***maw***-gee), the traditional ancestral
unceded territory of the Mi'kmaq (*Mig-**maw**) people.

Informatics

Informatics utilizes health information and health care technology to enable patients to receive best treatment and best outcome possible.

Let's Talk Informatics Objectives

This series is designed to enable participants to:

- Identify knowledge and skills healthcare providers need in order to use information now, and in the future.
- Prepare health care providers through an introduction to concepts and experiences in Informatics.
- Acquire knowledge to remain current by becoming familiar with new trends, terminology, studies, data and news.
- Collaborate with a network of colleagues to establishing connections with leaders who can provide advice on business issues, best-practice and knowledge sharing.

**Closed Loop
Medication Management**

enabling a digitally supported workflow

Session Specific Objectives

At the conclusion of this activity, you will be able to:

- Describe **Closed Loop Medication Management** (CLMM)

- Describe potential benefits of **computerized provider order entry** (CPOE) over traditional paper-based ordering workflows.

- Describe potential benefits of **electronic medication administration records** (eMAR) documentation over traditional paper-based documentation workflows.

- Identify the impact of **barcoded medication administration** (BCMA) on eMAR workflow and medication safety.

Nova Scotia Current State

1. **Incomplete patient information** poses safety risks and provider frustration

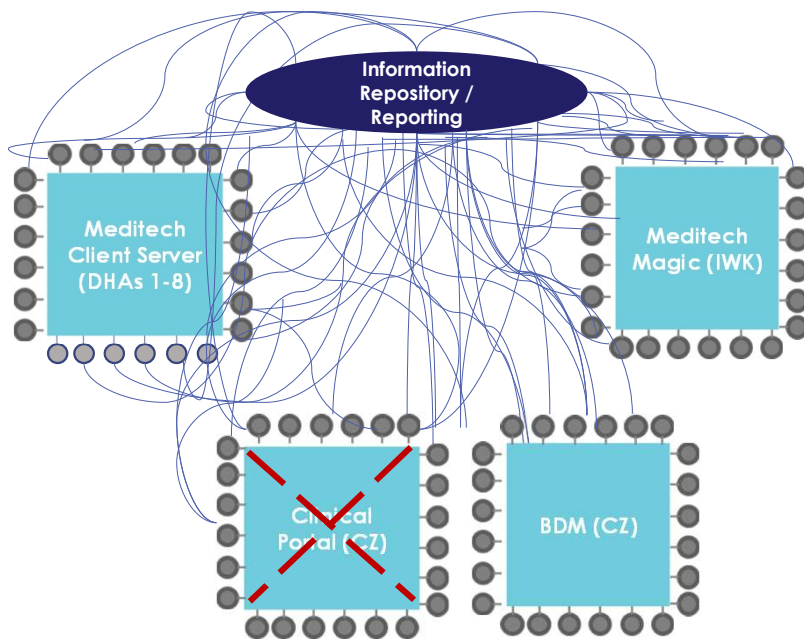2. **Siloed, highly customized health IM/IT systems** means information cannot seamlessly flow from one provider to another

3. **End-of-Life** health IM/IT systems routinely break down and are very expensive to maintain

Nova Scotia Current state – what do we have today?

Illustrative current state clinical information system environment

Information Repository / Reporting

Meditech Client Server (DHAs 1-8)

Meditech Magic (IWK)

Clinical Portal (CZ)

BDM (CZ)

- **Aging systems-** Example, CZ Clinical portal vendor supported ended in 2017.

- Clinicians, on average, log into **5+ different applications to deliver patient care**

- Finding patient information **adds 45-60 minutes** to a typical clinician's day

- **Minimal integration** and sharing of information between applications and between sites in Nova Scotia

Nova Scotia's clinical information systems landscape is fragmented, costly and failing. This is impacting patient care.

Nova Scotia Current State

Nova Scotia relies predominantly on paper orders
(handwritten/preprinted orders)

- 1200+ preprinted orders at NSHA
- 180+ preprinted orders at IWK
- **fragmented and inconsistent practice**
- Electronic forms applications can be **slow and unreliable**
- Auto filled PDFs (desirable for virtual care) are not supported

Closed Loop Medication Management has been identified as best practice.

The following items were identified as significant changes in future practice in Nova Scotia:

- computerized provider/prescriber order entry (CPOE)
- electronic medication administration records (eMAR)
- barcoded medication administration (BCMA)

What is Closed Loop Medication Management?

Closed Loop Medication Management (CLMM)

is a fully electronic process that documents all relevant medication information, from electronic ordering to administration.

"CLMM is a best practice in clinical care because it supports the reduction of medication errors related to prescribing, transcribing, dispensing, and administration" (Franklin et al., 2007).

"Medication management is care that optimizes appropriate drug therapy to ensure safe medication use" (CPSI, 2019).

Franklin, B. D., O'Grady, K., Donyai, P., Jacklin, A., & Barber, N. (2007). The impact of a closed-loop electronic prescribing and administration system on prescribing errors, administration errors and staff time: a before-and-after study. BMJ Quality & Safety, 16(4), 279-284.
Canadian Patient Safety Institute (CPSI) (2016). Medication Management. Retrieved from https://www.patientsafetyinstitute.ca/en/Topic/Pages/Medication-Management.aspx July 22, 2019.

Benefits of Closed Loop Medication Administration

23-56%	• reduction in the number of reported adverse drug events [1,2]
45-77%	• reduction in observed adverse drug events [1,2]
10%	• decrease in errors causing harm [1]
1 hour	• reduction in the total time nurses spent documenting medication administration per shift [2]
71%	• reduction in number of steps in medication administration, from 17 to 5 steps [3]

References:

1. Medication Management: A Closed Computerized Loop | Digital Healthcare Research (ahrq.gov)

2. Microsoft, Closing the Loop in Medication Management: Why an integrated, closed-loop solution is vital for hospitals, April 2009
Used with permission of HEALTHTECH

HEALTHTECH

Case Study for Closed Loop Medication Administration

North York Hospital 1st in Canada with CLMM*

Measured improvements:

- Medication **turnaround time** improved **83%** from 291 to 50 mins.

- **Order set usage** in patient admission **increased from 37%** when using paper, **to 97%** using **Computerized Prescriber Order Entry (CPOE).**

- **Appropriate prophylaxis** against VTE **increased from 50%** of inpatients to **96%.**

- **Mortality** from pneumonia and COPD exacerbation **reduced by 45%** using CPOE vs paper orders

- **11,000 patient mismatch errors prevented** with **barcode** scanning from 2010-2015 (total meds administered >6,000,000).

Catchment: 400,000 ppl
Sites: General, Branson, and Seniors' Health
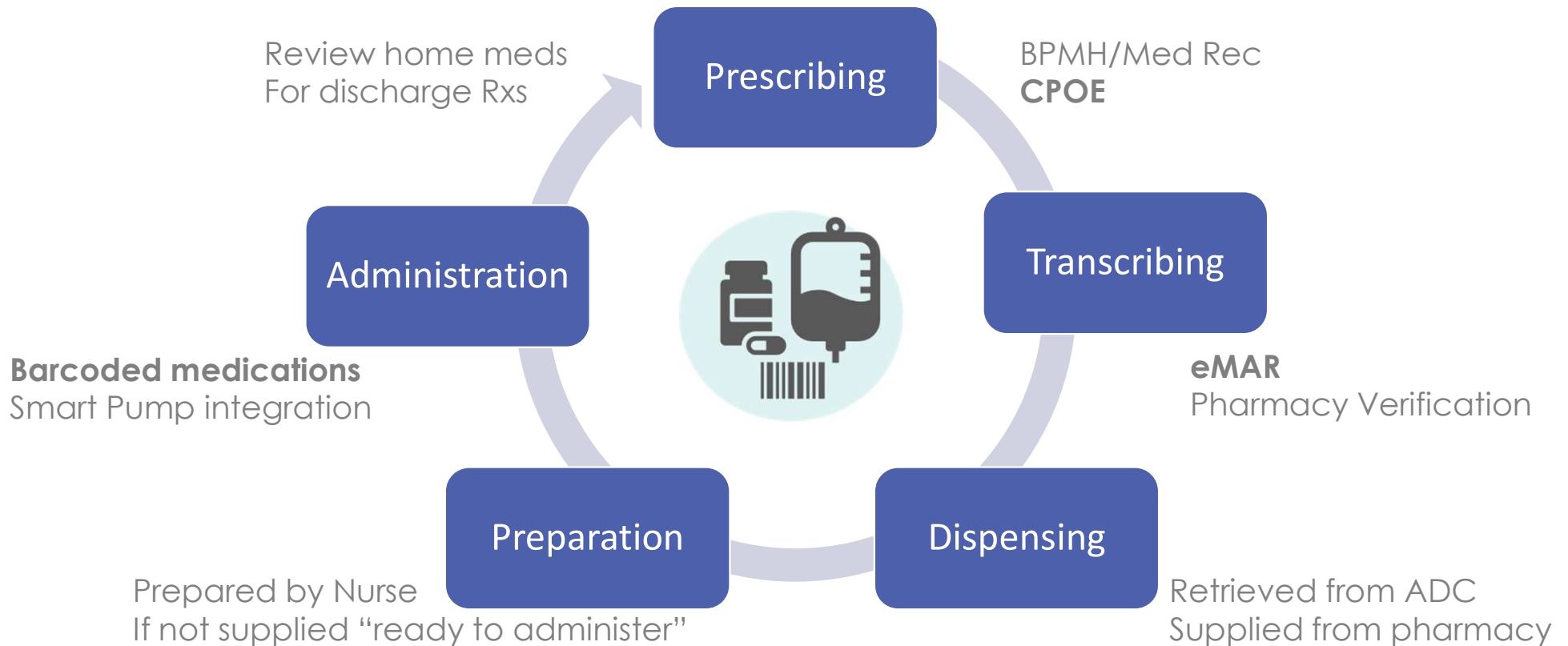
Beds: 426 acute care
       192 long-term care

Annual Volume:
- **124,000 ED visits**
- **31,000 inpatient cases**
- **214,000 outpatient cases**
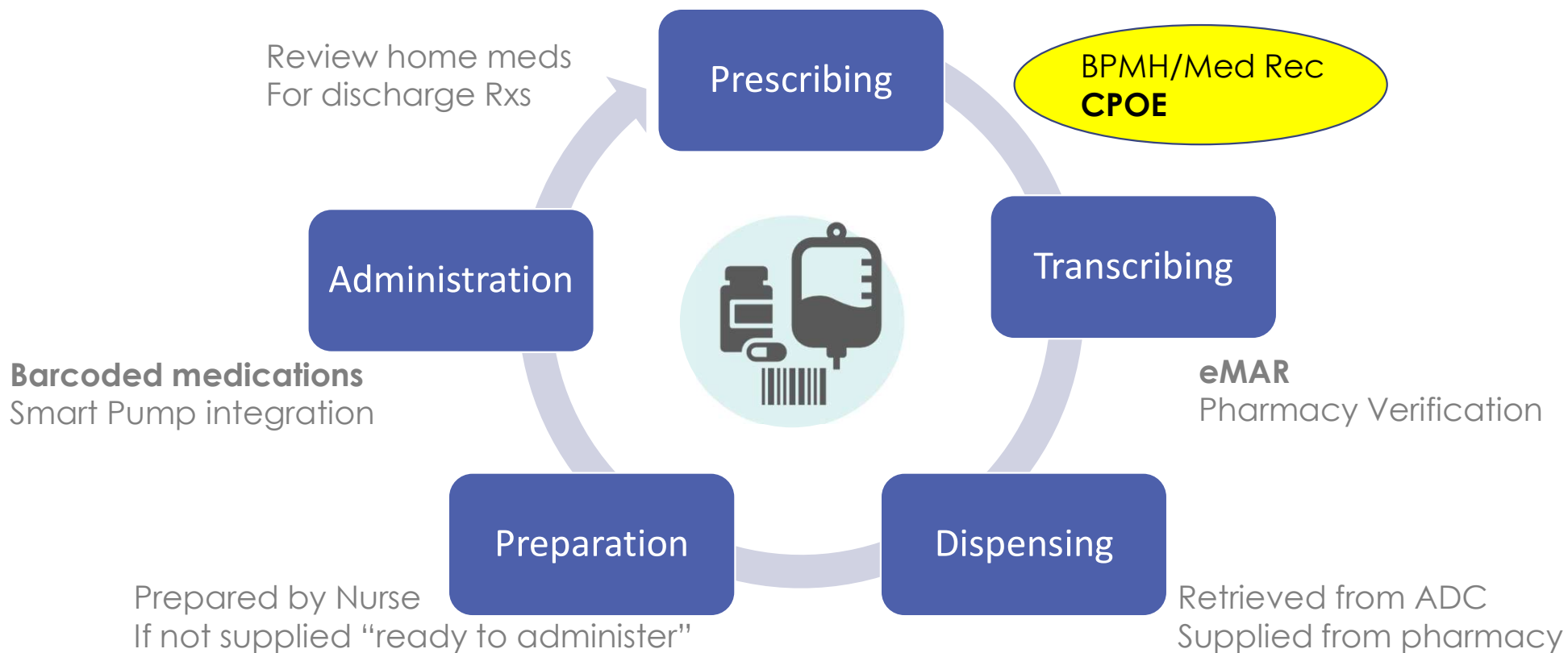- **5,800 births**

HIMSS Stage 6 since 2011

*First Canadian hospital to roll out closed-loop barcode medication administration in all Medical, Surgical and Critical Care units

Closed Loop Medication Management

Prescribing

Review home meds
For discharge Rxs

Prescribing

BPMH/Med Rec
CPOE

Administration

Transcribing

Barcoded medications
Smart Pump integration

eMAR
Pharmacy Verification

Preparation

Dispensing

Prepared by Nurse
If not supplied "ready to administer"

Retrieved from ADC
Supplied from pharmacy

What is Computerized Provider Order Entry (CPOE)?

Computerized Provider/Prescriber Order Entry (CPOE)

is system that allows direct,
electronic entry of orders into
an electronic health record
by licensed independent practitioners
or other staff with prescribing privileges.

Hoey PJ, Nichol WP, Silverman R. Computerized provider order entry. In: Dumitru D. The pharmacy informatics primer. Bethesda, MD: American Society of Health Systems Pharmacists; 2009:1-18.

Best Possible Medication History (BPMH)

Best Possible Medication History requires two sources of information

♦

Ideally (where possible) it should start with a **patient/family interview.**

♦

The **other source of information** could be a medication list, or the care provider could access the NS Drug Information System (DIS).

CPOE is more than how you enter the order…

CPOE → Order

- Admit/Transfer/Discharge
- Diagnostic Imaging
- Medications (eMAR)
- Lab, Microbiology, Blood bank, & Pathology
- Diet
- Consults (Specialists and Allied Health)

Receiving departments have information automatically populated into their respective systems without delay

It saves time!
Orders are processed faster because initiation for each starts **in parallel** rather than in series.

Order Sets in CPOE
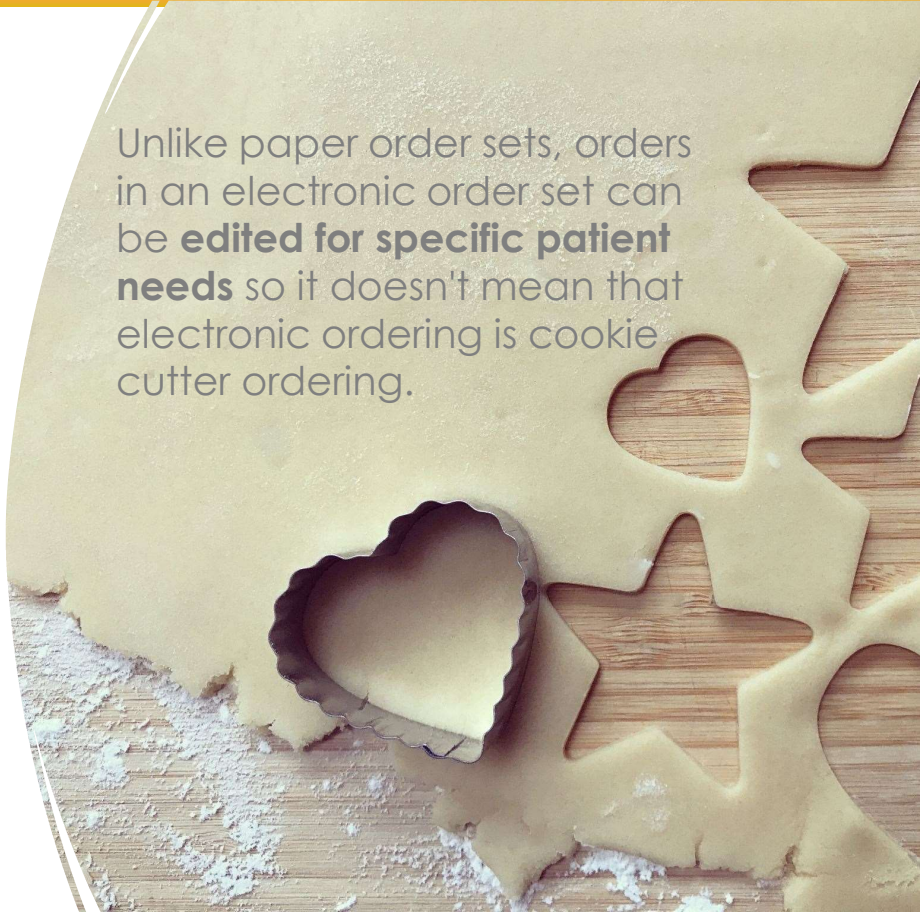
An order set is a group of bundled orders:

- Standardized and based on evidence

- Design is based on condition, disease or procedure (e.g., sepsis, pneumonia, etc.)

- Includes orders/tasks for therapeutic interventions, investigations and tasks associated with care (e.g., medications, blood work and vitals etc.)

Order Sets in CPOE

Standardized CPOE order sets :

- **reduce unintentional oversight**

- **reduce unnecessary calls** to providers for clarification i.e., illegibility

- provide **familiar workflow** for clinicians working in **multiple** care areas or facilities

- assist with **a smooth and safe patient transfer** between facilities

- support **efficient workflows**

Unlike paper order sets, orders in an electronic order set can be **edited for specific patient needs** so it doesn't mean that electronic ordering is cookie cutter ordering.

Clinical Decision Supports

A **Clinical Decision Support** system

is a type of **software system**
or application that supports the
clinical decision-making of a
clinician or **health care professional**.

Clinical Decision Supports

Prescribing and Pharmacy verification alerts

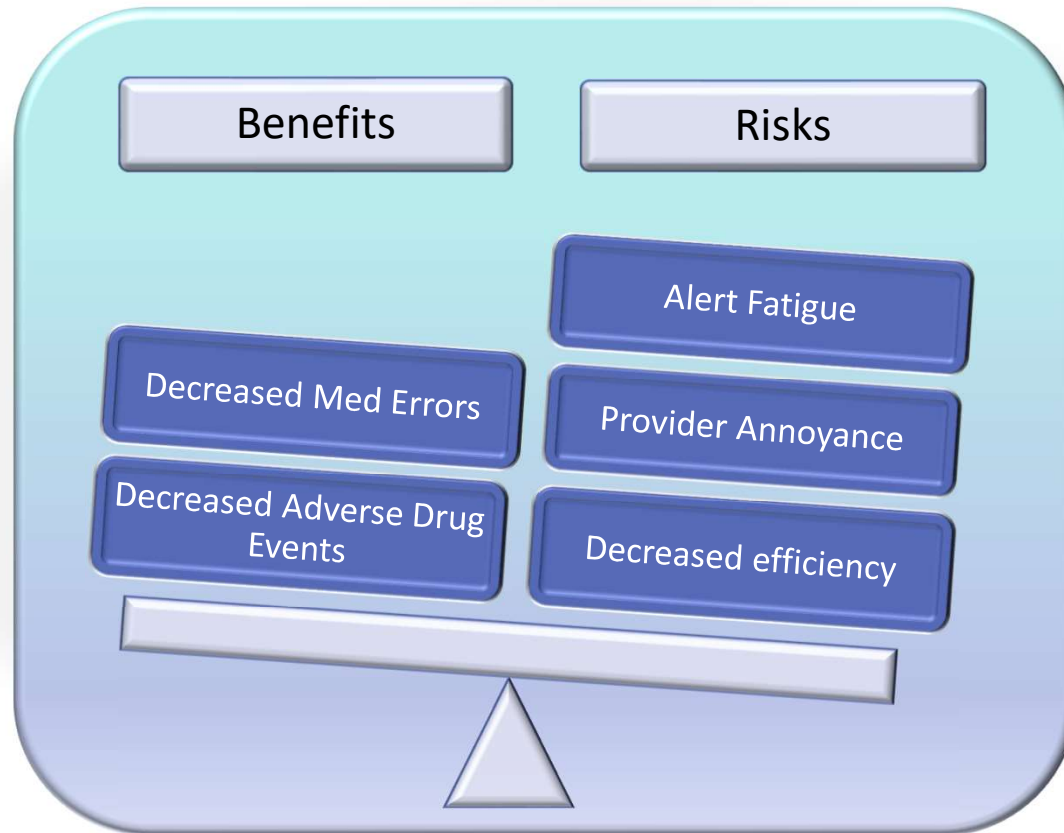Allergy and drug interactions

Documentation tools

Reference Links (dosing guidelines)
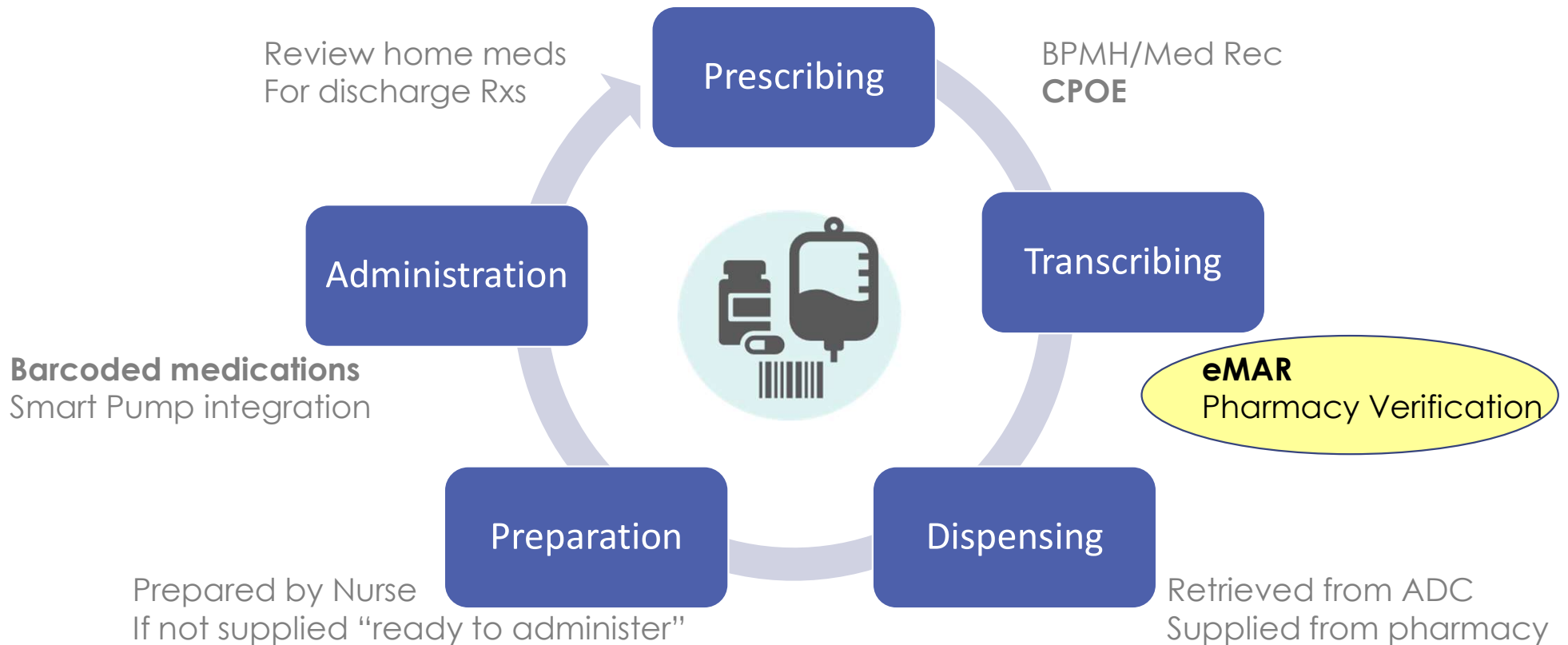
Order Sets

Care Plans

Clinical decision support can be vendor supplied or custom built

Clinical Decision Supports

Benefits

Risks

Alert Fatigue

Decreased Med Errors

Provider Annoyance

Decreased Adverse Drug Events

Decreased efficiency

Ammenwerth E, Schnell-Inderst P, Machan C, Siebert U. J Am Med Inform Assoc. 2008; 15(5):585-600.
Hug BL, Witkowski DJ, Sox CM, et al. J Gen Intern Med. 2010; 25(1):31-8.
van der Sijs H, Aarts J, Vulto A, Berg M. J Am Med Inform Assoc. 2006; 13(2):138-47.

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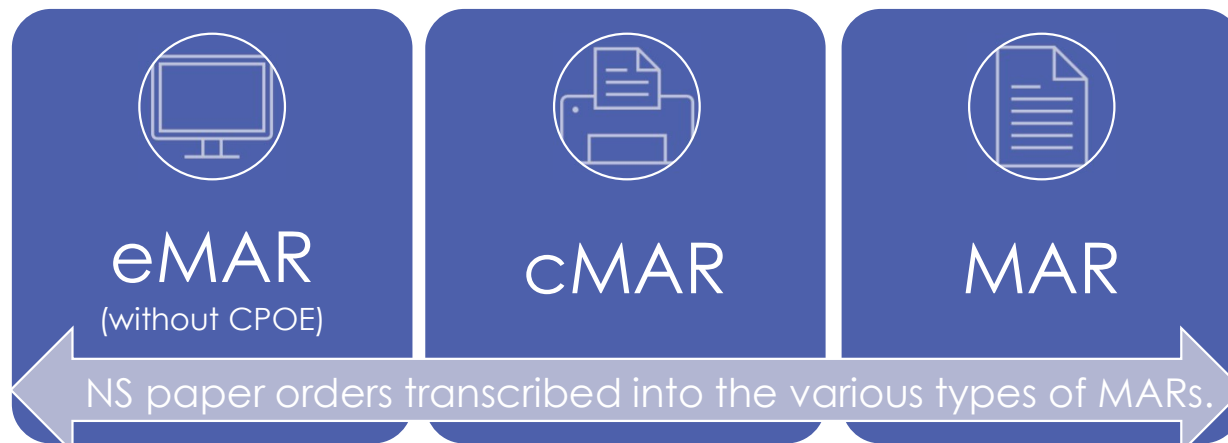If not supplied "ready to administer"

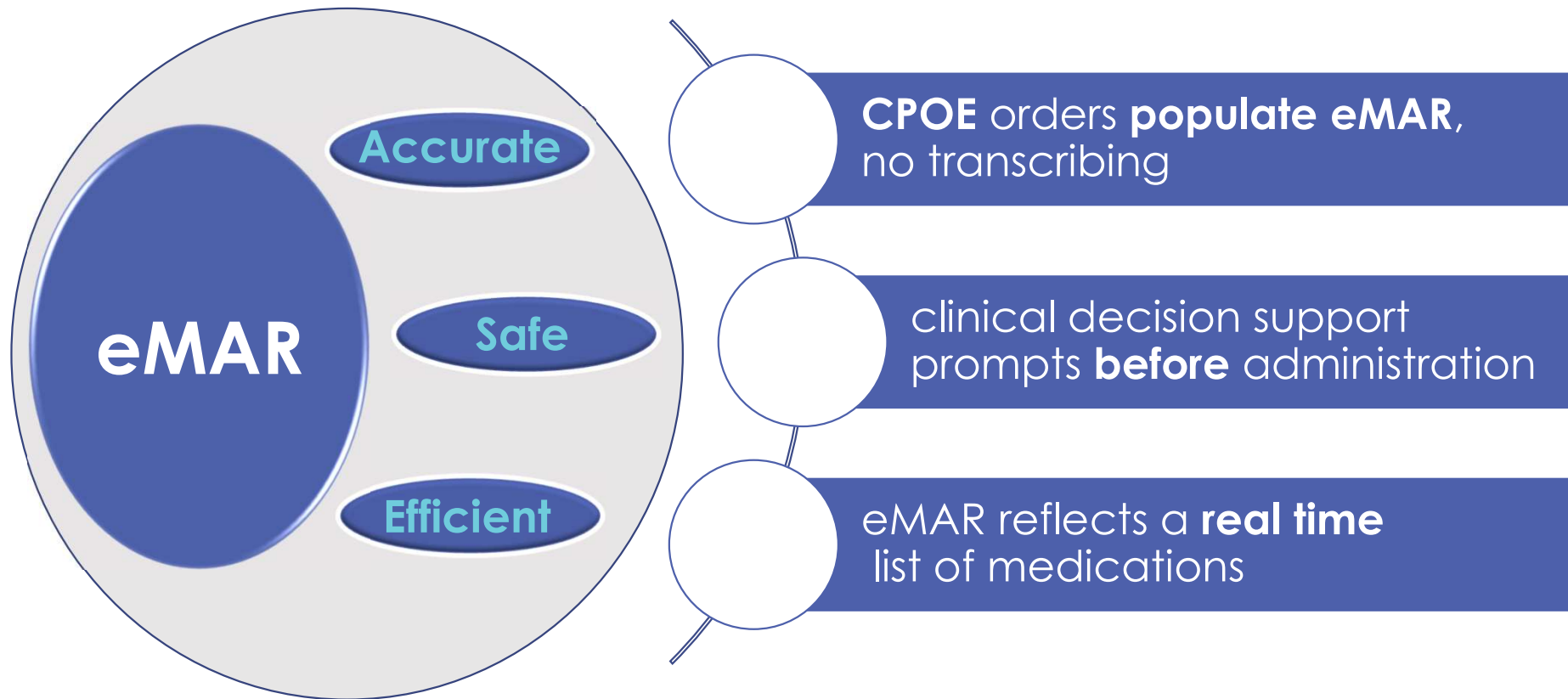Retrieved from ADC
Supplied from pharmacy

Electronic Medication Administration (eMAR)

eMAR definition: Application within an integrated electronic health record, or nursing documentation system that allows nurses and other providers administering medications to document medications administered to patients, including dose, route, frequency, time, patient, and other pertinent information related to the order.

eMAR (without CPOE)	cMAR	MAR

NS paper orders transcribed into the various types of MARs.

Electronic Medication Administration (eMAR)

eMAR

Accurate

Safe

Efficient

CPOE orders **populate eMAR**, no transcribing

clinical decision support prompts **before** administration

eMAR reflects a **real time** list of medications
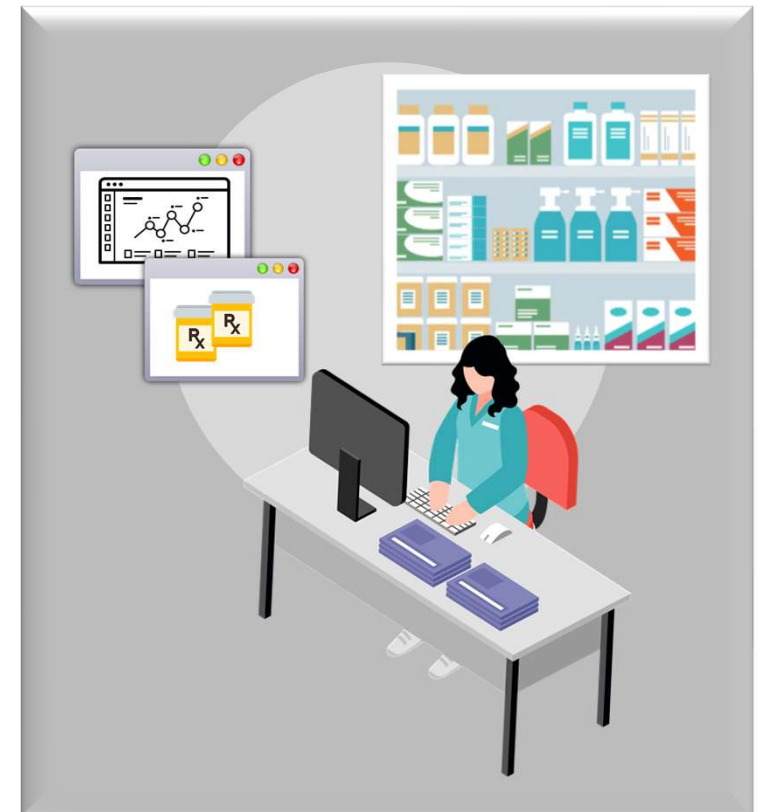
PHARMACY ORDER VERIFICATION

Verification & therapeutic Review
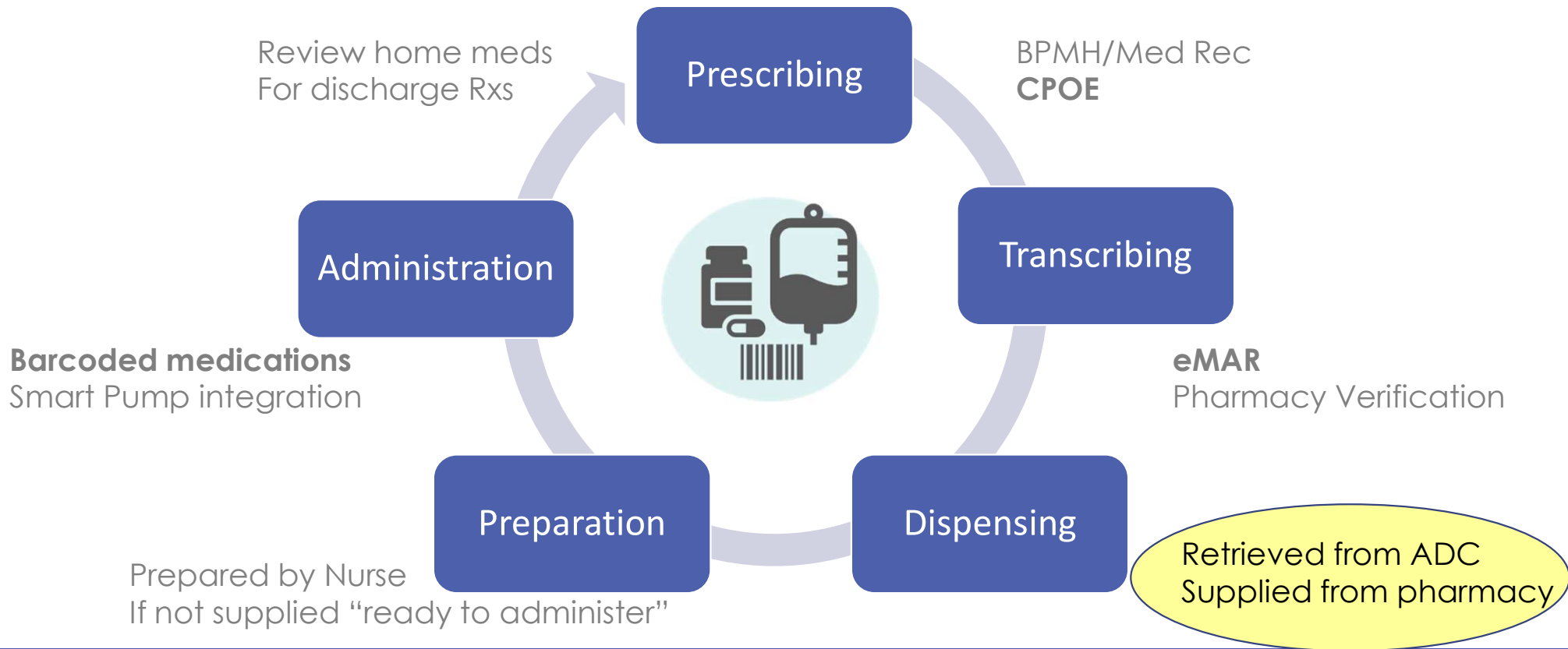
Verify right dose, route, frequency

Review for renal/hepatic adjustments, frailty, drug levels, anticoagulants, QT interval

Provide appropriate format (CIVA, oral liquid, formulary substitution)

Verification is more efficient with access to the patient's chart.

Dispensing

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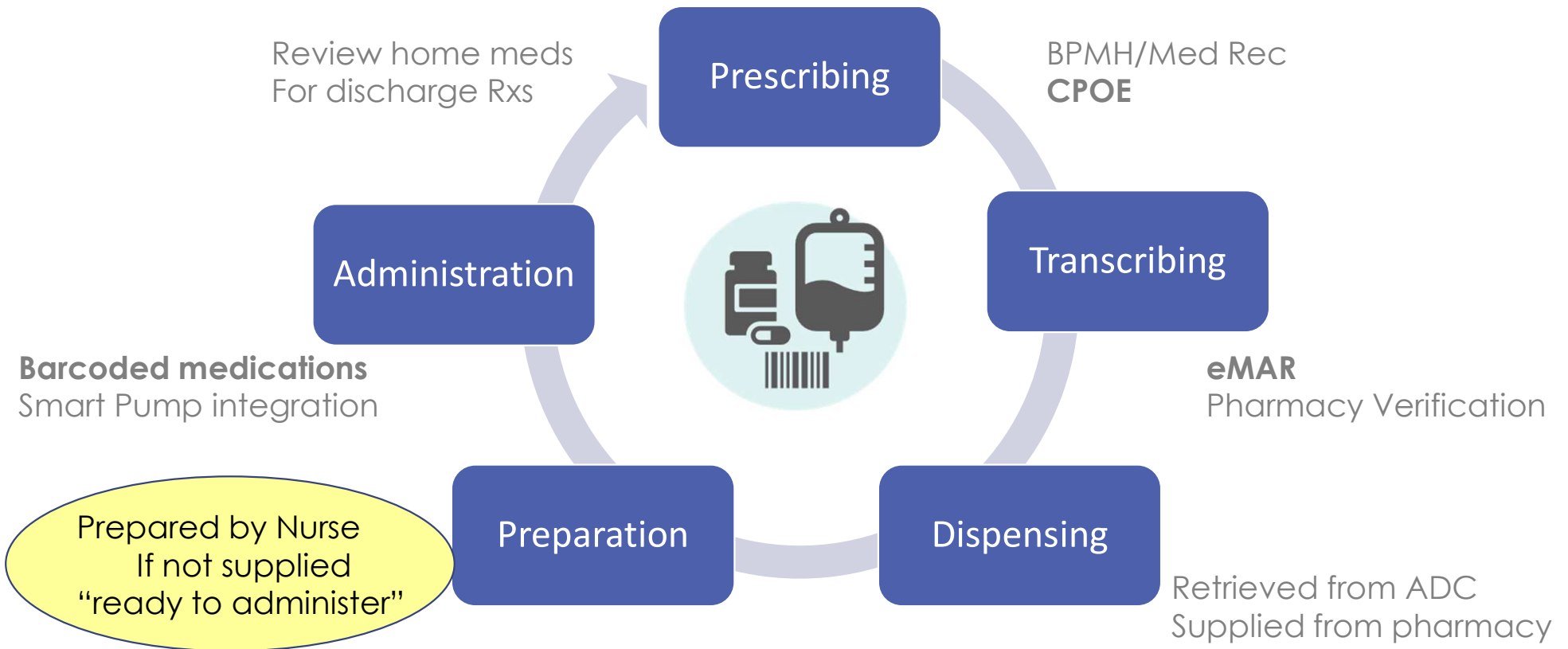Retrieved from ADC
Supplied from pharmacy

Dispensing

Ideally, medications would be readily available in Automated Dispensing Cabinets (ADCs) i.e., Omnicell or Pyxis.

- CPOE med orders can flow automatically to ADCs

- Discontinued/changed orders auto-update as soon as the prescriber changes an order in CPOE.

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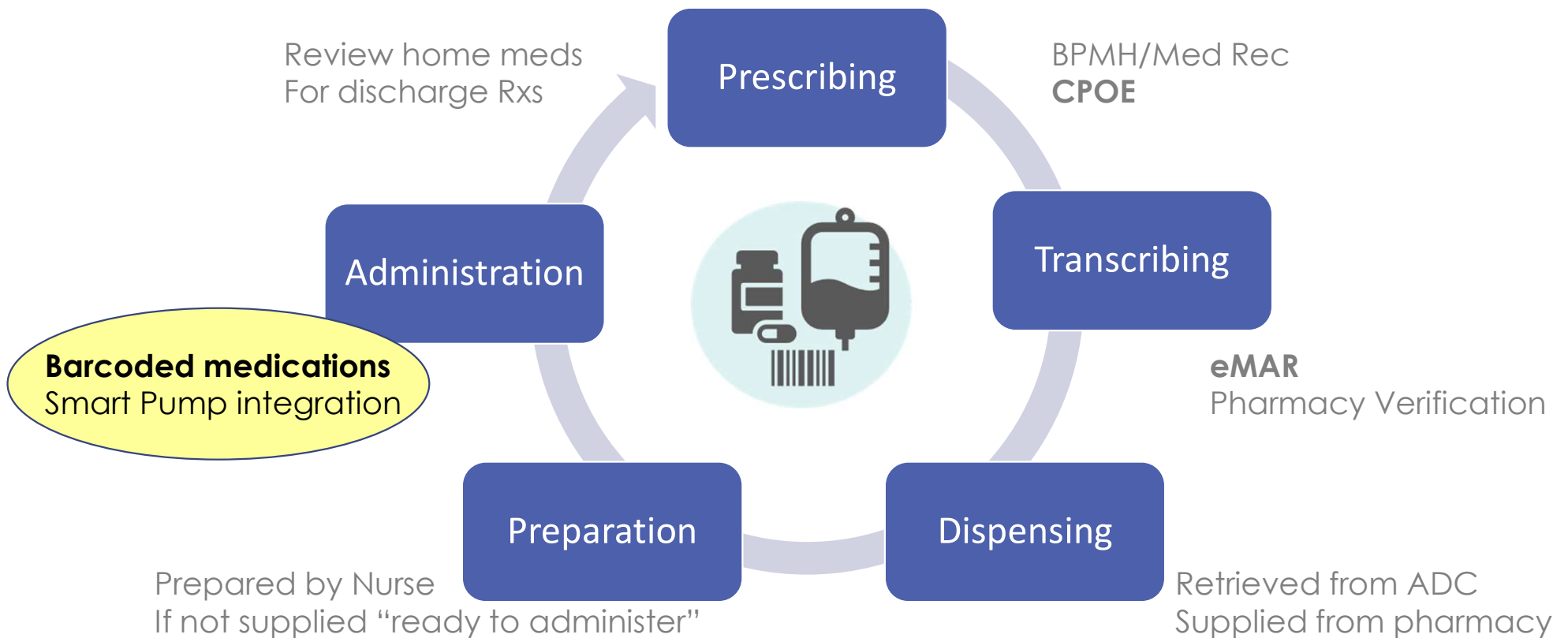Preparation

Dispensing

Retrieved from ADC
Supplied from pharmacy

Preparation

Expansion of pharmacy CIVA services
would enable more
"ready to administer/ready to scan"
medications which would improve
both nursing efficiency
and patient safety.

Administration

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Barcoded Medication Administration (BCMA)

At the **patient's bedside:**

- nurse **scans** the patient **armband barcode**
- **patient's eMAR** is **displayed**
- nurse scans the **barcoded medication**
- **Date/time are automatically documented**

Other details may be edited
(ie. half tablet or application site).

Barcode Scanning

Alerts nurse if:

X wrong patient

X wrong medication

X discontinued medication

X wrong due time

Labelling

**In advance of
Barcoded Medication Administration,
Pharmacy will need to
review inventory to:**

- Assure medications can be scanned
- Acquire unit dose products whenever possible
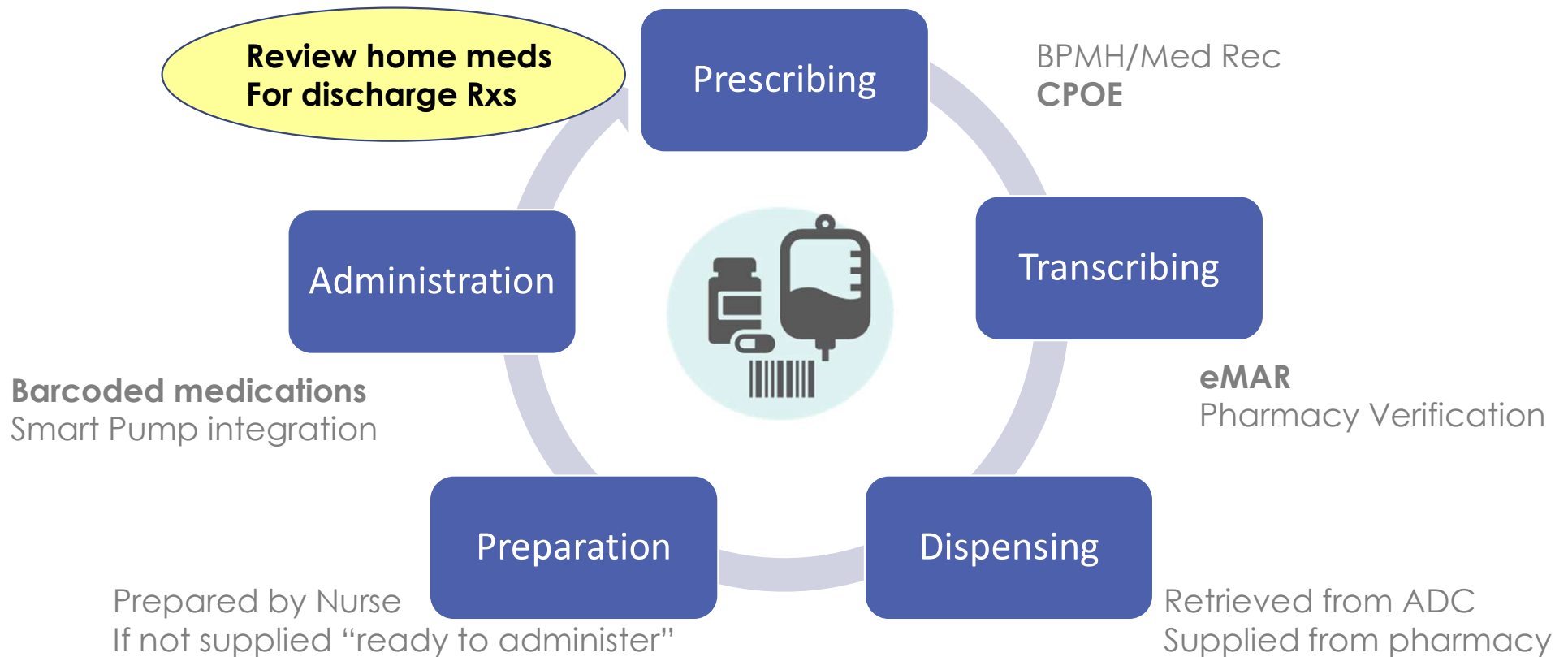- Create barcodes for items that don't have them
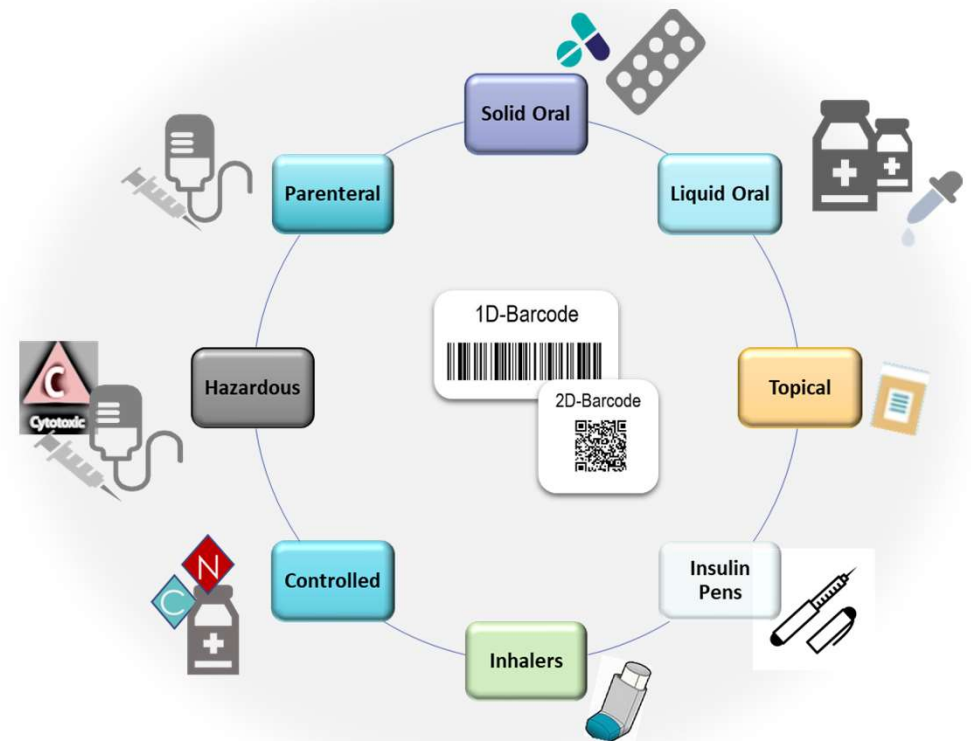
Smart Pump Integration

Ideally Smart Pumps would be integrated with the patient's eMAR and utilize barcode scanning.

- Smart Pumps may be auto programed based on eMAR information and the medication barcode.

- Infusion details may be set to flow back to the eMAR to auto-populate the documentation fields but would require nurse validation for final documentation.

Discharge Prescriptions

**Review home meds
For discharge Rxs**

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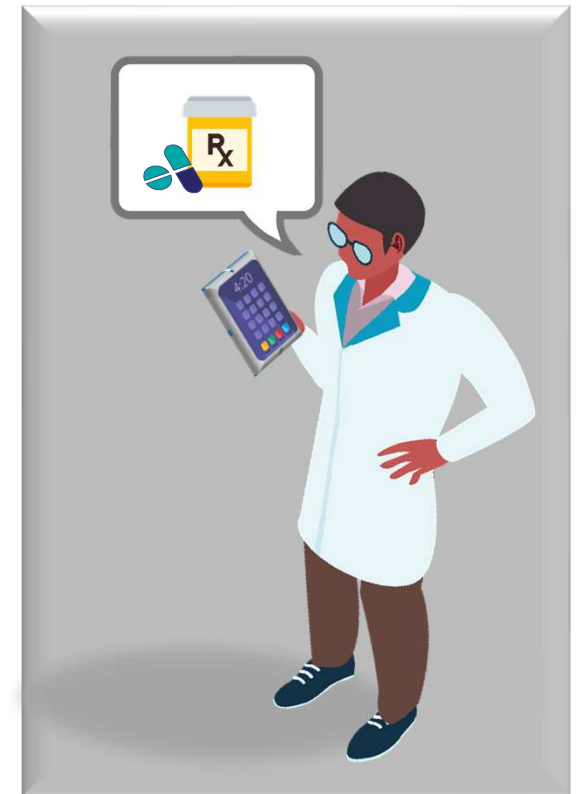If not supplied "ready to administer"
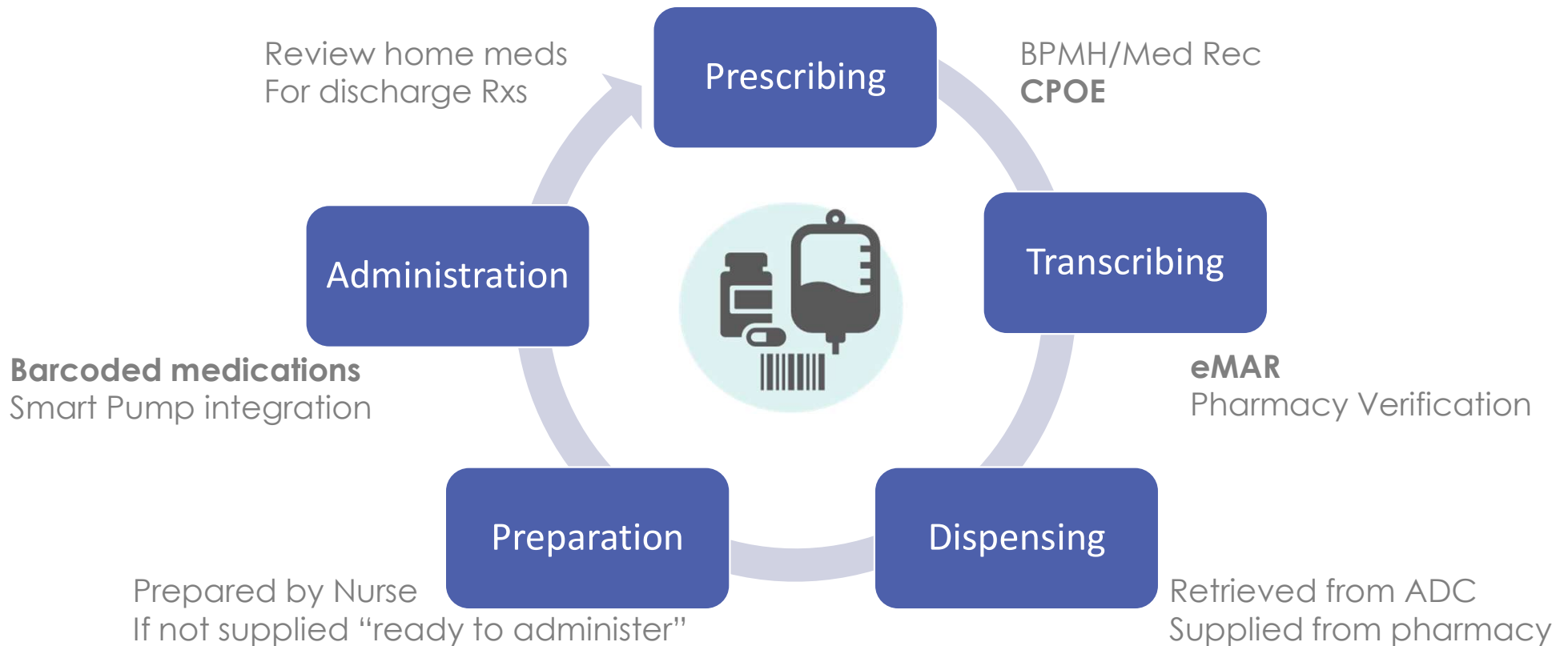
Discharge Prescriptions

- Review electronic list of home meds
- Continue, discontinue or modify

- Electronically send Rx to community pharmacy

- List of medications in patient portal

Summary

Review home meds
For discharge Rxs

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Let's Talk Informatics Certifications

- **Digital Health Canada** - participants can claim 1CE hour for each presentation attended.

- **College of Family Physicians of Canada and Nova Scotia Chapter** - participants can earn one Mainpro+ credit by providing proof of content aimed at improving computer skills applied to learning and access to information.

- **Canadian College of Health Information Management** - approves 1 CPE credit per hour for this series for professional members of Canada's Health Information Management Association (CHIMA).

Thank you

Need More Info?

letstalkinformatics@nshealth.ca