Closed Loop of Medication
a successful way to drug safety

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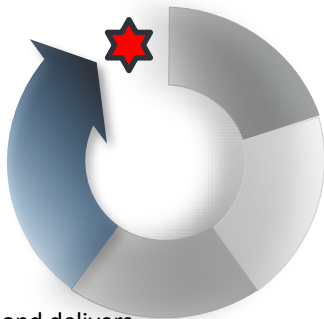# What is Closed Loop Medication Administration ?

A truly closed loop medication administration system is designed to feed outcomes from medication processes back into the system to allow for the future improvements and changes in a patient's course.

Source: Closing the Loop in Medication Management, Amalga Hospital Information System, April 2009

5. Physicians monitor patient response for follow up

1. The medication order originates with the physician

4. Nurses administer the medication

2. The pharmacist receives and validates the electronic order

3. Pharmacy processes and delivers patient related medications

Modified from:
Closing the Loop in Medication Management, Amalga Hospital Information System, April 2009

1 Mio. admissions due to adverse drug events (ADE) per year[1]

20% (200.000) thereof due to medication errors [1]

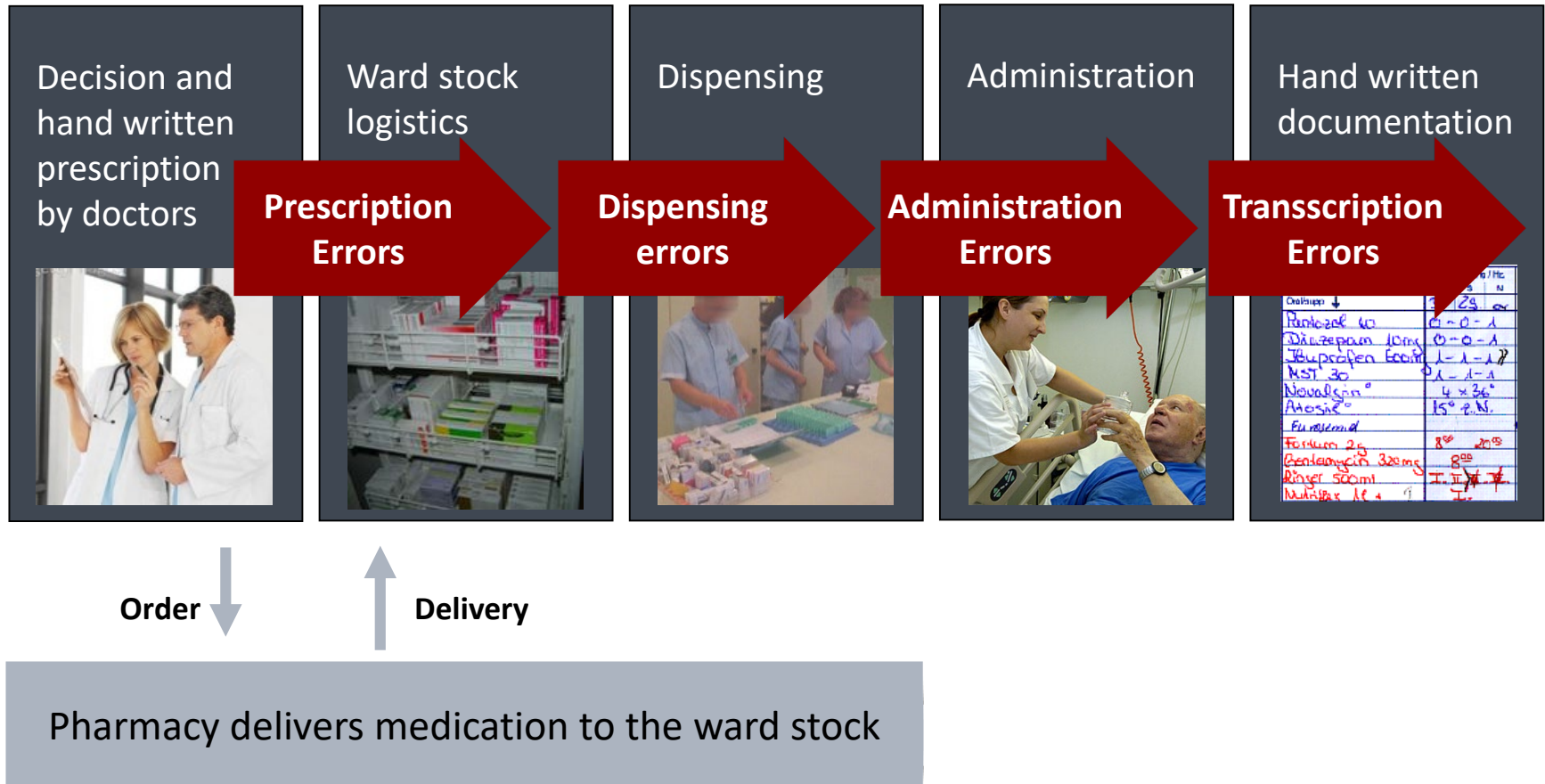12.000-24.000 deaths/year due to ADE [1]

After risk of infection, medication errors are the biggest risk for patients in the hospital [2]

Sources:
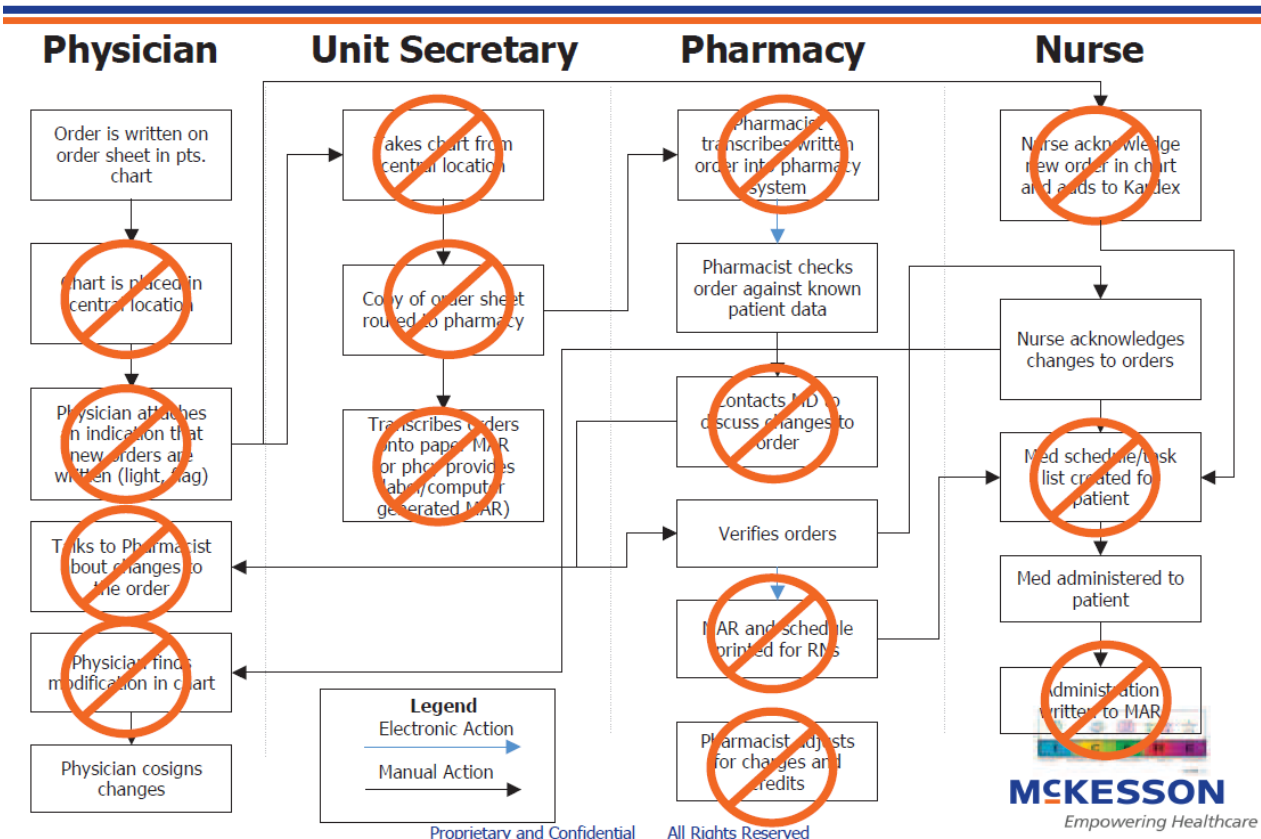(1) Amin-Farid Aly, K Boldt –ADKA Aachen 2016
(2) von Eiff (2011)

The traditional paper-based medication process

| Decision and hand written prescription by doctors | Ward stock logistics | Dispensing | Administration | Hand written documentation |

Prescription Errors → **Dispensing errors** → **Administration Errors** → **Transscription Errors**

Order ↓ ↑ **Delivery**

Pharmacy delivers medication to the ward stock

Complexity of medication process

Source: Bryan Eckert, McKesson Nov. 2003

Medication Process at UKE

CPOE
at bedside via
Soarian platform

registration of
administration

Unit dose
production
by pharmacy

Pharmacy validation
on the ward

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CPOE and CDS
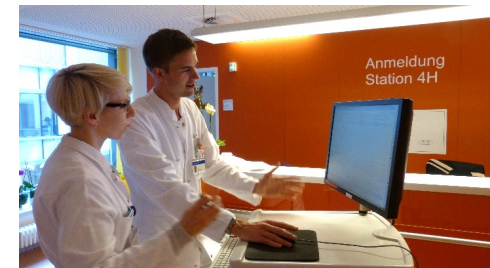
Doctors determine the final
- **medication**
- **dose**
- **route**
- **precise time**

After prescription medication order needs pharmacy validation to initiate the logistic process

CPOE
at bedside via
Soarian platform

Doctors can access any relevant patient data directly while prescribing.

ID Pharma check
Double order
Drug-drug interaction
Allergy check
Dose adoption
….

Pharmacy validation

Pharmacy validation comprises:

- ➲ medication reconciliation
- ➲ allergy check
- ➲ interaction counseling
- ➲ dosage check and adjustment
- ➲ early change to oral medication
- ➲ implementation of guidelines
- ➲ …

Pharmacists have an **unlimited access** to all patient relevant data (clinical chemistry, microbiology…)

CPOE at bedside via Soarian platform

Pharmacy validation on the ward

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Unit-dose production

The final link between medication and patient is fixed automatically by pouch production in the pharmacy

CPOE at bedside via Soarian platform

Production of unit-doses in the pharmacy
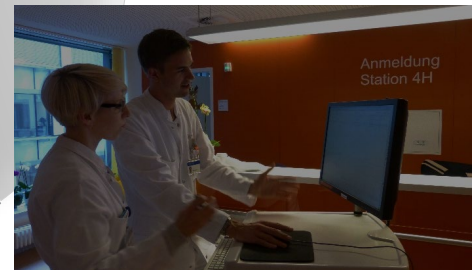
Pharmacy validation on the ward

Unit-dose production

Unit-dose production

Unit-dose medication is individually labelled with:

- patient name

- ward, room

- medication, dose, route

- date and time

- advice for administration

- complete drug information via QR-Code

Unit-dose supply

Two deliveries a day:

- main delivery
    - status after main ward round
    - contains all medications for the next 24 h starting with 6pm

- second delivery
    - contains latest changes between main ward round and 4 pm

- additional deliveries
    - only small amounts if urgently needed by tube system

Documentation of administration

CPOE
at bedside via
Soarian
platform

registration of
administration

Production of
unit-doses in
the pharmacy
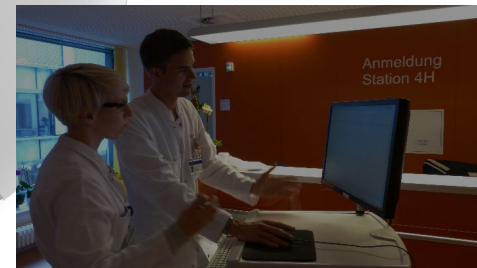
Pharmacy validation on the
ward

Paper based documentation

Documentation with Closed Loop Medication Administration

CPOE without unit-dose supply

University Medical Center of Freiburg
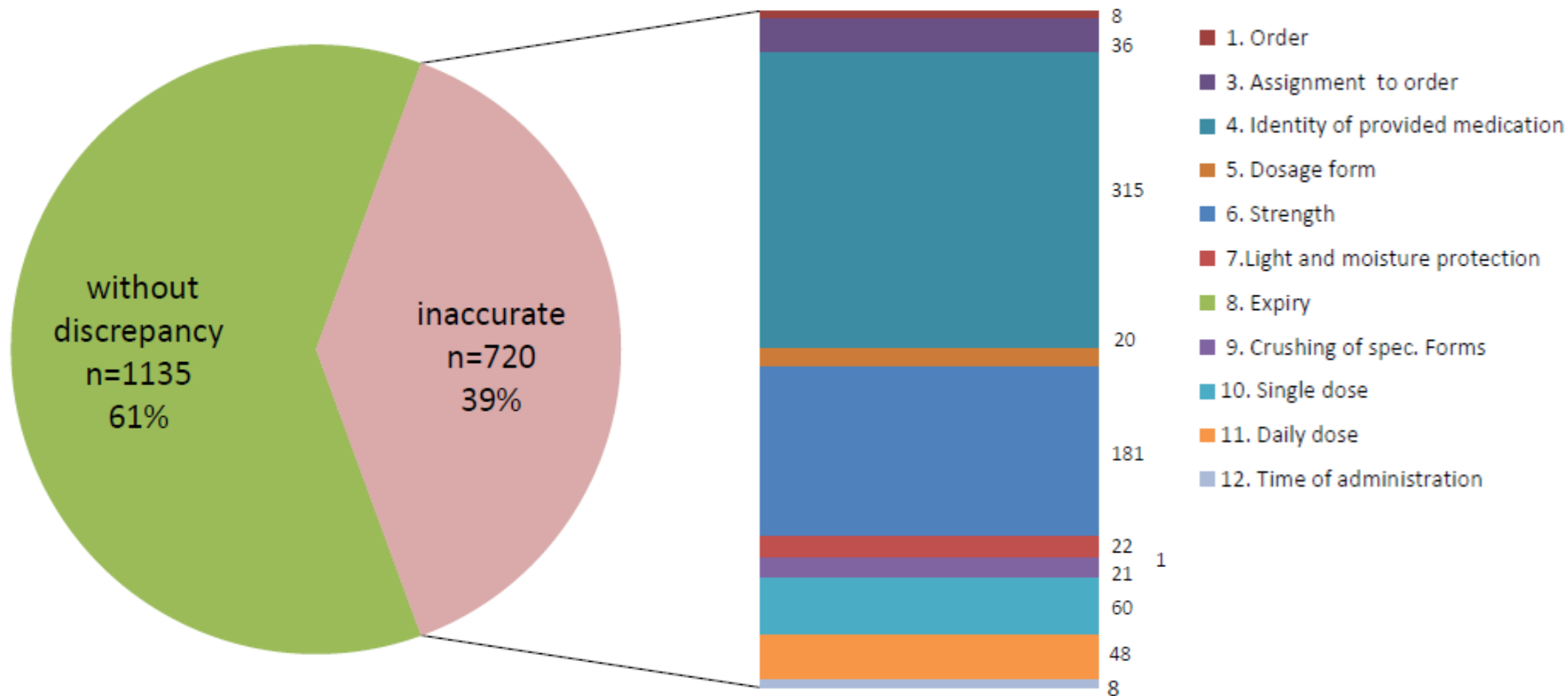
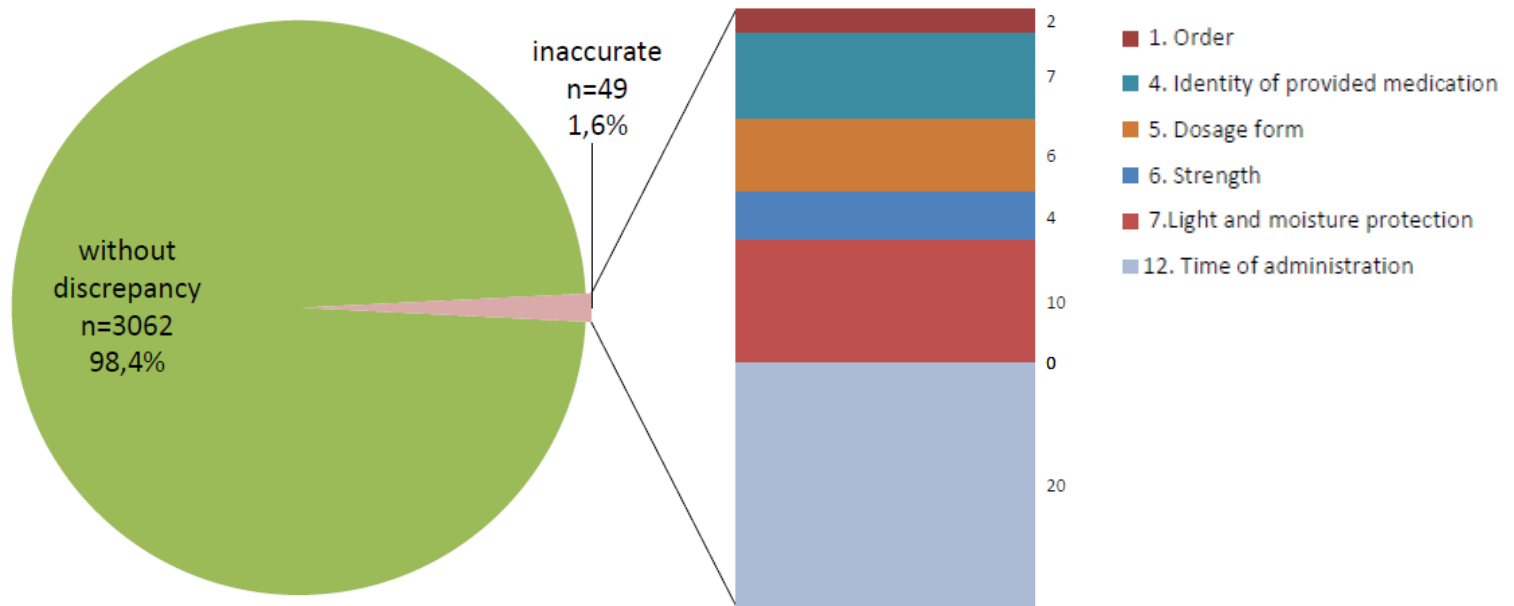according to Groth-Tonberge C, Häckh G, Strehl E, Hug M Krankenhauspharmazie 33:476-479 (2012)
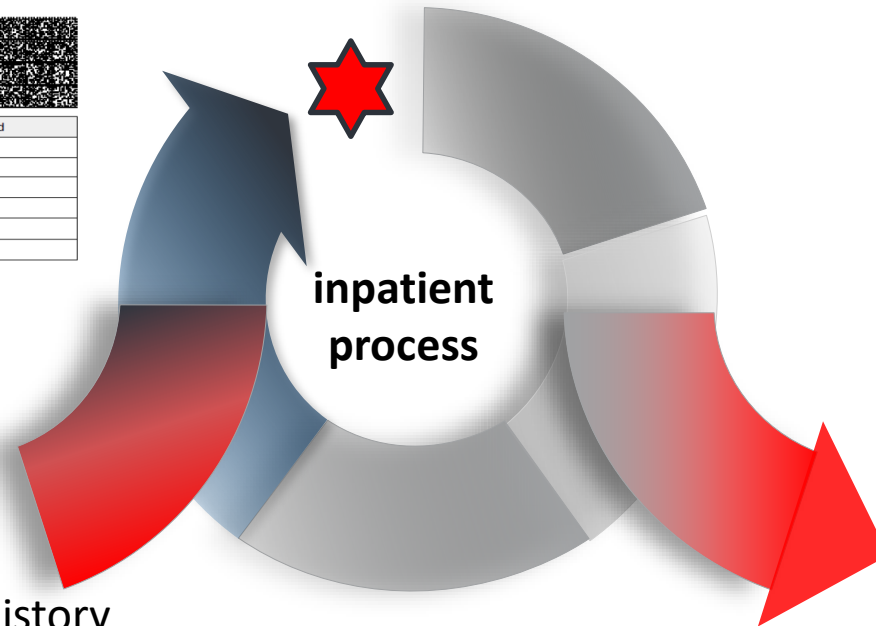
Increased medication safety

CPOE combined with unit-dose supply
University Medical Center Hamburg Eppendorf

inaccurate
n=49
1,6%

without
discrepancy
n=3062
98,4%

- 1. Order
- 4. Identity of provided medication
- 5. Dosage form
- 6. Strength
- 7.Light and moisture protection
- 12. Time of administration

2
7
6
4
10
0
20

Baehr M, van der Linde A, König R, Melzer S, Langebrake C, Groth-Tonberge C, Hug MJ. Kopplung von elektronischer Verordnung und patientenorientierter Logistik - Signifikante Verbesserung der Arzneimitteltherapiesicherheit. KHP 35:110-117 (2014)

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Easy management of admission and discharge interfaces

inpatient process

Discharge Management

- Doctor Letter
- Medical history
- Discharge recipe

Admission

- Medical history
- Automatic conversion to hospital formulary
- Admission medication order

Thank you for your attention

A subsidary of

Certified according to
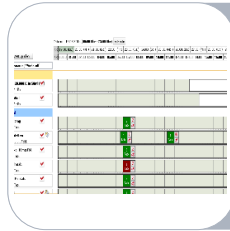DIN EN ISO 9001:2008

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Medication Process at UKE

registration of administration

CPOE at bedside via Soarian platform

The final link between medication and patient is fixed automatically by pouch production in the pharmacy

Administration

Pharmacy validation on the ward

Unit dose production by pharmacy