Conflict of Interest Disclosures

The views and opinions expressed in this lecture are those of this speaker and do not reflect the official policy or position of any agency of the federal, state, or local government, or university.

Disclosure Statement

I have no conflict of interest to disclose.

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Overview

What is Computerized Clinical Decision Support?

Current State of Decision Support in NHs

Benefits and Challenges of Decision Support in Nursing Homes

Explore the Clinical Decision Support life cycle and its fit for your nursing home

Clinical Decision Support Systems (CDSSs)

Definition: provides individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance health and health care.

Types: Alerts/reminders; clinical guidelines; condition-specific order sets; focused patient data reports; documentation templates; diagnostic support, and contextually relevant reference information, etc.

https://www.healthit.gov/topic/safety/clinical-decision-support
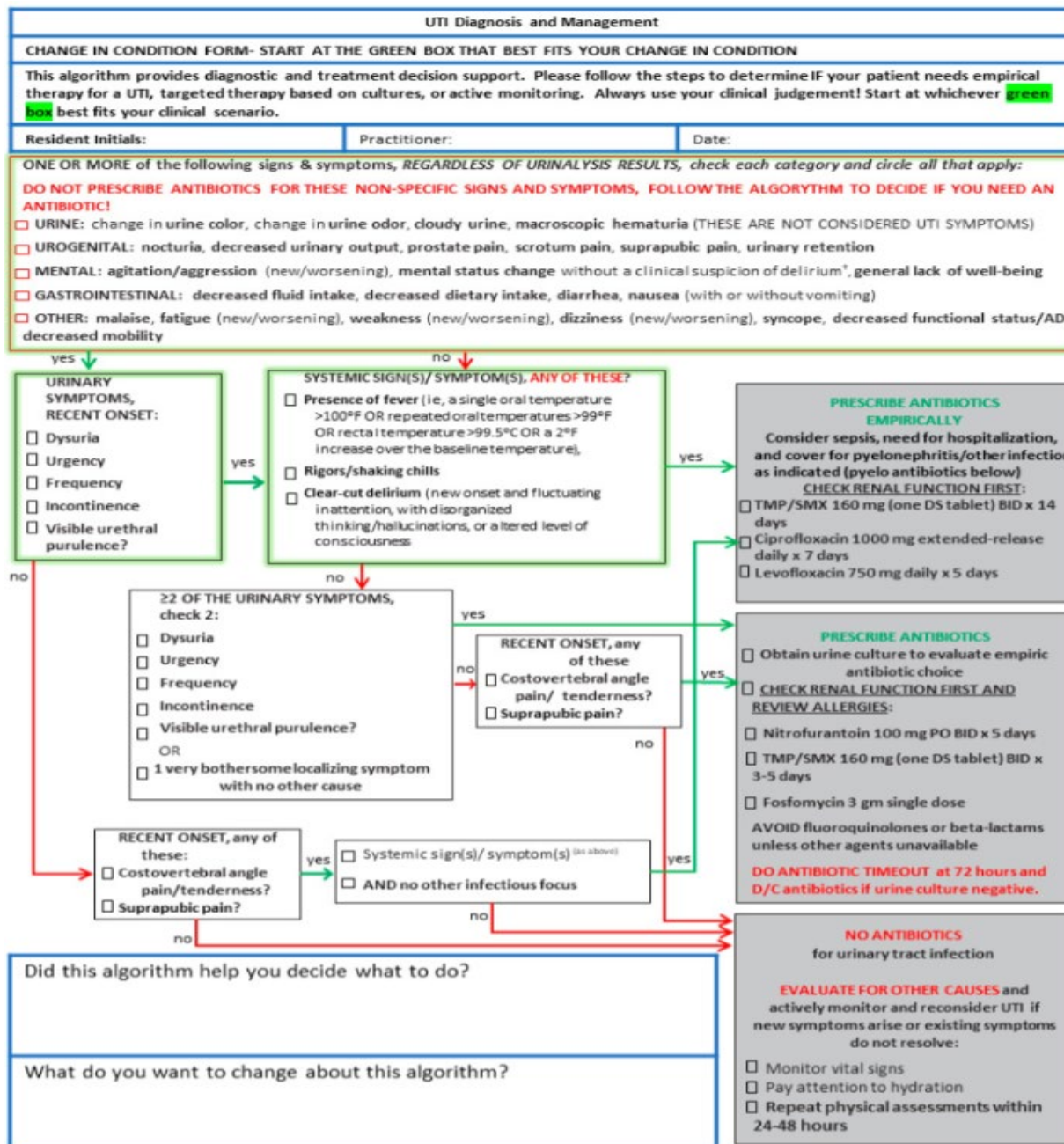
CDS and Health Information Technology

"**Health IT** is an umbrella term that "encompasses an array of technologies. Health IT is the use of computer hardware, software, or infrastructure to record, store, protect, and retrieve clinical, administrative, or financial information."

https://www.healthit.gov/topic/safety/clinical-decision-support

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Types of Computerized CDSs Used in Nursing Homes by Purpose

UTI Diagnosis and Management

CHANGE IN CONDITION FORM- START AT THE GREEN BOX THAT BEST FITS YOUR CHANGE IN CONDITION

This algorithm provides diagnostic and treatment decision support. Please follow the steps to determine IF your patient needs empirical therapy for a UTI, targeted therapy based on cultures, or active monitoring. Always use your clinical judgement! Start at whichever green box best fits your clinical scenario.

| Resident Initials: | Practitioner: | Date: |

ONE OR MORE of the following signs & symptoms, *REGARDLESS OF URINALYSIS RESULTS*, check each category and circle all that apply:

DO NOT PRESCRIBE ANTIBIOTICS FOR THESE NON-SPECIFIC SIGNS AND SYMPTOMS, FOLLOW THE ALGORYTHM TO DECIDE IF YOU NEED AN ANTIBIOTIC!

☐ URINE: change in urine color, change in urine odor, cloudy urine, macroscopic hematuria (THESE ARE NOT CONSIDERED UTI SYMPTOMS)

☐ UROGENITAL: nocturia, decreased urinary output, prostate pain, scrotum pain, suprapubic pain, urinary retention

☐ MENTAL: agitation/aggression (new/worsening), mental status change without a clinical suspicion of delirium', general lack of well-being

☐ GASTROINTESTINAL: decreased fluid intake, decreased dietary intake, diarrhea, nausea (with or without vomiting)

☐ OTHER: malaise, fatigue (new/worsening), weakness (new/worsening), dizziness (new/worsening), syncope, decreased functional status/ADL, decreased mobility

URINARY SYMPTOMS, RECENT ONSET:
☐ Dysuria
☐ Urgency
☐ Frequency
☐ Incontinence
☐ Visible urethral purulence?

SYSTEMIC SIGN(S)/ SYMPTOM(S), ANY OF THESE?
☐ Presence of fever (ie, a single oral temperature >100°F OR repeated oral temperatures >99°F OR rectal temperature >99.5°C OR a 2°F increase over the baseline temperature),
☐ Rigors/shaking chills
☐ Clear-cut delirium (new onset and fluctuating inattention, with disorganized thinking/hallucinations, or a altered level of consciousness

≥2 OF THE URINARY SYMPTOMS, check 2:
☐ Dysuria
☐ Urgency
☐ Frequency
☐ Incontinence
☐ Visible urethral purulence?
OR
☐ 1 very bothersome localizing symptom with no other cause

RECENT ONSET, any of these?
☐ Costovertebral angle pain/ tenderness?
☐ Suprapubic pain?

RECENT ONSET, any of these:
☐ Costovertebral angle pain/tenderness?
☐ Suprapubic pain?

☐ Systemic sign(s)/ symptom(s) (as above)
☐ AND no other infectious focus

PRESCRIBE ANTIBIOTICS EMPIRICALLY
Consider sepsis, need for hospitalization, and cover for pyelonephritis/other infection as indicated (pyelo antibiotics below)
CHECK RENAL FUNCTION FIRST:
☐ TMP/SMX 160 mg (one DS tablet) BID x 14 days
☐ Ciprofloxacin 1000 mg extended-release daily x 7 days
☐ Levofloxacin 750 mg daily x 5 days

PRESCRIBE ANTIBIOTICS
☐ Obtain urine culture to evaluate empiric antibiotic choice
☐ CHECK RENAL FUNCTION FIRST AND REVIEW ALLERGIES:
☐ Nitrofurantoin 100 mg PO BID x 5 days
☐ TMP/SMX 160 mg (one DS tablet) BID x 3-5 days
☐ Fosfomycin 3 gm single dose
AVOID fluoroquinolones or beta-lactams unless other agents unavailable
DO ANTIBIOTIC TIMEOUT at 72 hours and D/C antibiotics if urine culture negative.

NO ANTIBIOTICS
for urinary tract infection
EVALUATE FOR OTHER CAUSES and actively monitor and reconsider UTI if new symptoms arise or existing symptoms do not resolve:
☐ Monitor vital signs
☐ Pay attention to hydration
☐ Repeat physical assessments within 24-48 hours

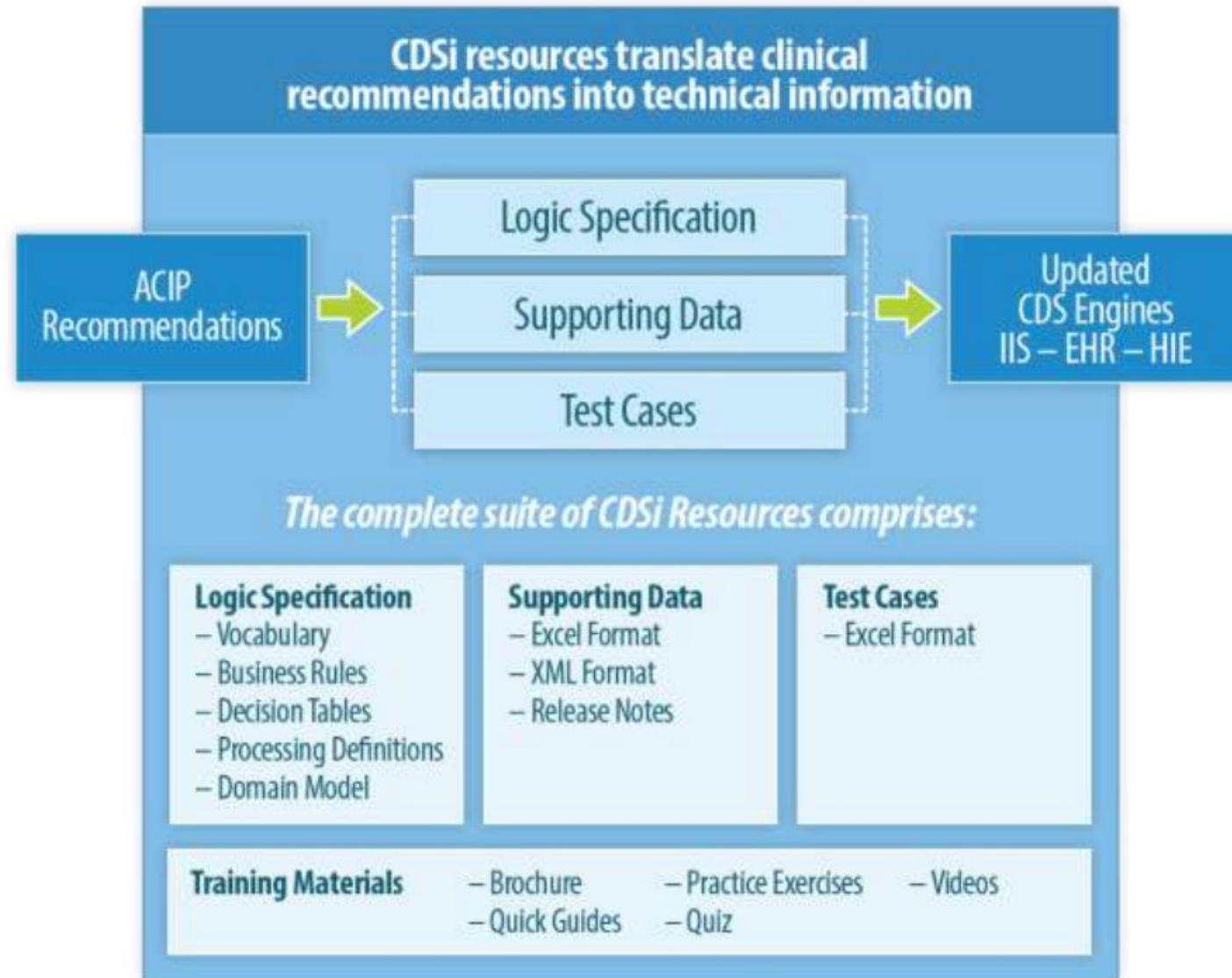Did this algorithm help you decide what to do?

What do you want to change about this algorithm?

Clinical guideline-based CDSs:

Help support evidence-based clinical decisions for UTIs, skin infections, etc.

New G et al Antibiotics 2022.

Types of Computerized CDSs Used in Nursing Homes by Purpose

Preventive care CDSs:

Ensures residents receive recommended preventive care services, such as immunizations.

CDSi resources translate clinical recommendations into technical information

ACIP Recommendations → Logic Specification / Supporting Data / Test Cases → Updated CDS Engines IIS – EHR – HIE

The complete suite of CDSi Resources comprises:

Logic Specification
– Vocabulary
– Business Rules
– Decision Tables
– Processing Definitions
– Domain Model

Supporting Data
– Excel Format
– XML Format
– Release Notes

Test Cases
– Excel Format

Training Materials – Brochure – Practice Exercises – Videos
– Quick Guides – Quiz

https://www.cdc.gov/vaccines/programs/iis/cdsi.html

Types of Computerized CDSs used in Health system by Purpose

Medication safety CDSs:

Prevent medication errors (with antibiotics) and identify potential drug interactions, allergies, etc.

Schaut M et al. Germs 2022 Jun.
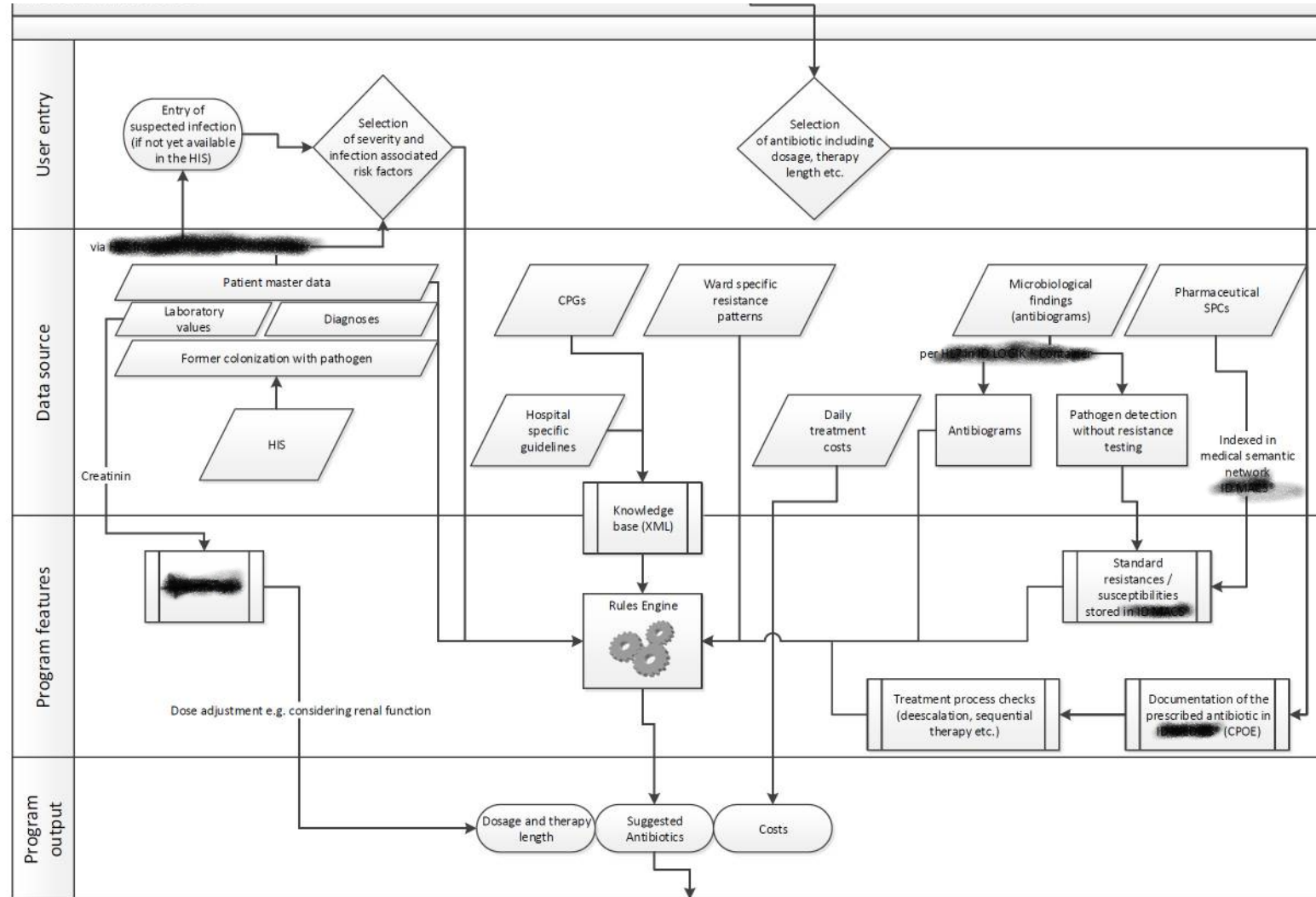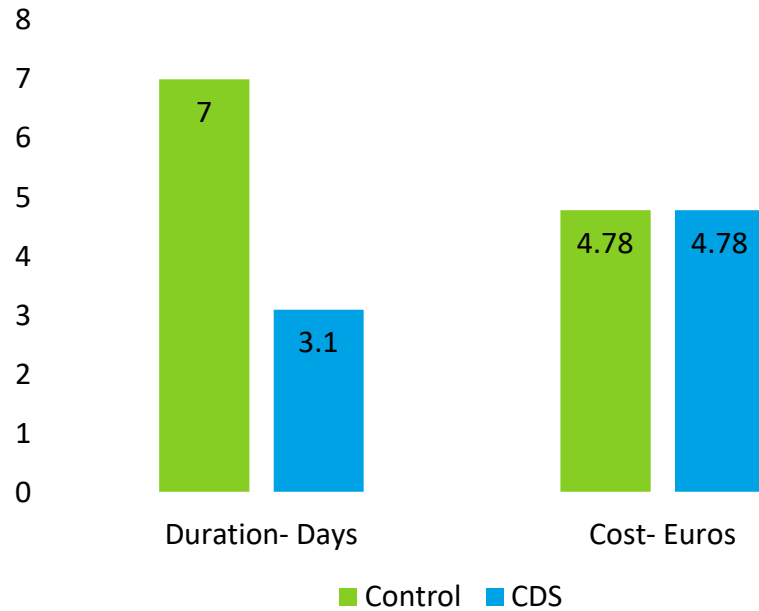
Case Study #1

Your nursing home wants to decrease antibiotic medication errors-you've had issues with incorrect times, doses, indications, etc.

Currently each unit nurse must review all meds for each new admission and monthly to verify and correct any errors because they lack indications, end dates, etc. with the help of the clinical pharmacist.

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Nurse-Administered Computer-Aided Drug Monitoring

Your nursing home sees benefits, have the time and take the time, curb administrative hassle, has collaboration at all levels, stated responsibility for the work, and requirements set from managerial positions, and is successful. Your prescribing errors fall.

Your colleague's nursing home does not and is unsuccessful.

Evidence for CDS to Improve Quality of Care in All Settings

When done well, CDSs improves the quality of care in various healthcare settings such as hospitals and primary care centers.

Factors associated with effectiveness of CDS (improved outcomes by >50%)

After removal of factors with no association (150 trials)	Odd Ratios	
Developed by authors	4.35 (1.66 to 11.44)	0.002
Advice presented in electronic charting or order entry	0.37 (0.17 to 0.80)	0.01
Provides advice for patients	2.77 (1.07 to 7.17)	0.03
Requires reason for over-ride	11.23 (1.98 to 63.72)	<0.001

Associated with failure — Associated with success

Roshanov PS et al BMJ Feb 2013
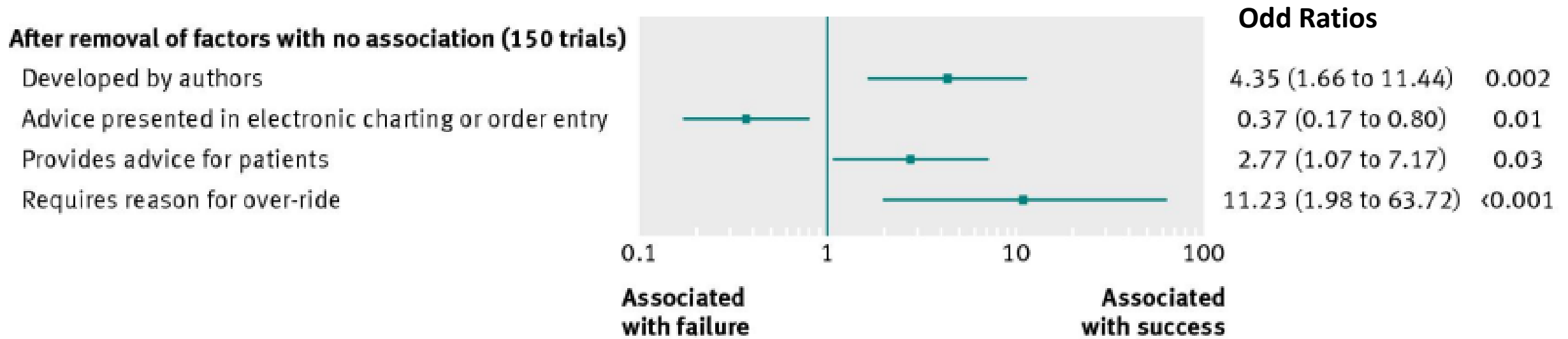
Current State of Connectivity in Nursing Homes

Nursing homes need connectivity, and it must be fast, reliable, and secure.

Enyioha C et al JAMDA 2021

Fisher exact test
EHR by region: *P* = .029; Wi-Fi by region: *P* = .024
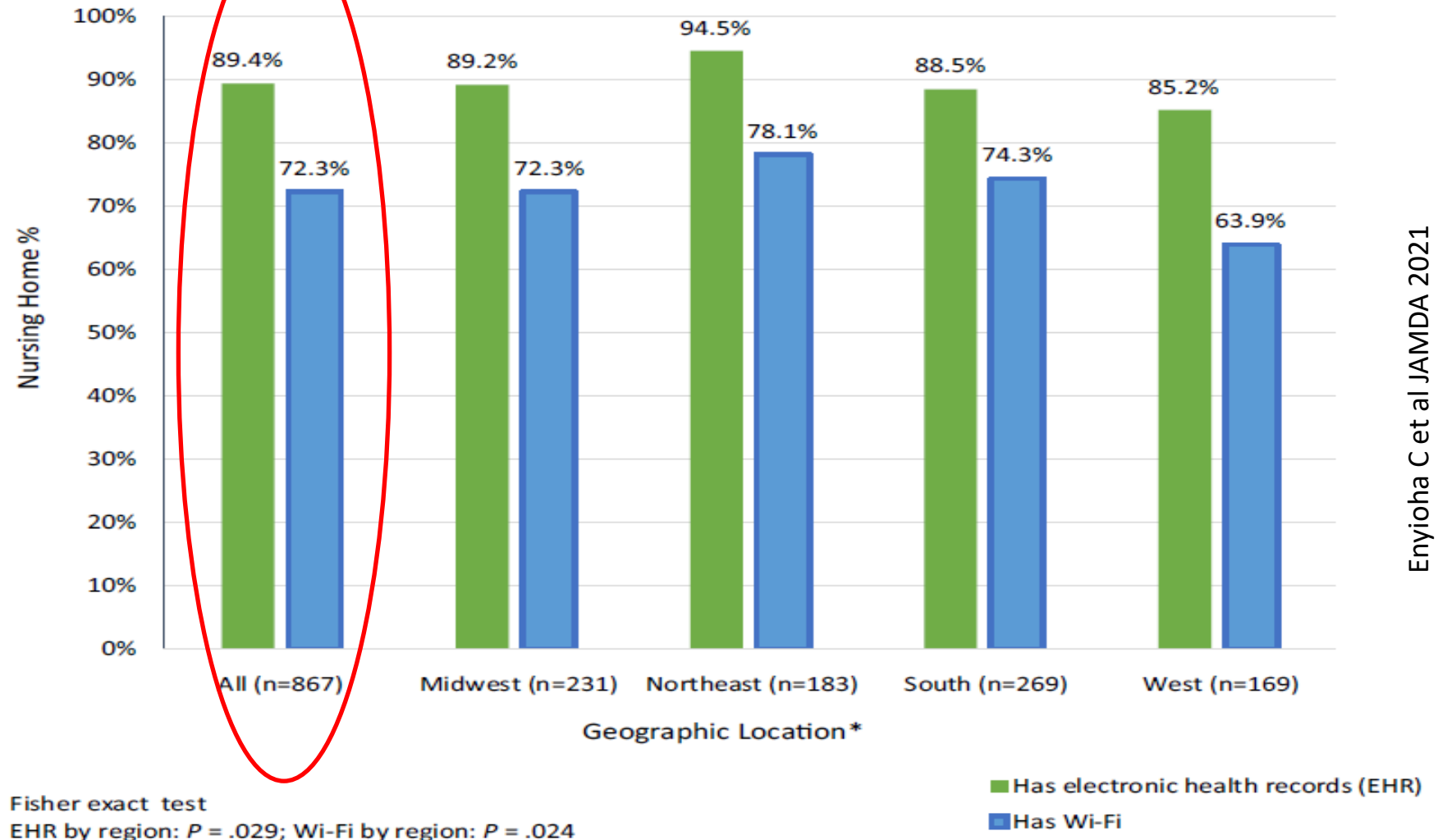
Current State of Clinical Decision Support Systems (CDSS) in Nursing Homes

- No systematic process for Health IT implementation
- Lack necessary technology support and infrastructure
- Underinvest in staff training

Current state has limited potential to realize Health IT-related gains in productivity and quality of care.

Ko M et al J Health Care Org Prov Financ 2018.

Success of CDS in Nursing Homes

The use of CDSSs in nursing homes is gradually increasing, with a growing number of studies focusing on their adoption and impact

A scoping review identified 24 studies on the use of CDSSs in nursing homes, only 6 RCTs.

- Found 4 major categories of CDS
- Few reported on clinical outcomes
- Most reported process measures or other outcomes like ease of training or CDS use

Studies reporting on clinical outcomes by CDS type

Pressure Ulcer: Effective 2, No effect 1, Unknown 4
Med Prescribing: Effective 0, No effect 2, Unknown 6
Med Review: Effective 0, Unknown 6
Disease Management: Effective 1, No effect 0, Unknown 2

Legend: Effective (green), No effect (blue), Unknown (yellow)

Abdellatif et al JAMDA 2021.

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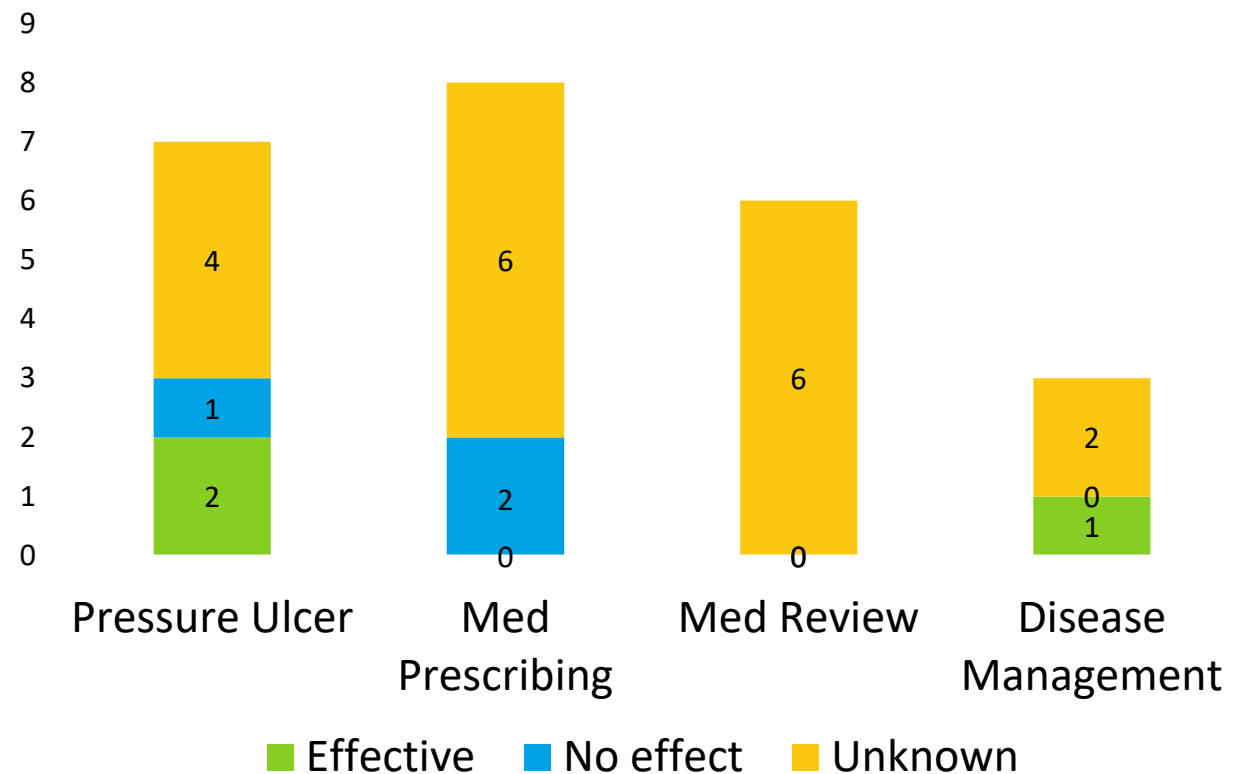
Success of CDS in Nursing Homes

CDS improved process measures and other outcomes

▶ **Care delivery improvements**

▶**Improvement of drug order quality**

▶**Better compliance with guidelines (for pressure ulcer prevention)**

▶**Enhanced documentation of care records**

Abdellatif et al JAMDA 2021.

Challenges for Consideration:
Implementation and integration with existing systems and workflows
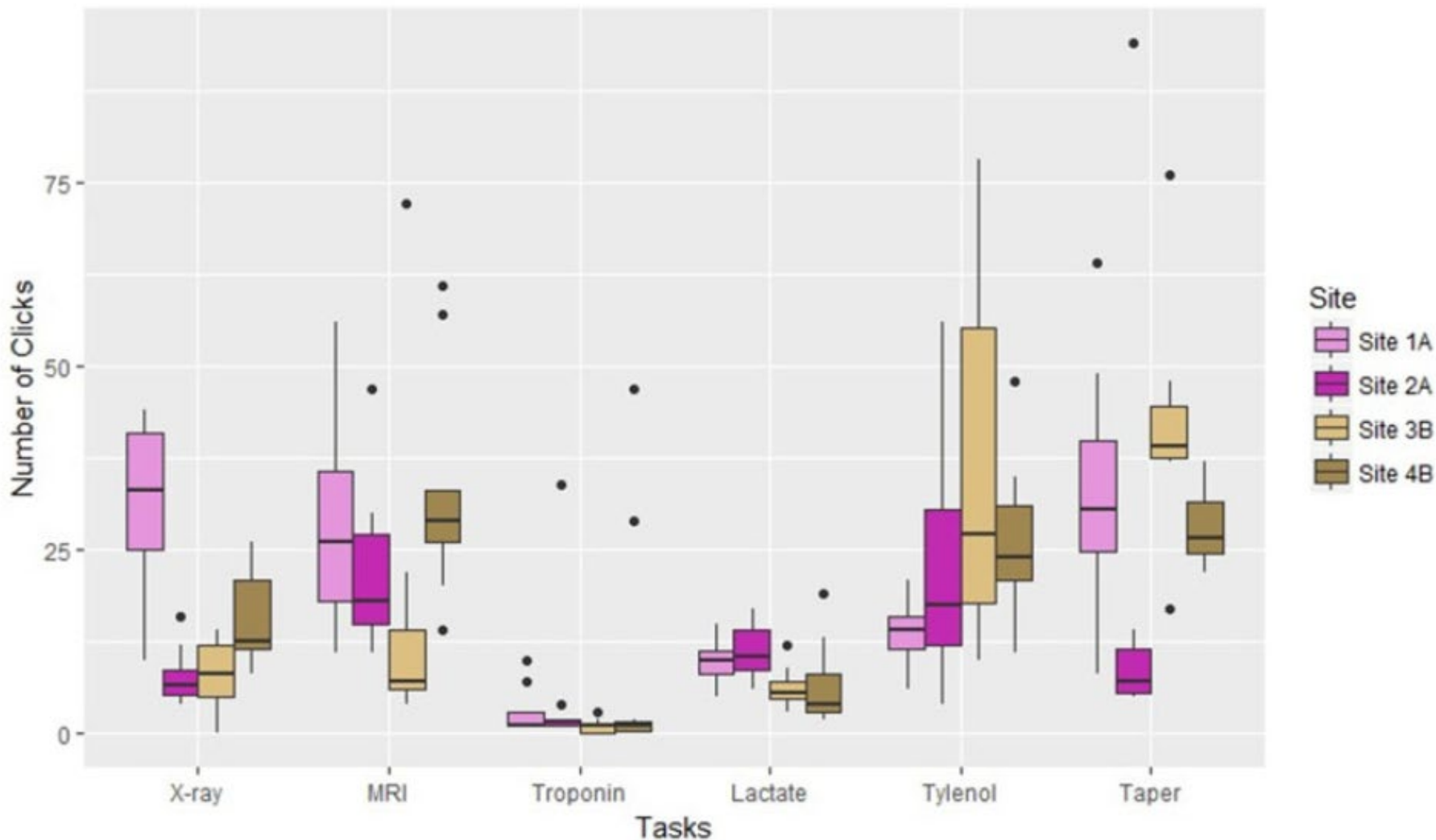
Evaluation of 2 EHR Vendors across 4 health systems (2 EPIC and 2 Cerner)

Ratwani et al. JAMIA July 2018.

Multilevel Workflow in NHs

Individual

Work group/unit

Organization

Industry levels
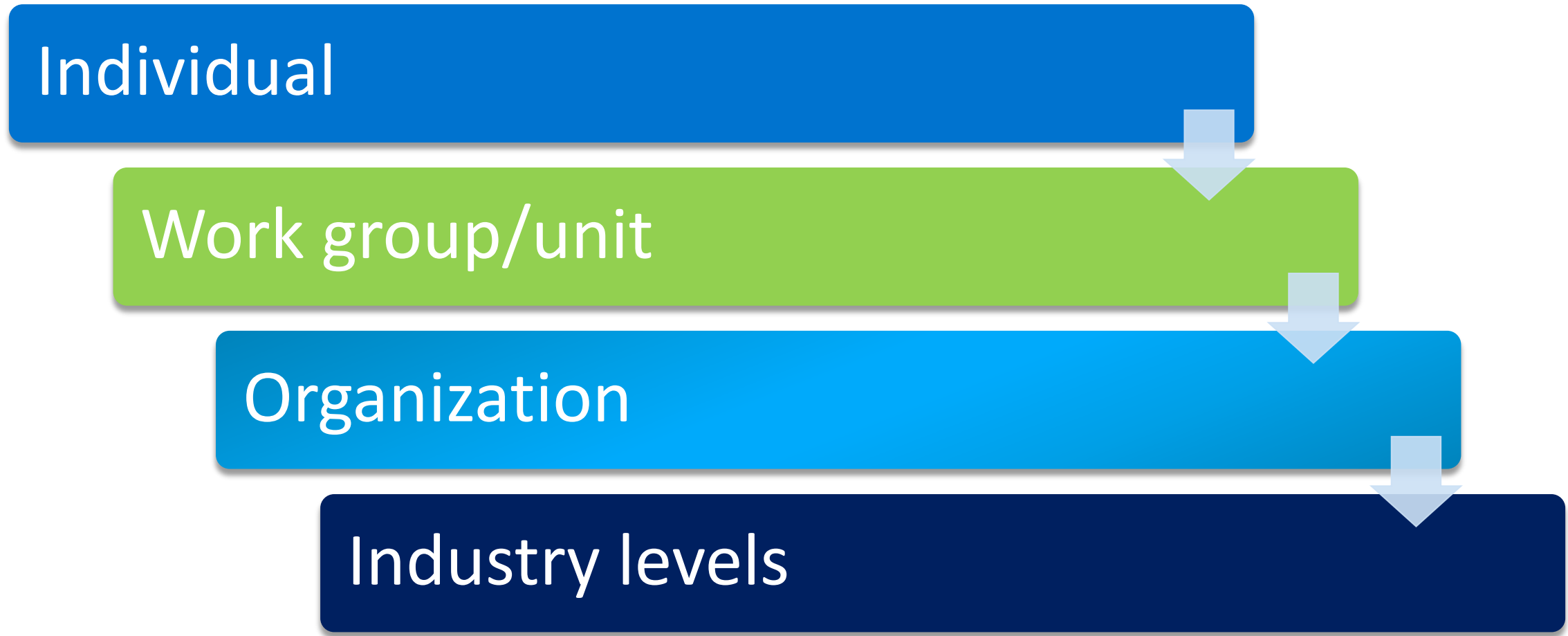
Special Considerations in Context of Multilevel Workflow

Importance of ongoing relationships of staff members with the residents to care delivery in NHs

Resident-centeredness of care, absence of memory aids

Impact of staff members' preferences on work activities.

Ozkaynak M et al Appl Clin Inform. 20202 Aug.

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Tips for Successful Use of a CDS:
Implementation and integration with existing systems and workflows

Prototype evaluation using "real world" scenarios helps maximize use through user-centered design.

Beerlage-De Jong N et al Am J Infect Contr 2017.
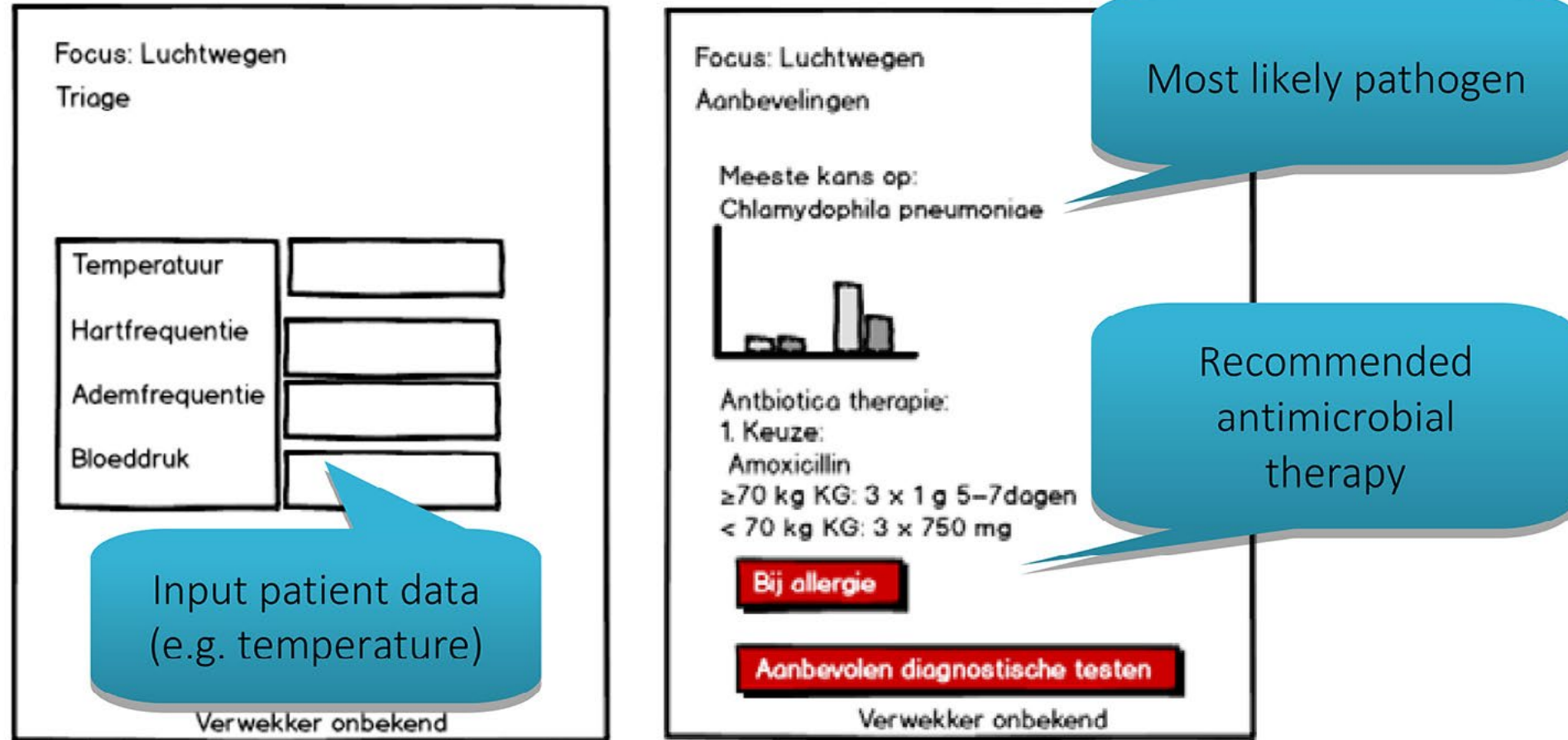
Clinical Decision Support in Nursing Homes: Case Study #2

Rural nursing home with a high population of residents with multiple chronic conditions and complex medication regimens. You want to implement a rule-based CDSS integrated with their EHR system.

Goal: to reduce the number of urinary cultures and improve antibiotic prescribing

Case Study #2

Intervention sites received on-site staff education, physician academic detailing, and integrated clinical tools

Antibiotic Prescriptions and Urine Cultures/1000 Resident Days

Legend:
- Prescriptions/1000 RD (Control)
- Prescriptions/1000 RD (Intervention)
- Urine Cultures/1000 RD (Control)
- Urine Cultures/1000 RD (Intervention)

Pasay DK et al IC & HE 2019.
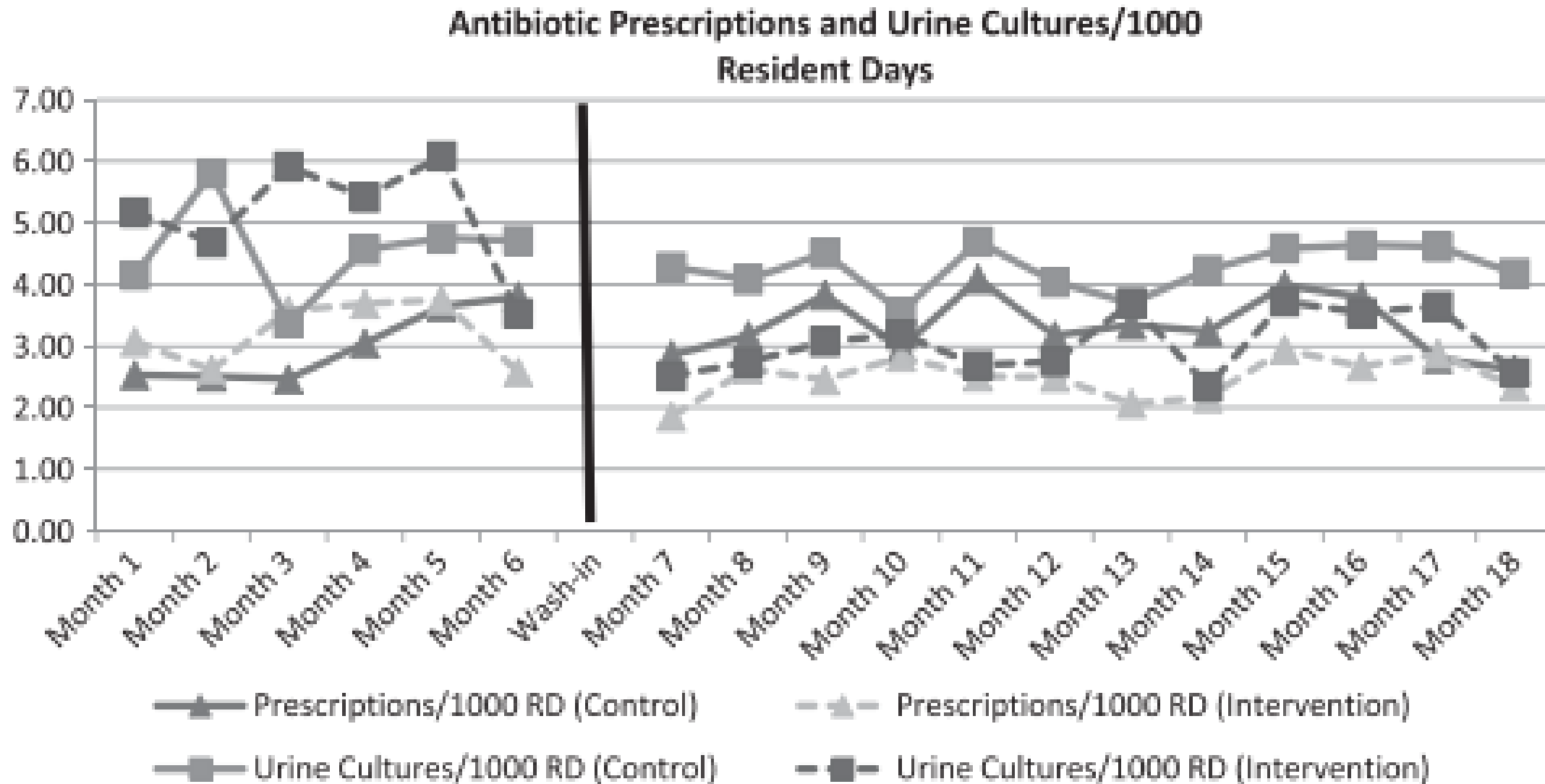
How to plan for CDS in your Nursing Home

Best practices for planning a CDS in a nursing home:

- **Get leadership buy-in**
- **Consider a pilot project**
- **Secure funding for implementation and maintenance**
- **Assess the needs of your facility**
- **Select a CDS that meets your needs and is flexible and customizable**

Lapp L et al J Med Internet Res 2022 Sep.

How to plan for CDS in your Nursing Home: Best Practices

Assess facility needs

Get Leadership Buy-in

Consider a Pilot Project
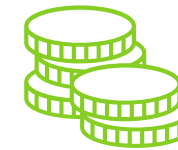
Secure funding for implementation

Flexible & customizable CMS that meets needs

Lapp L et al J Med Internet Res 2022 Sep.

Tips for Successful Implementation of a CDSS in a Nursing Home

▶ Provide adequate training for all staff

▶ Involve all stakeholders early and often and communicate regularly

▶ Provide adequate staff training, support, and time

▶ Develop a clear implementation plan to minimize workflow disruption

▶ Communicate regularly with staff throughout the implementation process

▶ Monitor the system's performance and make adjustments as needed

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Implementation of a Pharmacist-led CDS in Nursing Homes

The intervention group had a 92% lower incidence of alert-specific ADEs than usual care

Kane-Gill et al. JAGS 2020 November 2020
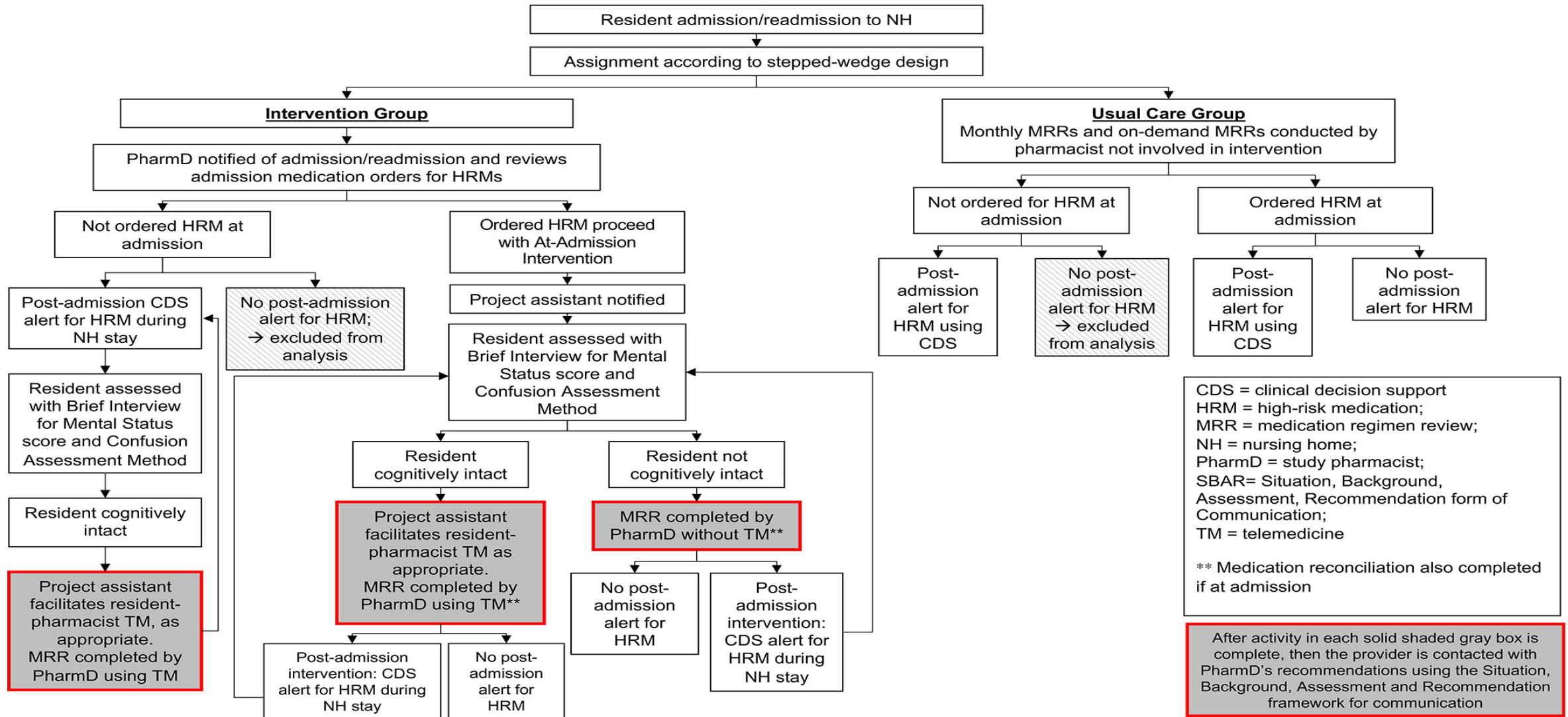
CDSS Maintenance and Continuous Quality Improvement

Maintenance and improvement phase is important for keeping the CDS up-to-date and effective
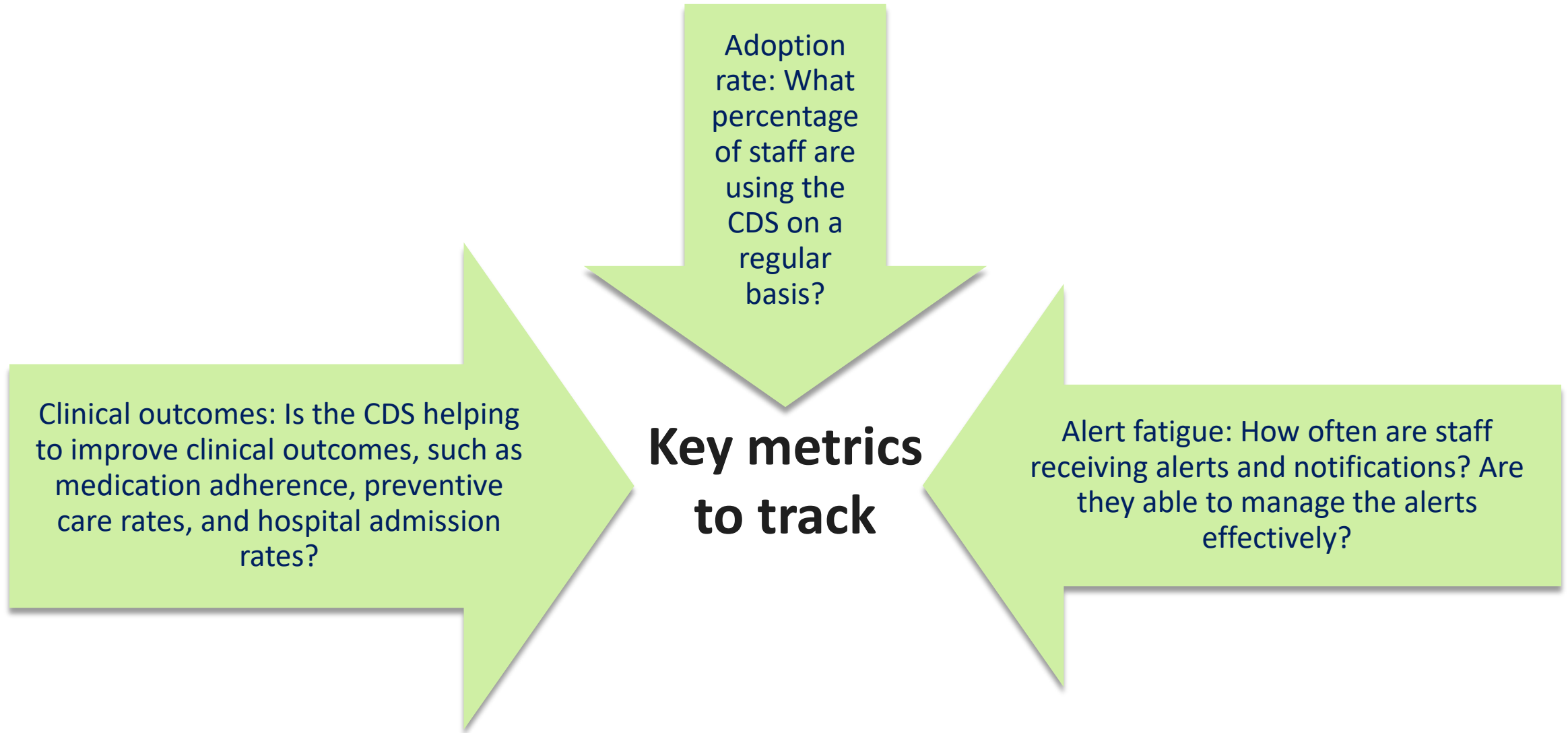
- **Ongoing leadership support**

- **Communicate with staff regularly about the CDSS and its benefits.**

- **Provide ongoing training and support to staff on how to use the CDSS effectively.**

Monitoring and Evaluation of CDS

Adoption rate: What percentage of staff are using the CDS on a regular basis?

Clinical outcomes: Is the CDS helping to improve clinical outcomes, such as medication adherence, preventive care rates, and hospital admission rates?

Key metrics to track

Alert fatigue: How often are staff receiving alerts and notifications? Are they able to manage the alerts effectively?

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The Future of CDSs in Nursing Homes

▶ CDSs are becoming increasingly sophisticated and integrated with other healthcare information technology systems.

▶ In the future, CDSs are expected to play an even greater role in improving the quality and efficiency of care in nursing homes.

The Future of CDSs in Nursing Homes

CDSs are becoming increasingly sophisticated and integrated with other healthcare information technology systems.

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Thank you   Questions?   Saif@unc.edu

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