Closing the Loop on Medication Administration

Andrew Staples MPHARM Hons MPHARM res
Clin Dip mGCP



HIMSS Analytics STAGE 6

Introduction

- Introduction to eHospital
- Why is closed loop medication administration hard?
- Importance of coded medication databases
  - Why BCMA, dm+d, GS1 standards are all associated
- Concept workflow for BCMA
  - Current workflow at CUH
  - Variants based on potential solutions
- Technical challenges in delivering successful closed loop medication administration
- Questions

eHospital

- CUH has been allocated the status of Global Digital Exemplar (GDE) as part of the NHS Digital Programme.
  - 1 of 16 sites
- The challenge presented to CUH is to achieve an international assessment scale of HIMSS EMRAM Level 7 within 2 years
  - Retain level 6 on re-inspection
- A key requirement to this is effective barcode administration of medications
- Evidence shows that the safest way to give medications to a patient is through scanning the patient and medication together

HIMSS EMRAM stages

15 Oct 2015

25 Oct 2014

EMR Adoption Model [SM]	
Stage	**Cumulative Capabilities**
Stage 7	Complete EMR integrates all clinical areas (e.g. ICU, ED, Outpatient) displacing all (medical) paper records in the hospital; Continuity of Care standards to exchange data; Data Warehouse used as basis for clinical and business analytics
Stage 6	Clinical Documentation interacts with advanced Decision Support (based on discrete data elements) AND Closed Loop Medication Administration
Stage 5	Integrated Image Management Solution (e.g. PACS) displaces all film-based images throughout the hospital
Stage 4	Electronic Ordering provides Clinical Decision Support (based on rules engines) in at least one clinical service area and for medication
Stage 3	Clinical Documentation as well as Electronic Ordering of Physician and/or Nursing Care services; includes tracking of Medication Administration (eMAR)
Stage 2	Clinical Data Repository / Electronic Patient Record allows collection and normalization of data from disparate clinical sources throughout the hospital
Stage 1	Information Systems for major ancillary departments (Laboratory, Radiology, Pharmacy) are installed or data output from external service providers are processed electronically
Stage 0	Information Systems for major ancillary departments (Laboratory, Radiology, Pharmacy) are not installed or data output from external service providers cannot be processed electronically

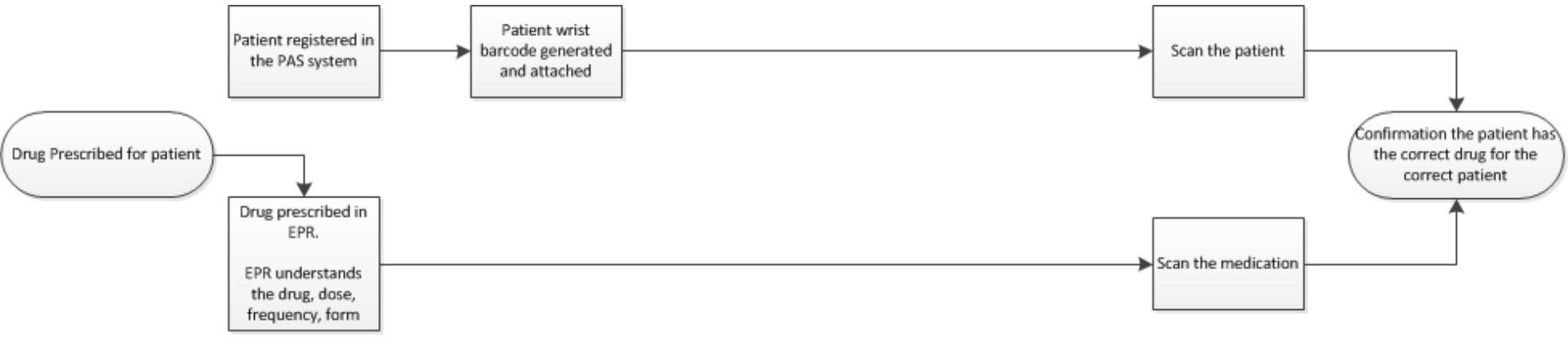
HIMSS UK

Technology transforming health and care

1. BCMA

1. Have a medication prescribed
2. Have a medication scanned by the nursing team
3. Have the patient scanned
4. Have the EPR match the medication and the patient and confirm they are correct / incorrect

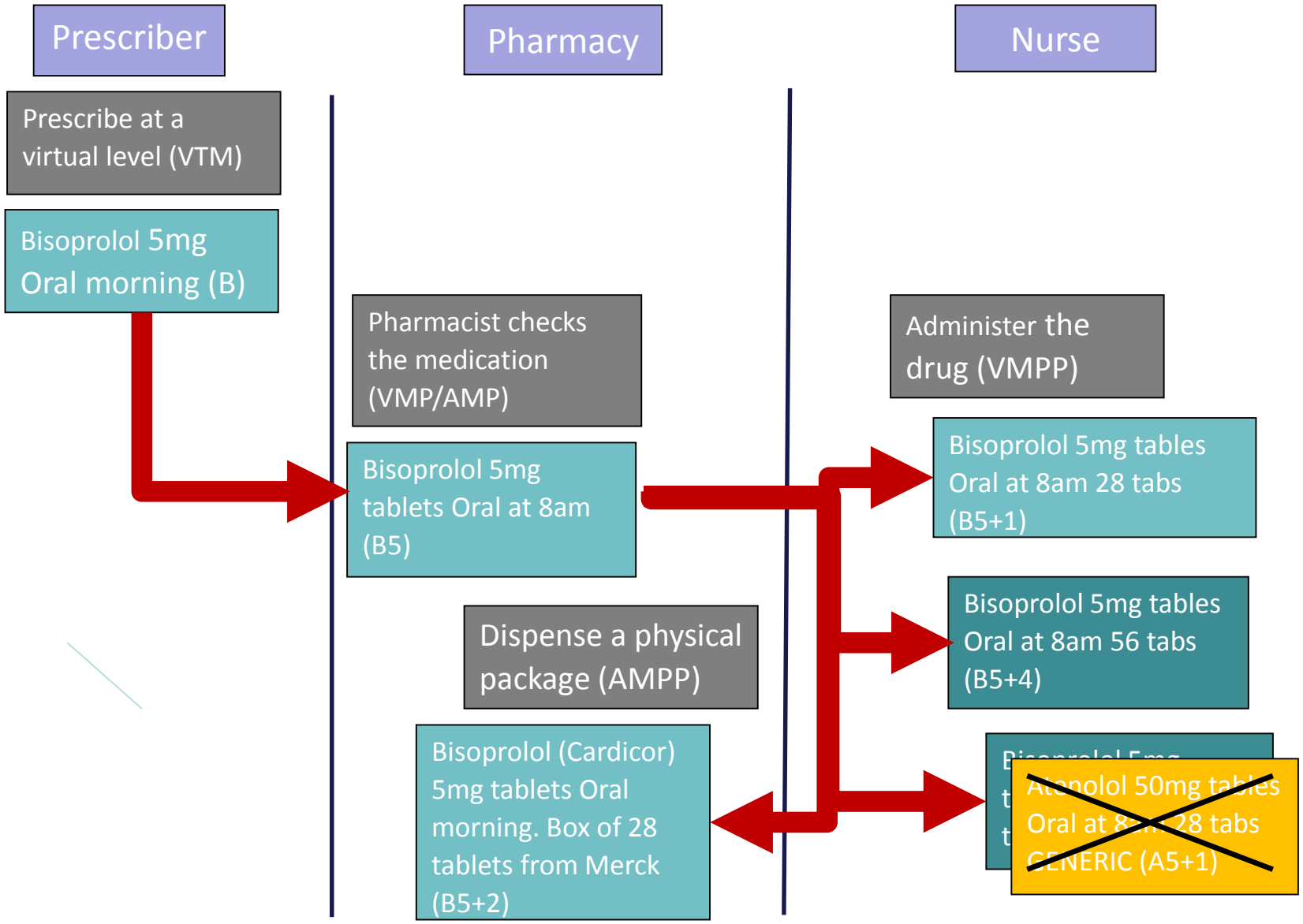
- Its tricky …
- Lets consider the variables


Patient registered in the PAS system
Patient wrist barcode generated and attached
Scan the patient
Drug Prescribed for patient
Confirmation the patient has the correct drug for the correct patient
Drug prescribed in EPR.
EPR understands the drug, dose, frequency, form
Scan the medication

2. BCMA

Prescribe	Pharmacy	Nurse
Bisoprolol 5mg tablets Oral morning 8am 28 tabs Merck	Bisoprolol (Cartelol) 5mg tablets Oral morning Box of 28 tablets Merck	Bisoprolol 5mg tables Oral 8am Box of 28 tablets

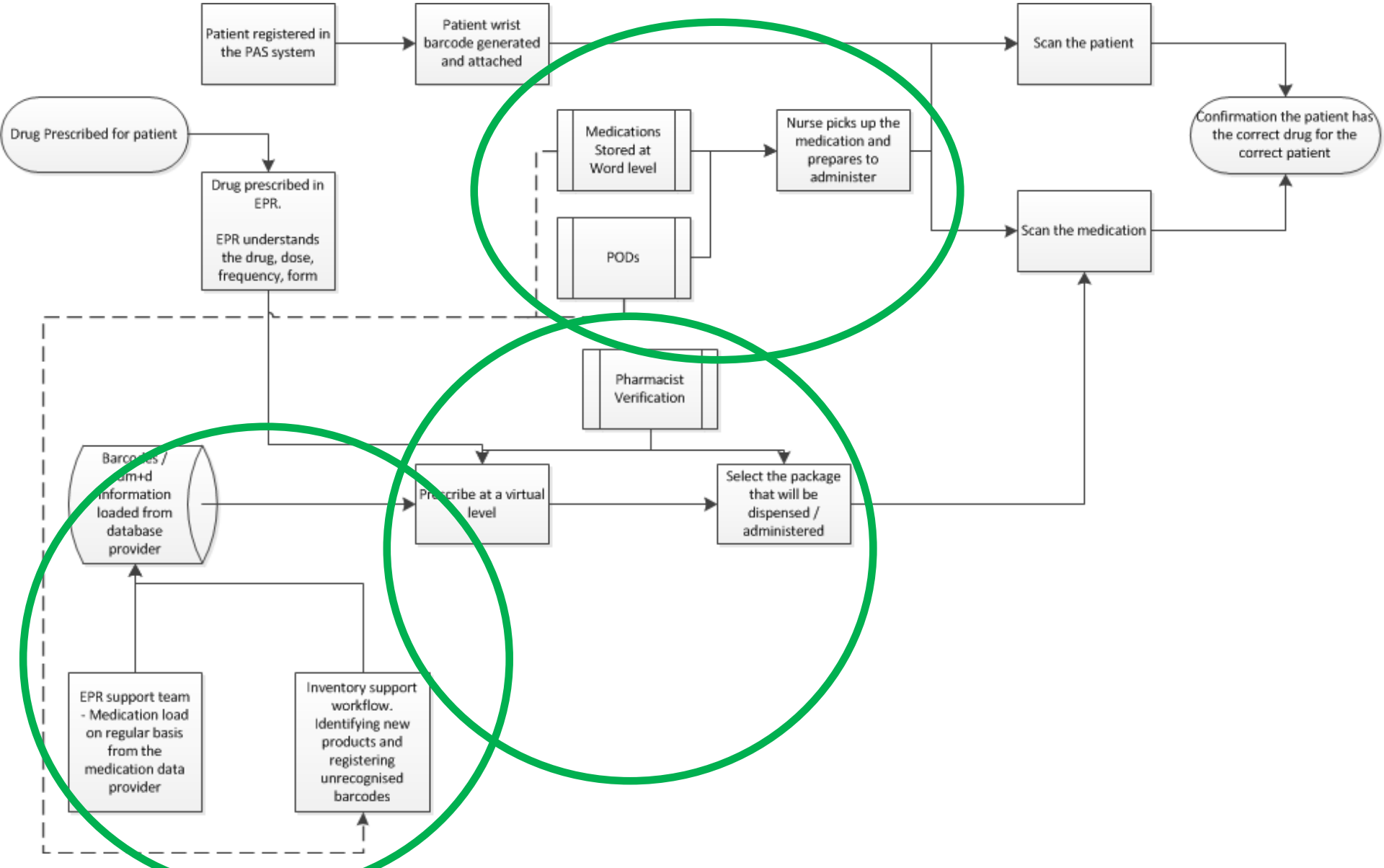
3. BCMA


Prescriber
Pharmacy
Nurse
Prescribe at a virtual level (VTM)
Bisoprolol 5mg Oral morning (B)
Pharmacist checks the medication (VMP/AMP)
Bisoprolol 5mg tablets Oral at 8am (B5)
Administer the drug (VMPP)
Bisoprolol 5mg tables Oral at 8am 28 tabs (B5+1)
Bisoprolol 5mg tables Oral at 8am 56 tabs (B5+4)
Dispense a physical package (AMPP)
Bisoprolol (Cardicor) 5mg tablets Oral morning. Box of 28 tablets from Merck (B5+2)
Atenolol 50mg tables Oral at 8am 28 tabs GENERIC (A5+1)

Key Factors

- The prescribed order has to allow all components of the workflow to progress.
- Coded drug data that contains
  - dm+d data structure i.e. understands medications from a virtual level to the granular level and their relationships i.e. brands & generics
  - Contains current barcode details
  - GS1 barcode also contains BN and Exp.
  - The two components (dm+d & GS1) also form significant sections of fmd
- An EPR that can support the functionality

D2 Model BCMA workflow



4. BCMA

- at CUH on BCMA pilot ward:
  - Medication prescribed
    - Nurse takes the medication from ward stock (infused med variant)
      - Scans the patient
        - » Scans the medication (scanner or portable EPR interface with scanner)
          - » Scanner is portable device or WOW
          - » Med room variant workflow allowing setup / pending the workflow
        - » EPR confirms the match or alerts of an error

5. BCMA

Powers what the prescriber selects through virtual medication setup.
VMP level. i.e. We govern what the prescriber can access

Contract Supplier Structure

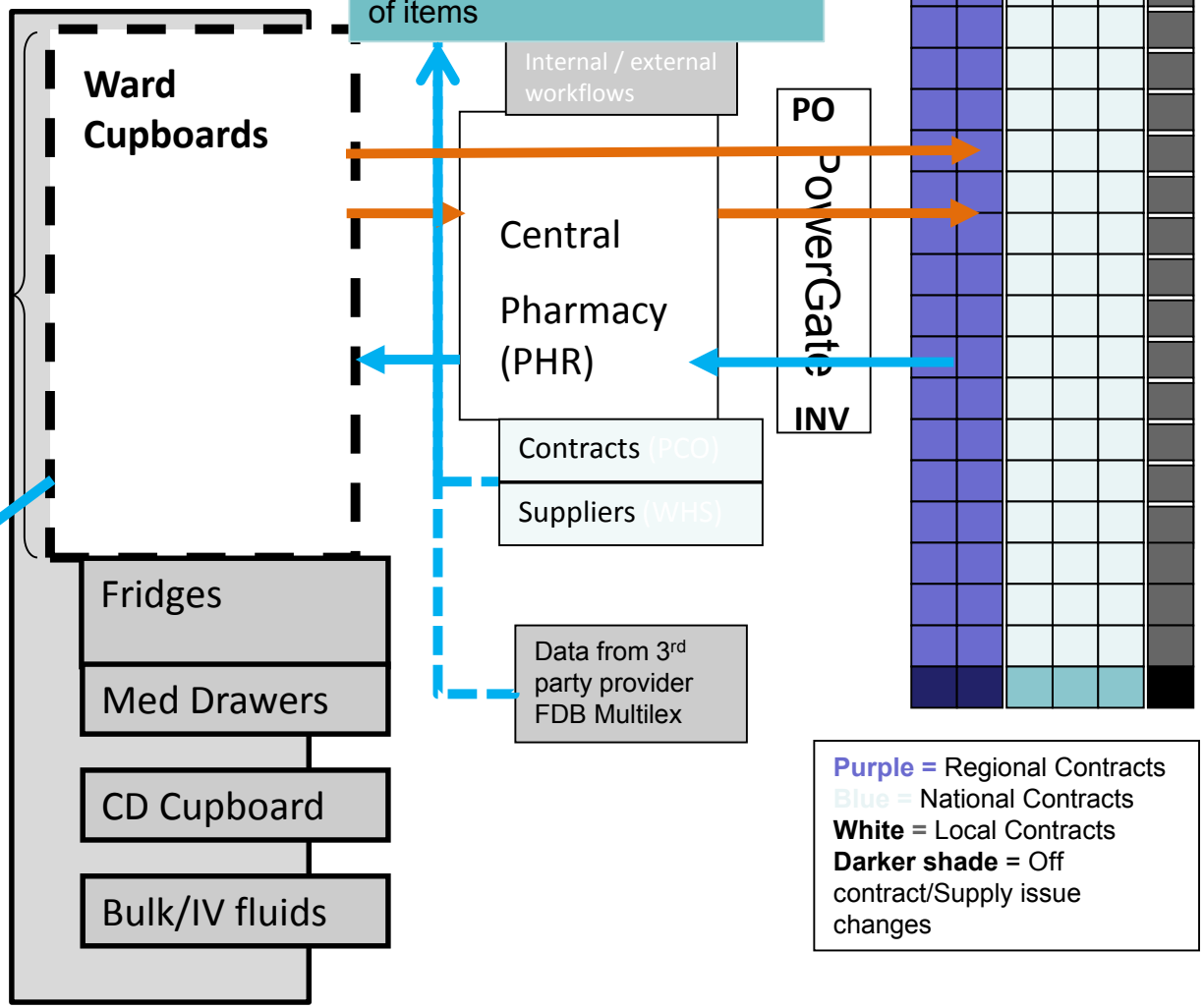
Contract specifies which medication pack to use and price (AMPP/VMPP).
Barcode either from FDB Multilex or registered at receive of items

Medication order signed
Dispense order generated.

I.e. we know which VMP and VMPP at this point.
Contract preferences dictate which AMPP we use

Nurse administers the medication from "Ward Stock"

When the Nurse scans the AMPP We know what medication to expect i.e. what was prescribed and can match the scanned barcode to this.



Workflow Challenges (1)

- The biggest challenge for Closed Loop Workflows
  - IV meds / infusions
    - Where you change the form of the medication
    - E.g.
      - ampule has no barcode, what do you scan?
      - Draw up a vial and add to an infusion bag, what do you scan?
  - Non-solid forms matching what the nurse wants to administer
    - E.g. Amoxicillin 1Gram IV
      - Is it a bolus … or is it an infusion?
        - » This will change what you intend to scan

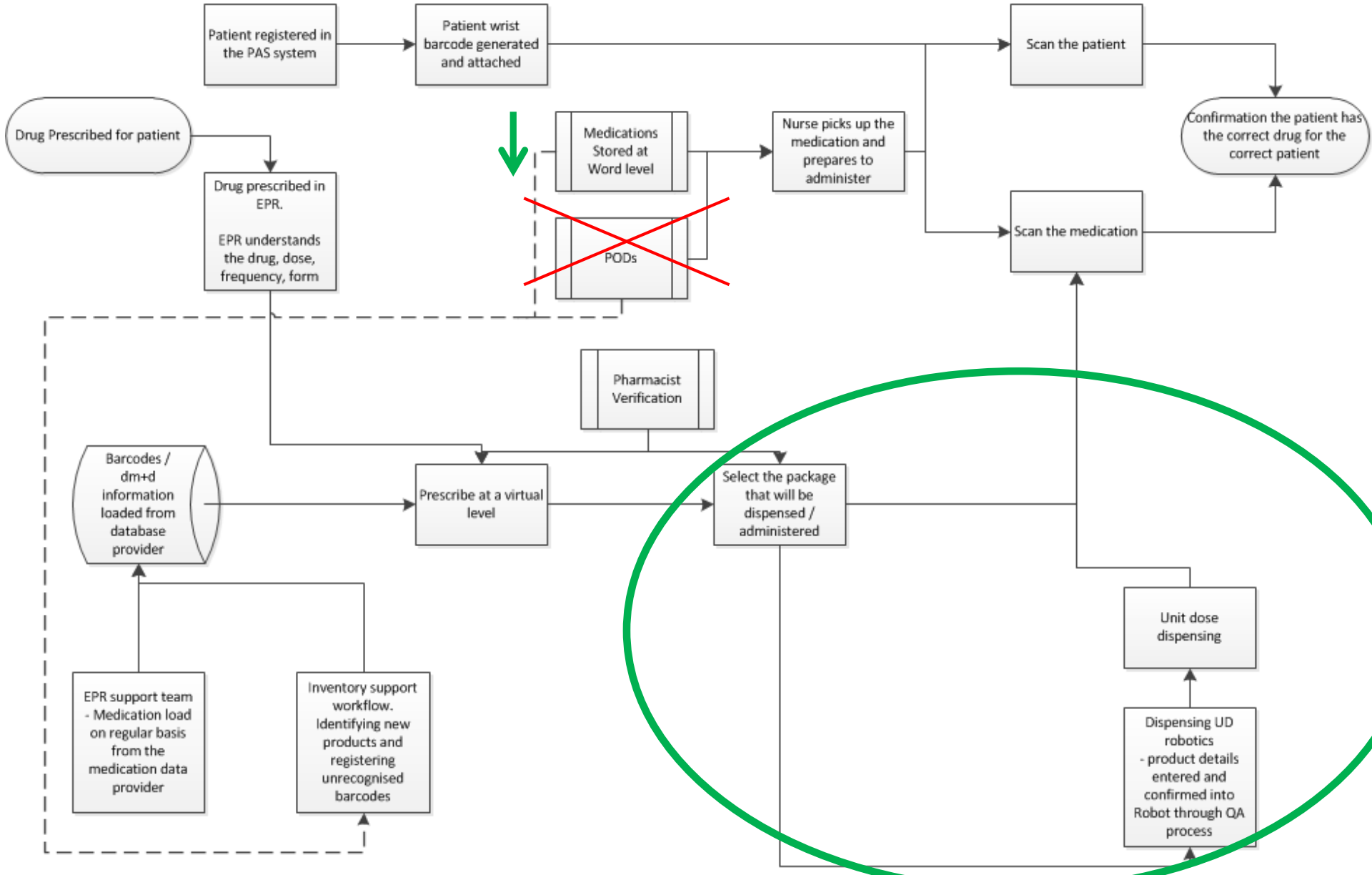
Workflow Challenges (2)

- Specialist areas
  - Emergency department
  - ICU, HDU / intensive care areas
    - High number of IVs / non-solid oral forms.
  - Significantly different workflows in terms of medication administration compared to standard ward areas.
    - Create a new / bespoke workflows / bespoke hardware profile to match specialist areas need.

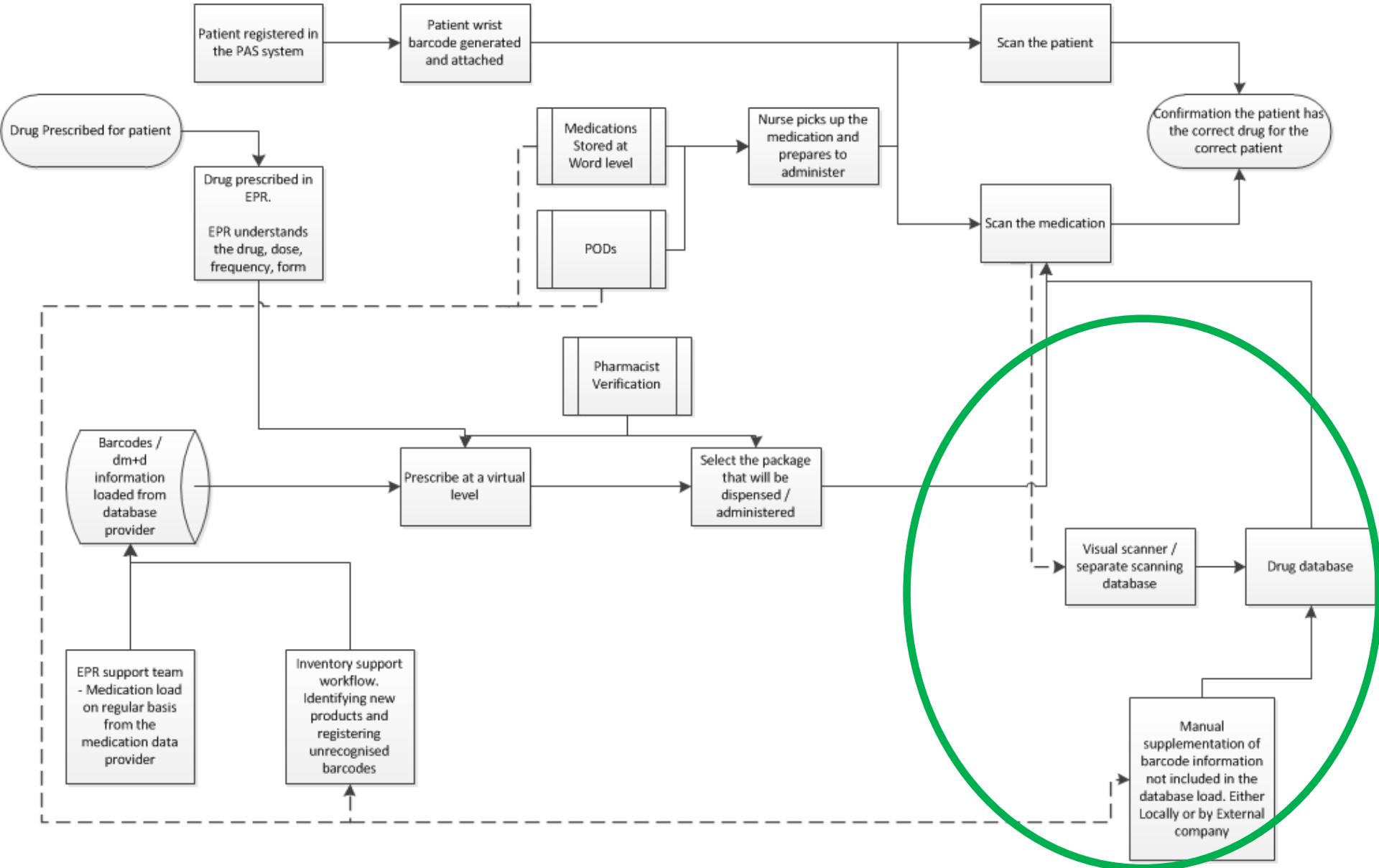
Closed Loop Solution – HIMSS EMRAM L6 & L7

- Lets think about what we can do to ensure good workflow adoption of the closed loop system
  - Scan rate above 85%
  - Coverage over 90% of patients

Unit Dose Workflow Variant



Secondary Database / Better Scanner Variant



Challenges in Delivering Closed Loop Workflow

- Up to date product registration
  - Up to date barcode data
  - Up to date scan details
- Support workflows in pharmacy to ensure all products can scan
  - Staff resource with appropriate QA processes
- Hardware profile at ward level
  - Scanners, WOWs, EPR access in required locations, wifi
- Workflow training and support

Future steps (1)

- Centralised database containing up to date barcodes for all products used within the UK.
  - This will make workflows more achievable
    - Reduce resource requirements of supportive workflows
    - Increases the confidence / minimises error introduced by manual manipulation
- Barcoding at inner pack level e.g.
  - Ampules, vials, tablet strips, etc

Future steps (2)

- Review our supply and administration model.
  - How does closed loop med administration fit with:
    - Carter report: Medication delivery, storage, etc
    - FMD
    - Budget restrictions
  - Adoption of unit dose workflows
    - Unit Dose Robotic workflows
  - Other solutions?


Questions
Answers