

Is there another way?

- The Newcastle Approach

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and Medicines Optimisation



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Pharmacy Transformation

Pharmacy Stock Control

EPMA

Since 2009

Ward based Automation (Medical Ward pilot)

Closed Loop

What is it and how do we deliver it?



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Post-Omniceil – Significant workflow change

- Morning **medication administration round changed**
- **2 nurses** administering medications now rather than 4
- Receipt / administration / weekly checks of **Controlled Drugs (CDs)** has changed
- **Ward top up/restock** completed by pharmacy staff
- **Ward stock stored in Omnicell cabinet**
- **Fingerprint** access
- Improved stock management has resulted in **reduction of waste and drug expenditure**
- Considerable **reduction in stock holding**
- Improved **visibility of borrowed medicines**

Medication Administration Round (Morning) - Excluding Controlled Drugs

Ward 30 Status	Pre-Omniceil	Post-Omniceil
No. of Nurses involved in administration	4	2
Total number of patients	30	30
Average time taken for medication administration round per nurse (hh:mm)	01:04	01:32
Average TOTAL time taken for medication administration round per ward (hh:mm)	04:16	03:04



Nursing time saved post-Omniceil:
1 hour 12 minutes per day
8 hours 24 minutes per week

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Controlled Drug Administration

Average time required for 2 nurses pre-Omniceil:

6 minutes 12 seconds per CD issue

7 hours 33 minutes per week*

Average time required for 2 nurses post-Omniceil (using an electronic register):

3 minutes 40 seconds per CD issue

4 hours 28 minutes per week*



Nursing time saved on ward Post-Omniceil:

3 hours 5 minutes per week

*Based on average 73 CD issues per week

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Putting away ward stock medicines

Pre-Omniceil:

- **2 deliveries per week** by nursing staff
- **38 minutes 57 seconds**
Average time taken per order



- **100% nursing time saved** as pharmacy staff now complete restock post-Omniceil



Nursing time returned to patient care:

1 hours 18 minutes per week

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Summary of nursing time savings (so far)

Process	Time Saving per week (hh:mm)
Morning Medication Administration Round (excluding Controlled drugs)	08:24
Controlled Drug Administration	03:05
Ward Stock Restock	01:18
Total Time Saving	12:47



Time saving so far:

12 hours 47 minutes per week

Time savings still to be calculated:

Lunchtime/Teatime/Night time medications administration rounds
Ward stock ordering
CD ordering and restocking

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Estimated Saving with Cerner Integration

- Utilising integration with Cerner ePMA would mean that medications were no longer required to be “queued” on RemoteRx and could be selected from a list of medications prescribed either at the Omnicell or on AnywhereRN.
- **This is estimated to reduce the time spent entering medication details by 50-70%**



Estimated time saving:

Potentially 2 hours per week

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However.....

- Significant error potential still exists
- Transcribing prescription information into automated ward drug cupboards
- Medicines Administration
 - No change/Additional concern?



Medication Errors Observed in 36 Health Care Facilities

Kenneth N. Barker, PhD; Elizabeth A. Flynn, PhD; Ginette A. Pepper, PhD; David W. Bates, MD, MS; Robert L. Miskal, PhD

Background: Medication errors are a national concern.

Objective: To identify the prevalence of medication errors (doses administered differently than ordered).

Design: A prospective cohort study.

Setting: Hospitals accredited by the Joint Commission on Accreditation of Healthcare Organizations, nonaccredited hospitals, and skilled nursing facilities in Georgia and Colorado.

Participants: A stratified random sample of 36 institutions. Twenty-six declined, with random replacement. Medication doses given (or omitted) during at least 1 medication pass during a 1- to 4-day period by nurses on high medication-volume nursing units. The target sample was 50 day-shift doses per nursing unit or until all doses for that medication pass were administered.

Methods: Medication errors were witnessed by observation, and verified by a research pharmacist (E.A.F.).

Clinical significance was judged by an expert panel of physicians.

Main Outcome Measure: Medication errors reaching patients.

Results: In the 36 institutions, 19% of the doses (605/3216) were in error. The most frequent errors by category were wrong time (43%), omission (30%), wrong dose (17%), and unauthorized drug (4%). Seven percent of the errors were judged potential adverse drug events. There was no significant difference between error rates in the 3 settings ($P=.82$) or by size ($P=.39$). Error rates were higher in Colorado than in Georgia ($P=.04$).

Conclusions: Medication errors were common (nearly 1 of every 5 doses in the typical hospital and skilled nursing facility). The percentage of errors rated potentially harmful was 7%, or more than 40 per day in a typical 300-patient facility. The problem of defective medication administration systems, although varied, is widespread.

Arch Intern Med. 2002;162:1897-1903

From the Center for Pharmacy Operations and Designs, School of Pharmacy, Auburn University, Auburn, Ala (Drs Barker and Flynn); the School of Nursing, University of Colorado Health Sciences Center, Denver (Dr Pepper); the Division of General Internal Medicine and Primary Care, Brigham and Women's Hospital, and the Center for Applied Medical Information Systems, Partners Healthcare and Harvard Medical School, Boston, Mass (Dr Bates); and DACE Co, West Monroe, La (Dr Miskal).

THE 1999 Institute of Medicine report¹ on the quality of care, entitled *To Err Is Human: Building a Safer Health System*, has drawn national attention to the occurrence, clinical consequences, and cost of adverse drug events (ADEs) in hospitals. The report calls for more systematic approaches to the prevention of injuries due to medical care. Many of these ADEs are viewed as originating from systems problems (ie, problems with the processes of the medication use system). We divide those processes into (1) prescribing and (2) delivery and administration. The focus of this article is on the latter.

Leape and associates² studied ADEs involving medications using methods that included solicited self-report and daily medical record review by clinical nurse re-

searchers. They found that 56% of the events they detected were due to prescribing errors and 44% involved administration. Obviously, drug therapy cannot be successful unless prescribing and delivery and administration are performed correctly.

A key variable in assessing the medication system in health care facilities is whether the patient receives the prescribed medication. A medication error was defined for this study as a discrepancy between the dose ordered and the dose received. This definition takes a systems view of medication error, because the focus is on the system outcome rather than on the actions of individual health care workers. Medication error is operationalized as an easily understood rate that is simply calculated: (doses in error/total doses given or omitted) \times 100. This measure of medi-

Effect of Bar-Code Technology on the Safety of Medication Administration

Eric G. Poon, M.D., M.P.H., Carol A. Keohane, B.S.N., R.N., Catherine S. Yoon, M.S., Matthew Ditmore, B.A., Anne Bane, R.N., M.S.N., Onat Levitzion-Korach, M.D., M.H.A., Thomas Moniz, Pharm.D., Jeffrey M. Rothschild, M.D., M.P.H., Allen B. Kachalia, M.D., J.D., Judy Hayes, R.N., M.S.N., William W. Churchill, M.S., R.Ph., Stuart Lipsitz, Sc.D., Anthony D. Whittlemore, M.D., David W. Bates, M.D., and Tejal K. Gandhi, M.D., M.P.H.

ABSTRACT

BACKGROUND

Serious medication errors are common in hospitals and often occur during order transcription or administration of medication. To help prevent such errors, technology has been developed to verify medications by incorporating bar-code verification technology within an electronic medication-administration system (bar-code eMAR).

METHODS

We conducted a before-and-after, quasi-experimental study in an academic medical center that was implementing the bar-code eMAR. We assessed rates of errors in order transcription and medication administration on units before and after implementation of the bar-code eMAR. Errors that involved early or late administration of medications were classified as timing errors and all others as nontiming errors. Two clinicians reviewed the errors to determine their potential to harm patients and classified those that could be harmful as potential adverse drug events.

RESULTS

We observed 14,041 medication administrations and reviewed 3082 order transcriptions. Observers noted 776 nontiming errors in medication administration on units that did not use the bar-code eMAR (an 11.5% error rate) versus 495 such errors on units that did use it (a 6.8% error rate) — a 41.4% relative reduction in errors ($P<0.001$). The rate of potential adverse drug events (other than those associated with timing errors) fell from 3.1% without the use of the bar-code eMAR to 1.6% with its use, representing a 50.8% relative reduction ($P<0.001$). The rate of timing errors in medication administration fell by 27.3% ($P<0.001$), but the rate of potential adverse drug events associated with timing errors did not change significantly. Transcription errors occurred at a rate of 6.1% on units that did not use the bar-code eMAR but were completely eliminated on units that did use it.

CONCLUSIONS

Use of the bar-code eMAR substantially reduced the rate of errors in order transcription and in medication administration as well as potential adverse drug events, although it did not eliminate such errors. Our data show that the bar-code eMAR is an important intervention to improve medication safety. (ClinicalTrials.gov number, NCT00243773.)

From Brigham and Women's Hospital (E.G.P., C.A.K., C.S.Y., M.D., A.B., O.L.K., T.M., J.M.R., A.K., J.H., W.W.C., S.L., A.D.W., D.W.B., T.K.G.); Harvard Medical School (E.G.P., J.M.R., A.S.K., A.D.W., D.W.B., T.K.G.); Partners Information Systems (E.G.P., D.W.B.); and Faulkner Hospital (J.H.) — all in Boston. Address reprint requests to Dr. Poon at the Division of General Medicine Primary Care, Brigham and Women's Hospital, 3/F, 162 Tremont St., Boston, MA 02120, or at epoon@partners.org.

N Engl J Med 2010;362:1698-707.
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The Challenge: Medication Errors

- Patient harm. (James 2013)(Kohn, Corrigan et al. 2000)
- Adverse Drug Events
 - Increased length of hospital stay, and healthcare costs, patient morbidity and mortality.
- Administration errors common
 - Administration error rate 10.5-19.7% (Berdot, Gillaizeau et al. 2013)
- Up to 1 in 5 administrations are wrong (Barker et al., 2002)



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The Solution: Healthcare IT

- Reductions in: medication errors, ADEs, Healthcare Costs
- Increased rates of adoption of Healthcare IT systems across U.K.
- Bar-code technology: Reduction in medication administration errors
 - Reduced non-IV Medication Administration Errors by 39% (7.0% pre-intervention to 4.3% post-intervention).(Franklin, O'Grady et al. 2007)
 - 41% reduction in non-timing administration errors and a 51% reduction in potential ADEs from these errors. Errors in the timing of medication administration fell by 27%.(Poon, Keohane et al. 2010)



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The System: MedEye

- A complete **'closed loop'** solution
- Helps nurses work **faster** and **safer** at the administration stage
- **Integrates** with existing hospital information systems
- **Notifies** the nurse if any incorrect doses are present



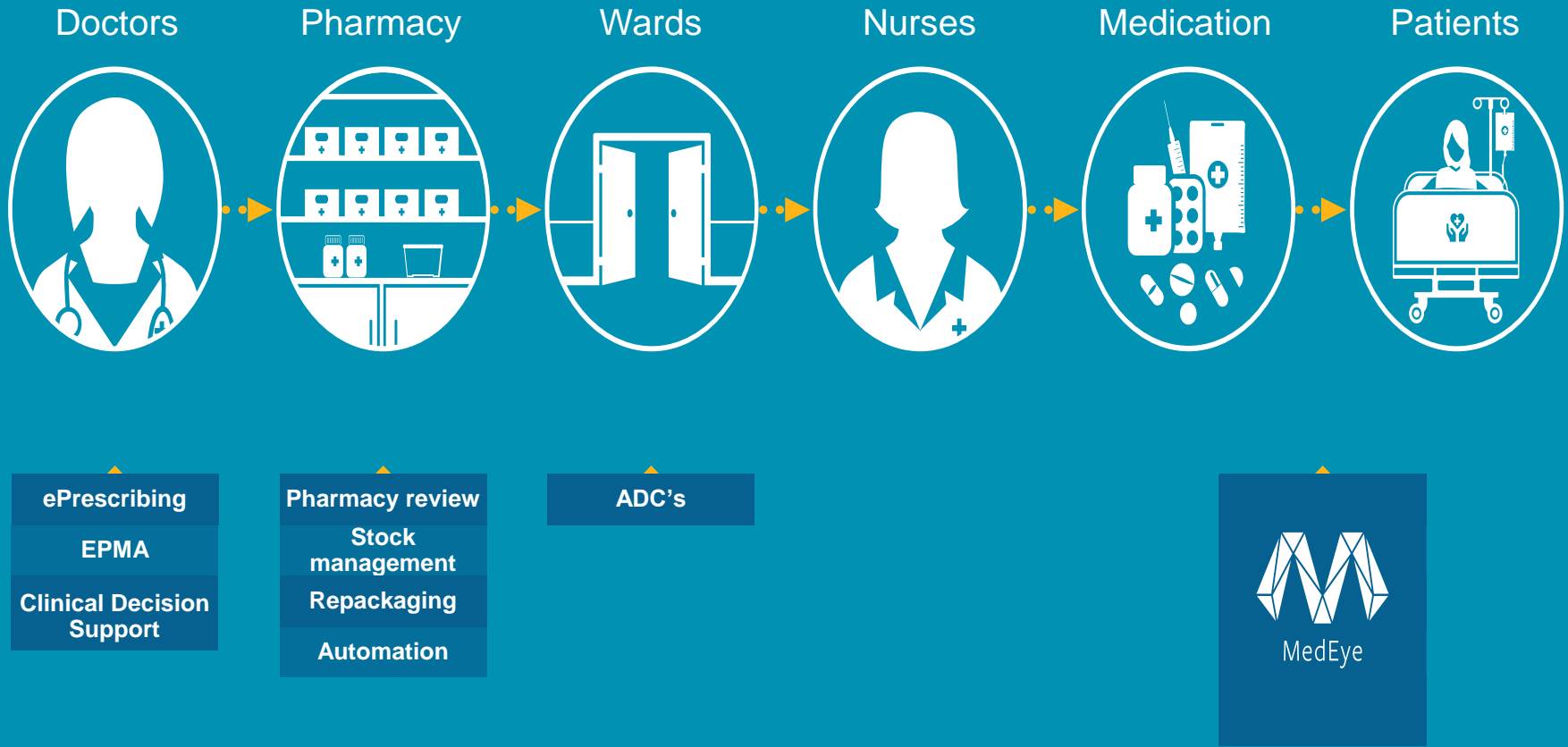
MedEye Scanner- tablets and oral solids



MedEye '2nd Eye' scanner- all medications (inhalers, barcoded ampoules)

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The medication process is complex



Automating checks at bedside



Faced with errors, professions respond with process and automation



Aviation



Surgery



Nursing



Faced with errors, professions respond with process and automation



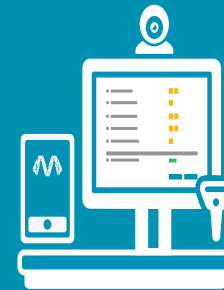
Aviation



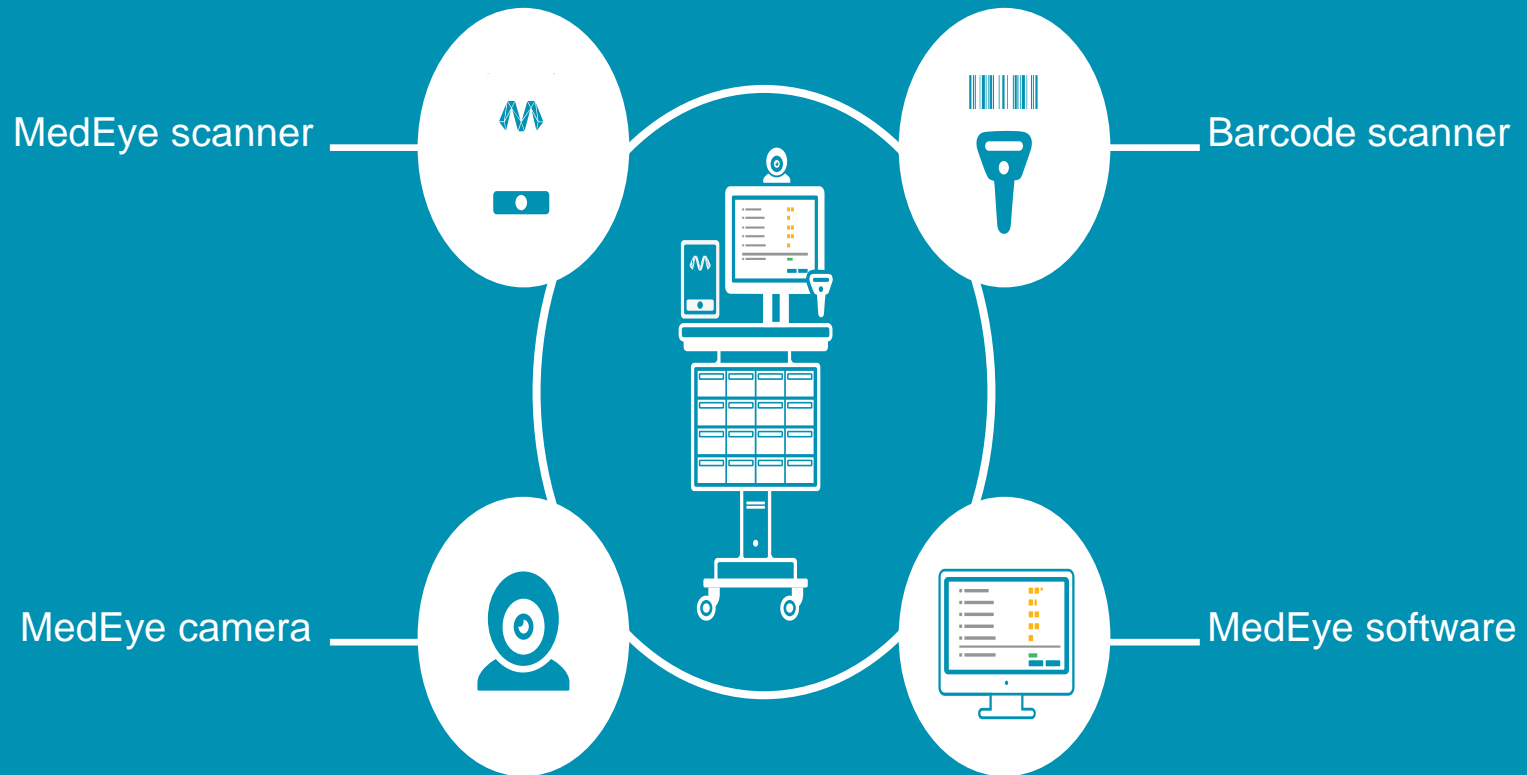
Surgery



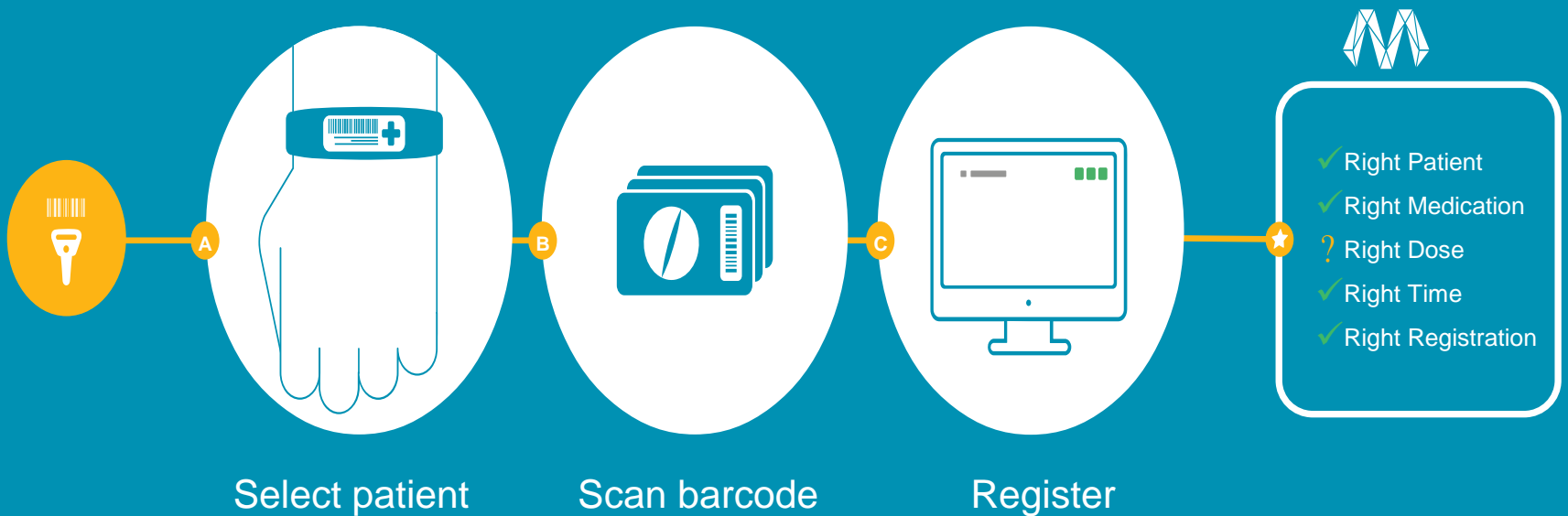
Nursing



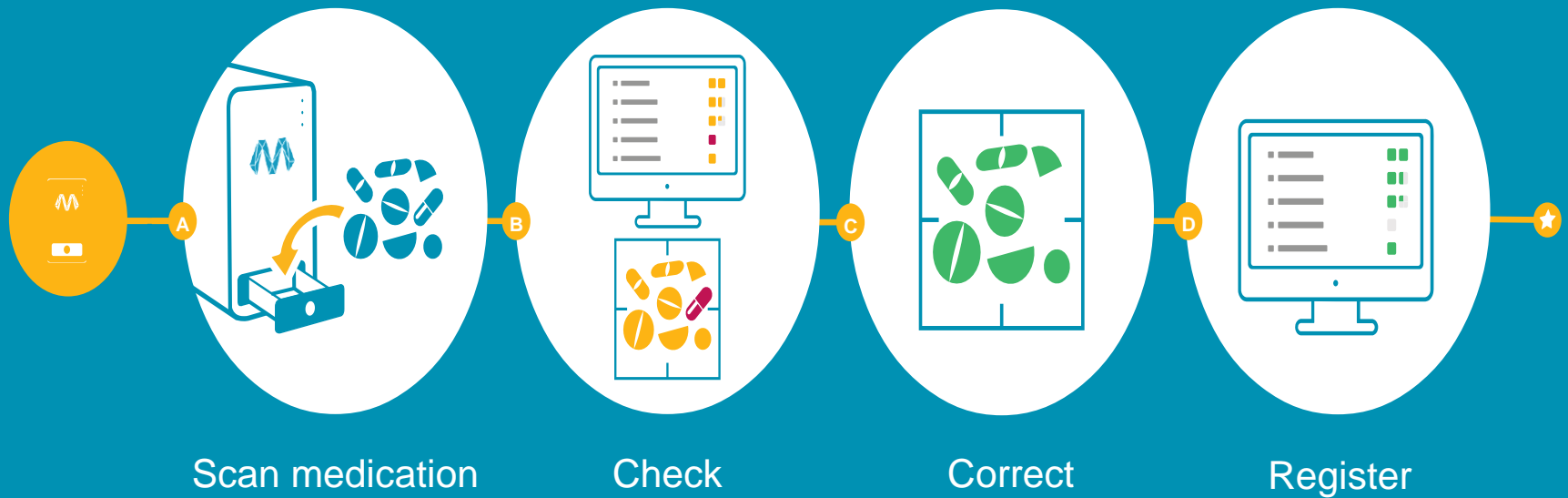
MedEye – versatile, efficient and safe



Barcode scanning



MedEye scan with correction



Link to ePrescribing



mint solutions

A QUETIAPINE CF TABLET 25MG
14:31



B SPIRONOLACTON TEVA TABLET 25MG
14:31



C FOLIUMZUUR PCH TABLET 0,5MG
14:31

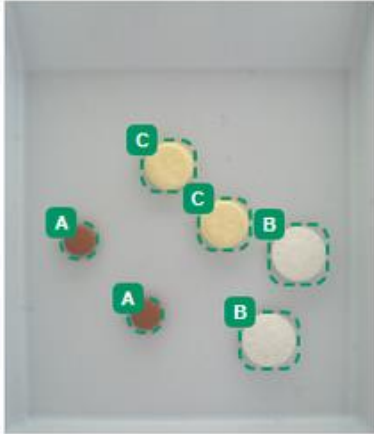


Show Overdue Show More

Register

Cancel

Scanned Medicines - Correct



A QUETIAPINE CF TABLET 25MG
14:31

B SPIRONOLACTON TEVA TABLET 25MG
14:31

C FOLIUMZUUR PCH TABLET 0,5MG
14:31

Show Overdue Show More

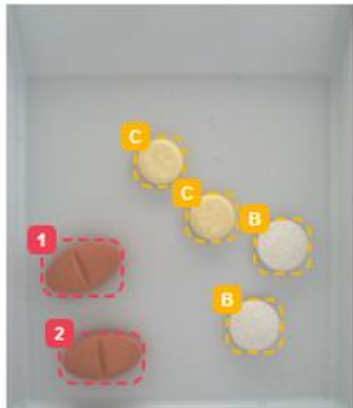


⚠ Drawer needs to open to register!

Register

Cancel

Scanned Medicines - Incorrect



- 1 Niet verwacht
- 2 Niet verwacht

A QUETIAPINE CF TABLET 25MG
14:35



B SPIRONOLACTON TEVA TABLET 25MG
14:35



C FOLIUMZUUR PCH TABLET 0,5MG
14:35



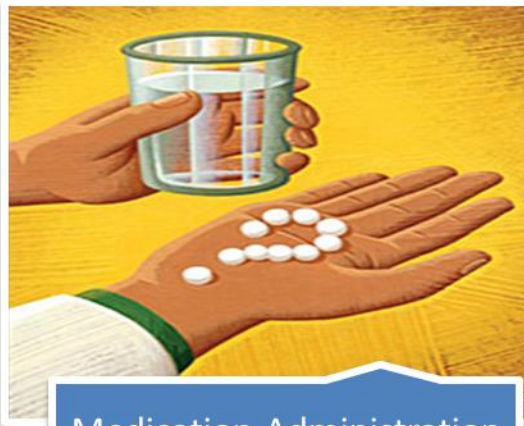
Show Overdue Show More

Register

Cancel

Proof of performance in a U.K. hospital

To evaluate the impact of MedEye on...



Medication Administration
Error Rates



Nursing satisfaction and
workflow



Costs



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Conclusions

- Not just about human checks or bar-code scanning
- System integration is a problem currently
- Pharmacy Verification of all medicines prior to administration!!??
- Important role for GDE Learning Network to lead necessary change



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MedEye is the complete solution



Scanner



Barcode service & integration



External camera & remote view

Pills & capsules



Unit dose



Bulk injections



Variable dosing



Changed prescription w/ multidose



Combi/Multidos
e



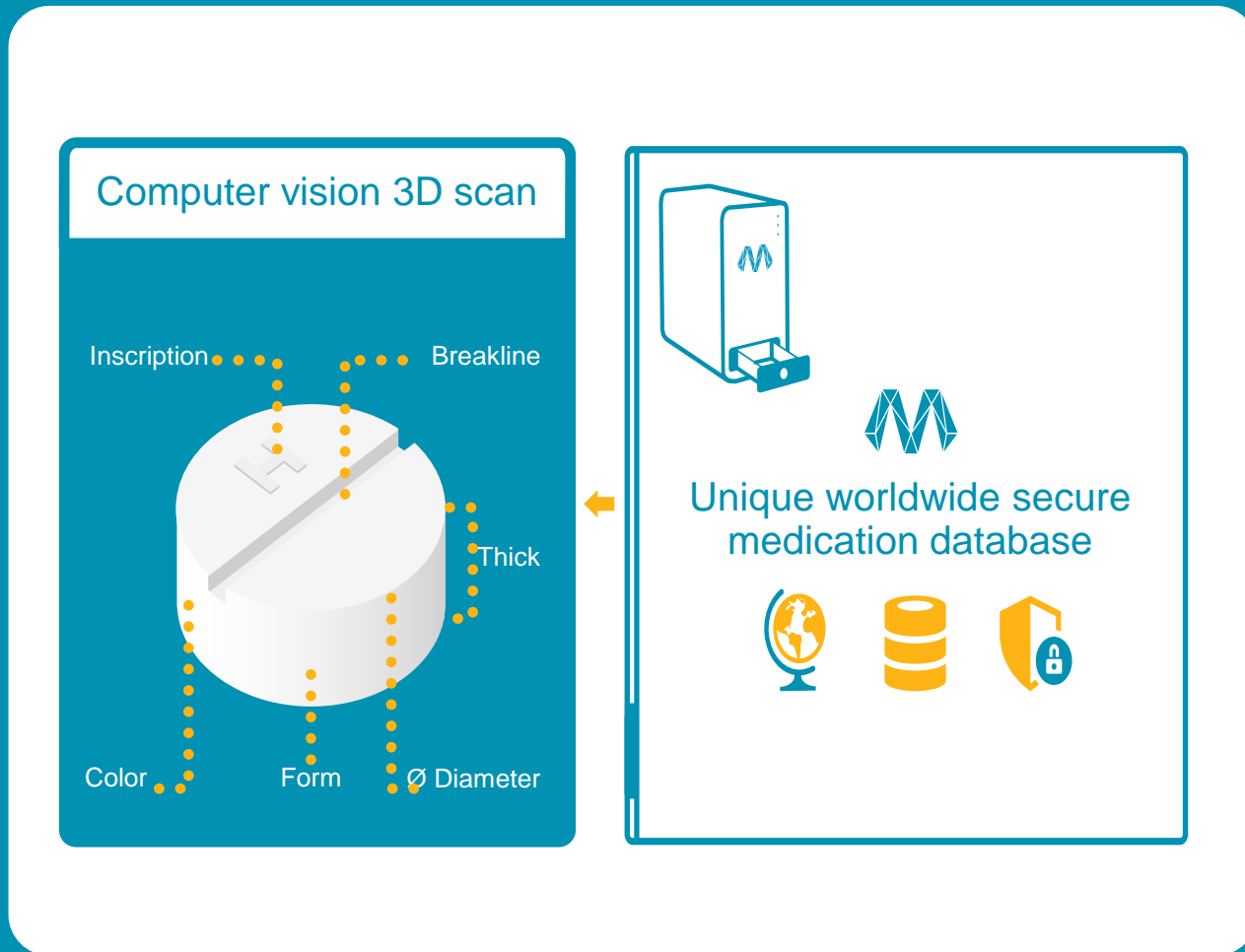
Preparations



Infusions and pumps



How does the MedEye scanner work?



How does the MedEye scanner work?

Dose check



Whole



Half



Quarter

Shape recognition



Round



Elliptical



Oblong



Triangular



Any shape...

Color recognition



Any color
&
combination

Diameter & thickness



Any size