

# Computerized Clinical Decision Support in Nursing Homes

(with a focus on Antibiotic Stewardship)

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# Disclosures of Land Use



The University of North Carolina at Chapel Hill sits on the ancestral lands of the Shakori, Tuscarora, Eno, and Lumbee tribes. The University of Pittsburgh sits on the ancestral lands of the Shawandasse Tule (Shawanwaki/Shawnee) and Monongahala cultural tribes.



The University of North Carolina was built and maintained by enslaved people and the “Unsung Founders” memorial honors their contribution. Eight of the 21 original founders of the University of Pittsburgh owned slaves and streets and buildings which still bear their names.



- <https://native-land.ca/>
- <https://www.lumbee-tribe.com/>
- <https://shawnee-nsn.gov/>
- <https://exhibits.lib.unc.edu/exhibits/show/slavery/introduction>
- [https://en.wikipedia.org/wiki/Unsung\\_Founders\\_Memorial](https://en.wikipedia.org/wiki/Unsung_Founders_Memorial)
- <https://pittsburghquarterly.com/articles/slavery-s-shadow/>

# 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

Christine E. Kistler, MD, MASc – I had the following relationship and it has been mitigated - Consultant/Advisor- Base 10, Inc

# 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.”

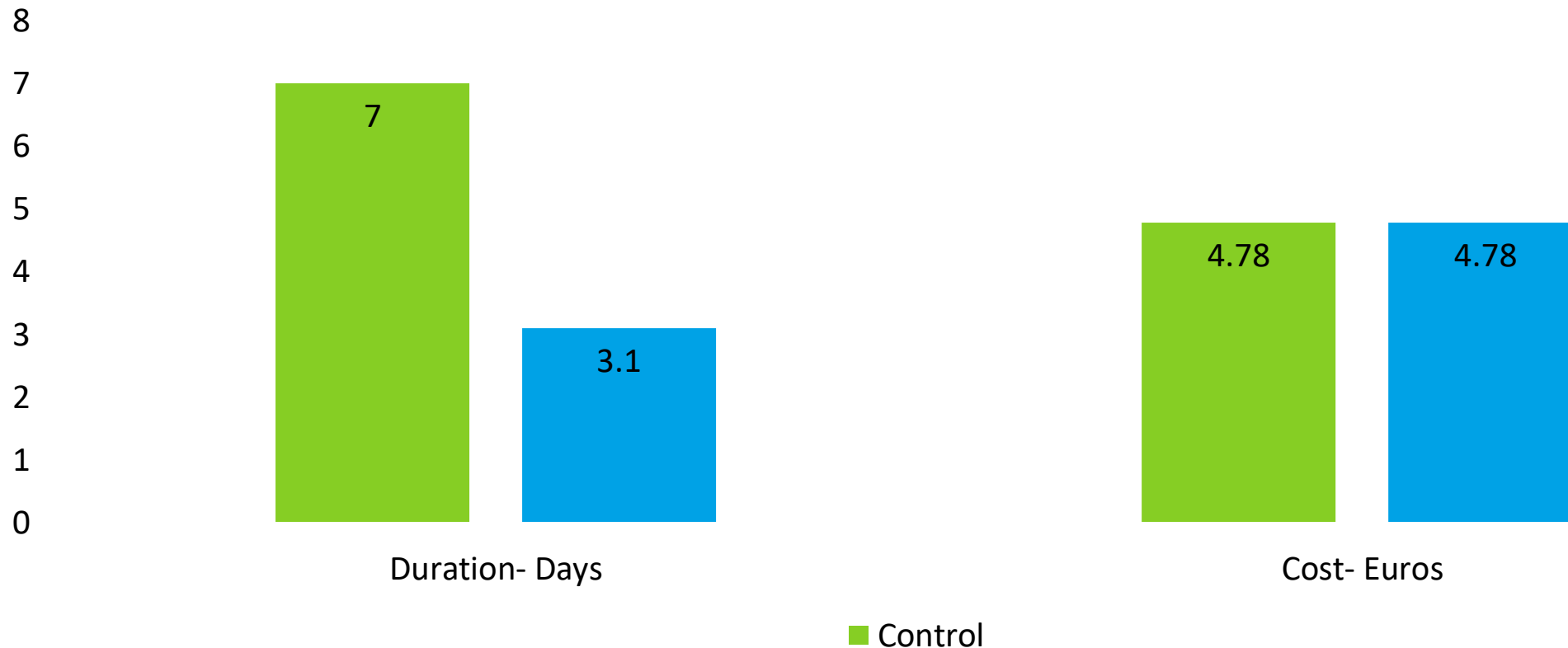
<https://www.healthit.gov/topic/safety/clinical-decision-support>

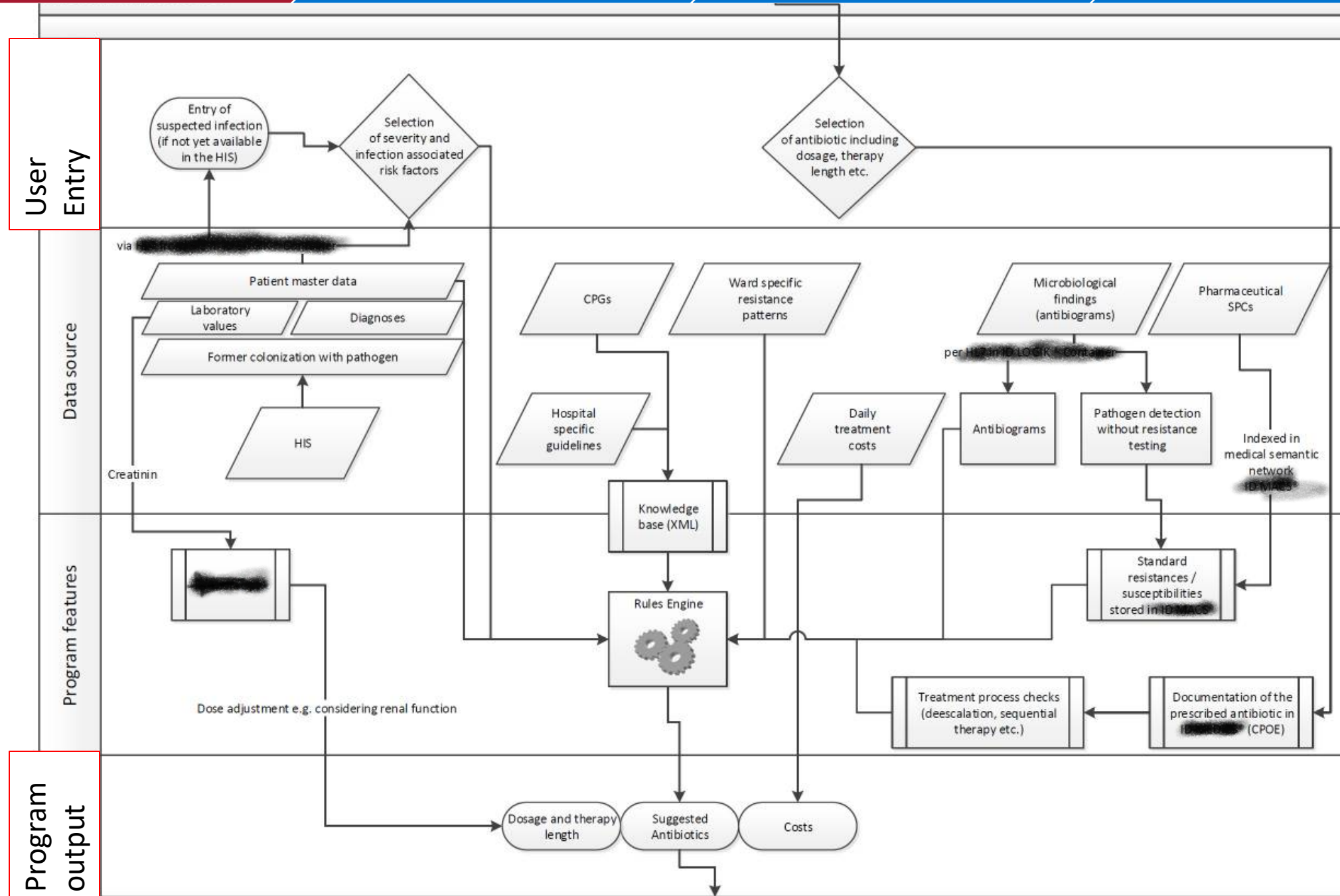


IMAGE: <https://www.healthit.gov/topic/clinical-quality-and-safety/implementation-and-monitor-improvements>

# Types of Computerized CDSs used in Nursing Homes by Purpose

Medication safety CDSs: prevent medication errors (with antibiotics) and identify potential drug interactions, allergies, etc.



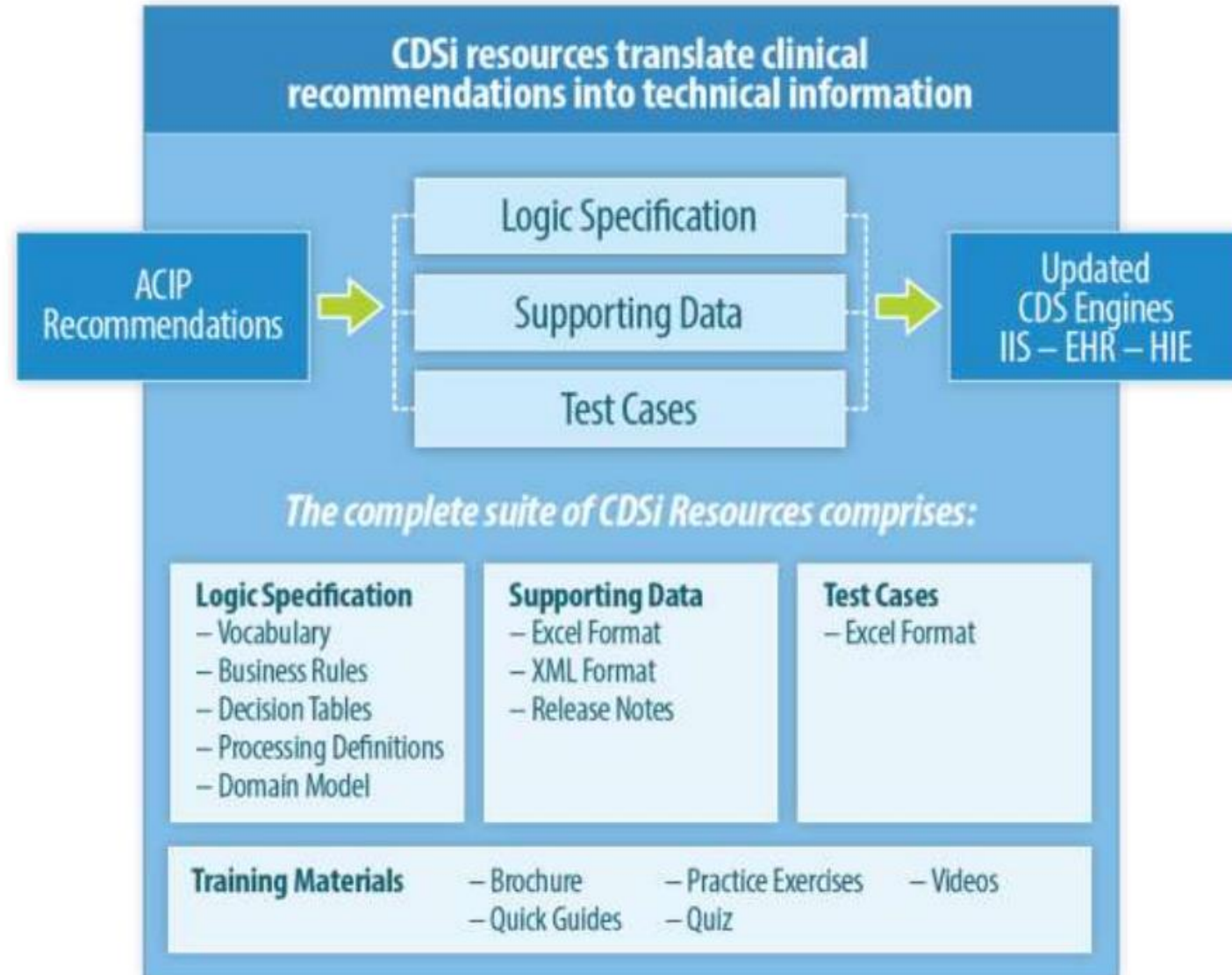


Schaut M et al. Germs 2022 Jun.



# Types of Computerized CDSs Used in Nursing Homes by Purpose

Preventive care CDSs: ensures residents receive recommended preventive care services, such as immunizations.



# Types of Computerized CDSs Used in Nursing Homes by Purpose

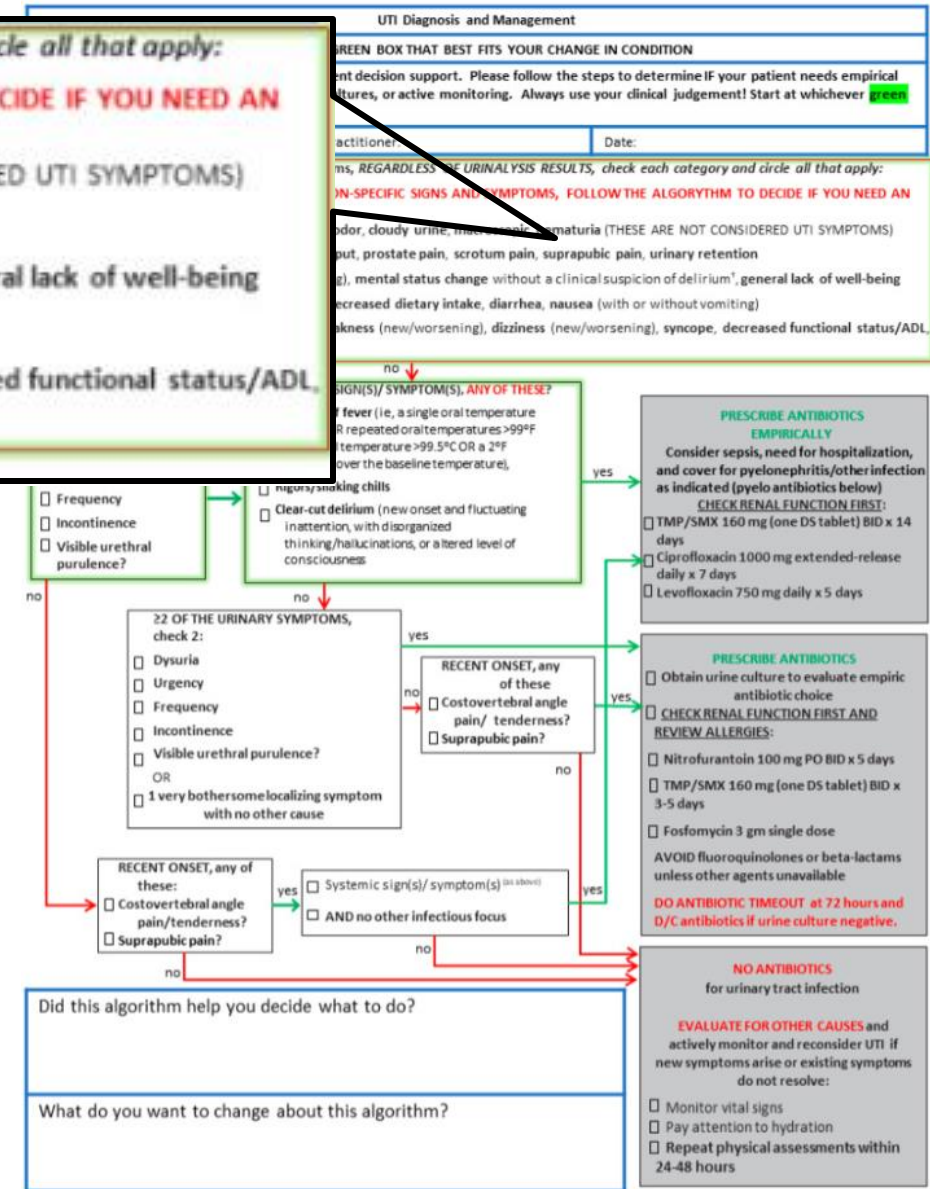
ONE OR MORE of the following signs & symptoms, **REGARDLESS OF URINALYSIS RESULTS**, check each category and circle all that apply:

**DO NOT PRESCRIBE ANTIBIOTICS FOR THESE NON-SPECIFIC SIGNS AND SYMPTOMS, FOLLOW THE ALGORITHM 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

YES ↓      NO ↓

Clinical guideline-based CDSs: help support evidence-based clinical decisions for UTIs, skin infections, etc.



# 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 has to 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.

# Nurse-Administered Computer-Aided Drug Monitoring



Your nursing home sees benefits, discovers that if they have the time for the CDS, it reduces workload, curbs administrative hassle, and helps collaboration at all levels. Everyone takes their stated responsibility for the work, and sets requirements from management, and is successful. Your prescribing errors fall.

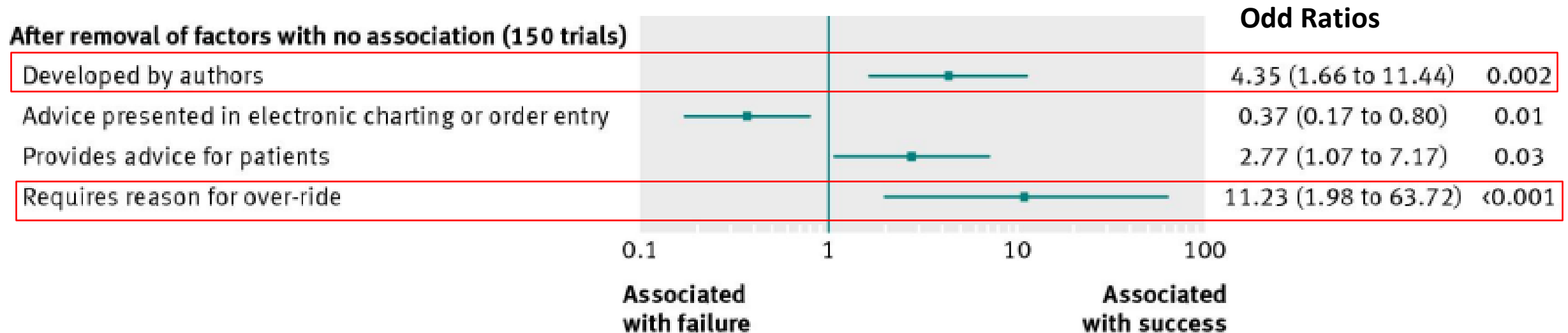


Your colleague's nursing home does not and is unsuccessful.

# 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.

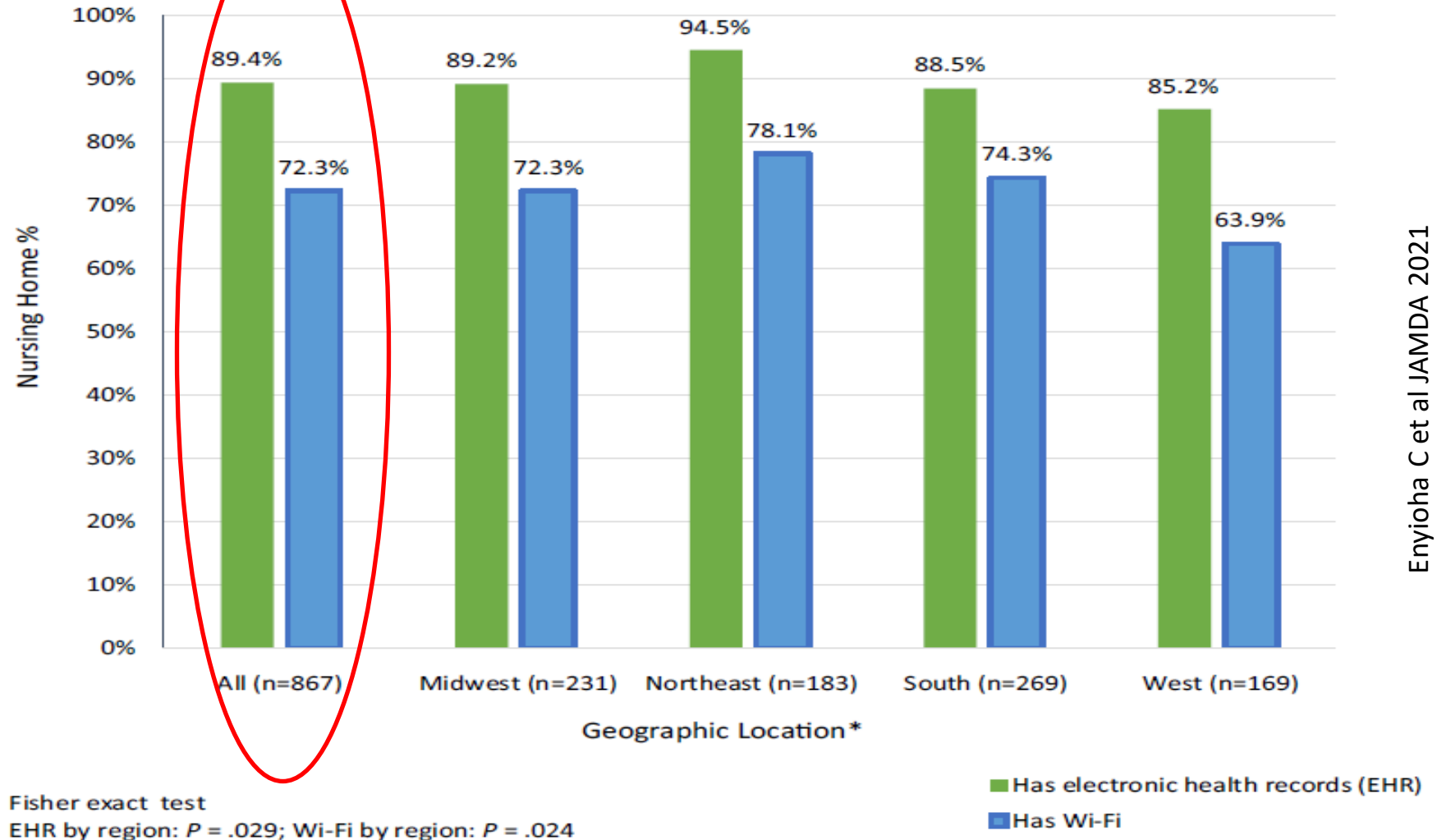
Factors associated with effectiveness of CDS (improved outcomes by >50%)





# 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

## 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.**

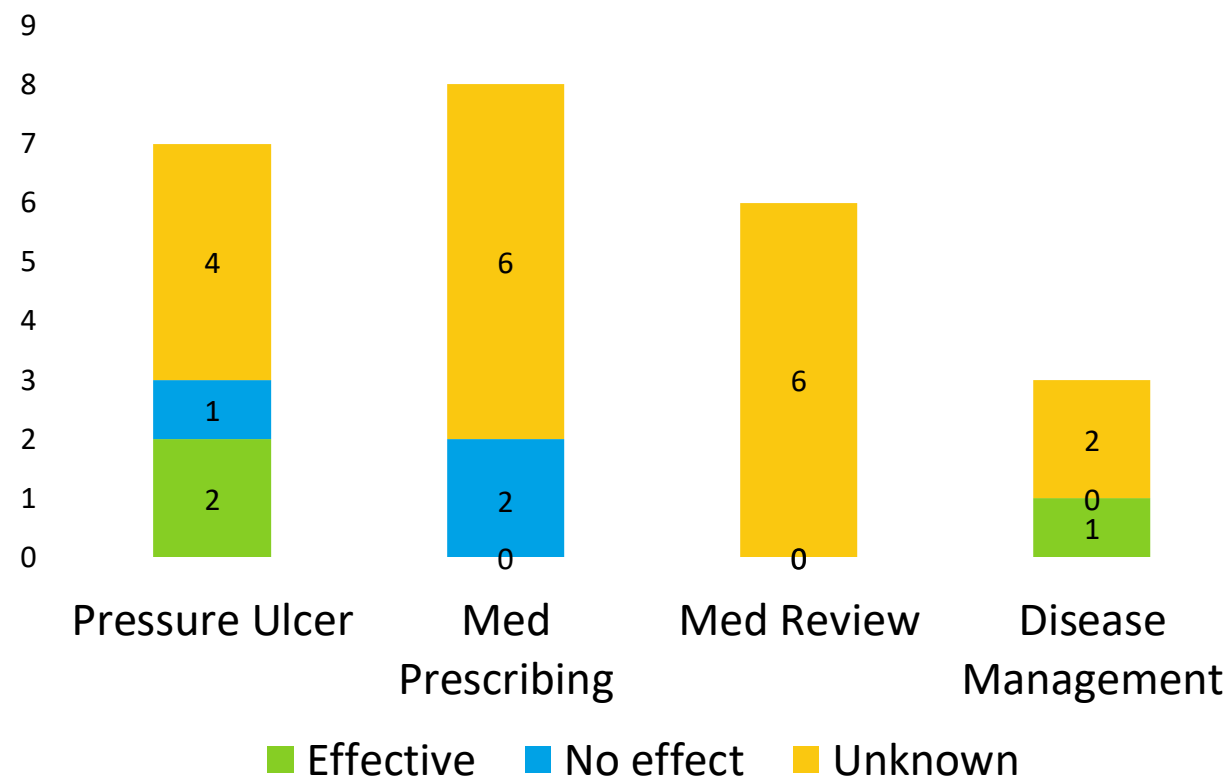
## Success of CDS in Nursing Homes

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

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

- Found 4 major purposes 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 purpose



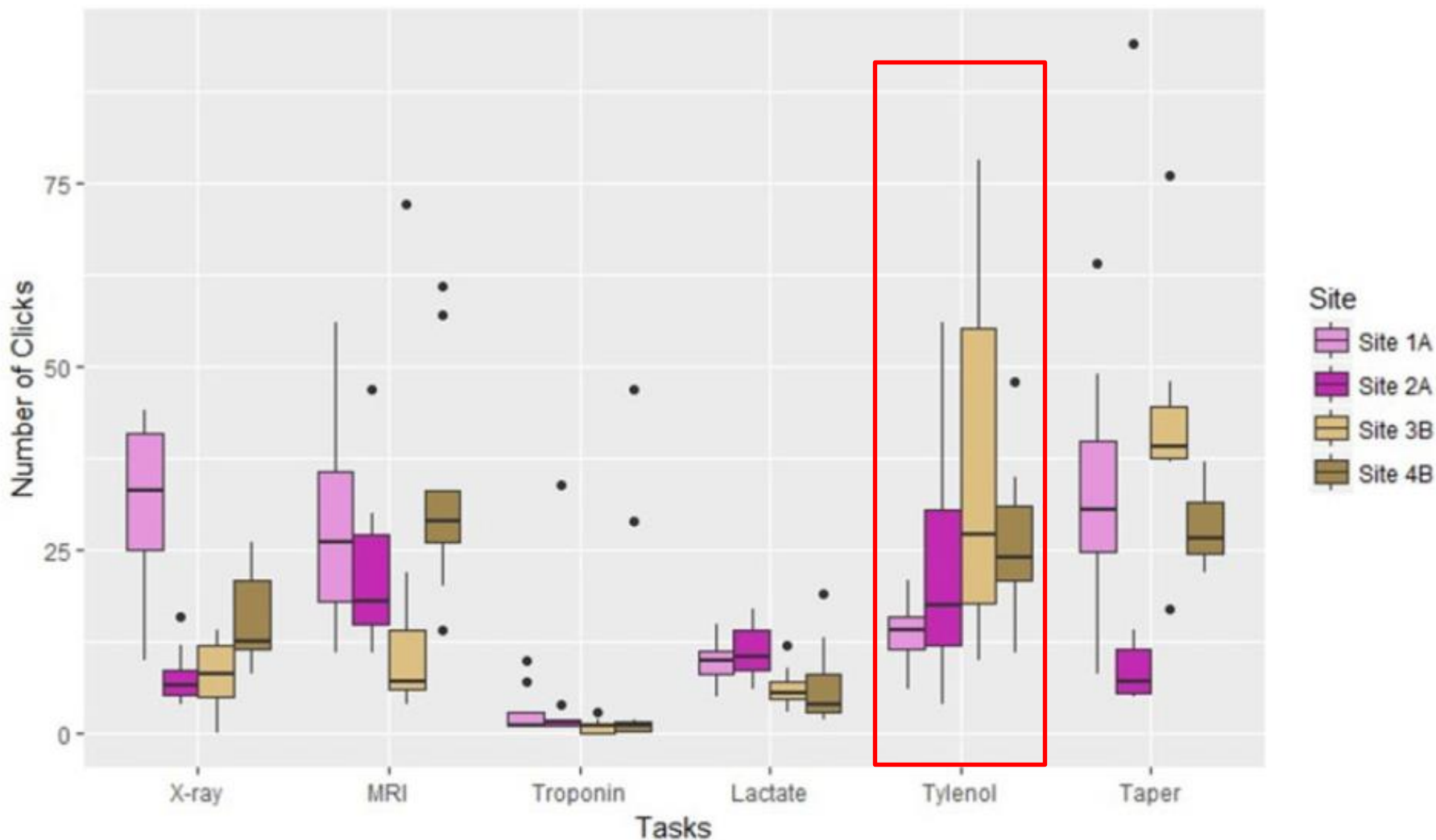


## Success of CDS in Nursing Homes

CDS improved process measure outcomes

- ▶ Care delivery improvements
- ▶ Improvement of drug order quality
- ▶ Better compliance with guidelines (for pressure ulcer prevention)
- ▶ Enhanced documentation of care records

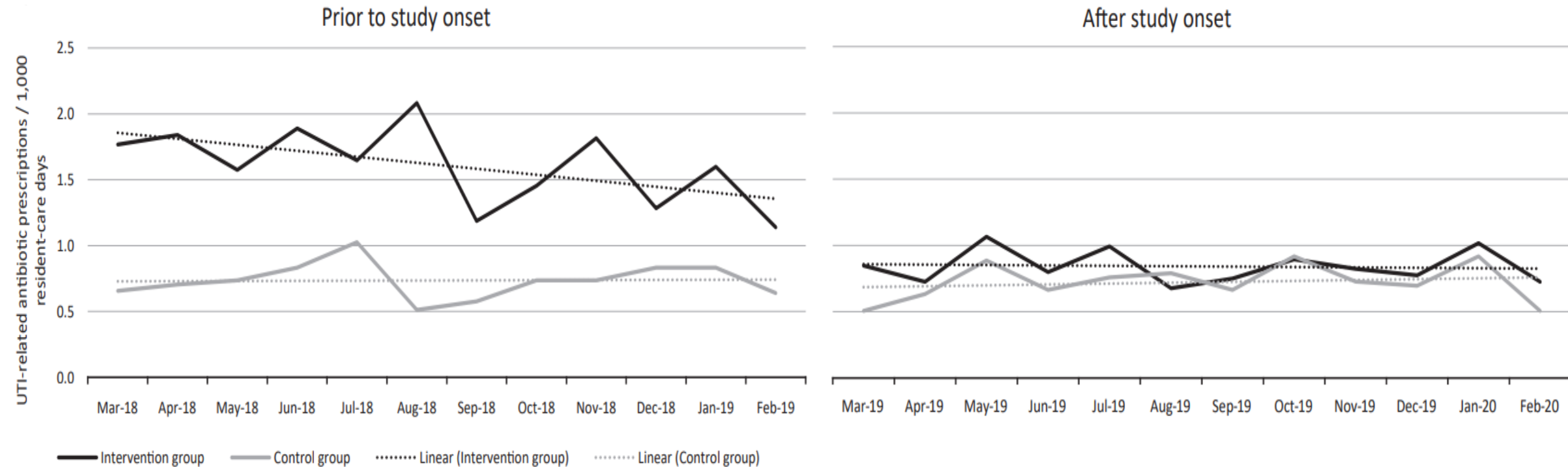
# Challenges for Consideration: Implementation and integration with existing systems and workflows



**Evaluation of 2 EHR  
Vendors across 4 health  
systems (2 EPIC and 2  
Cerner)**

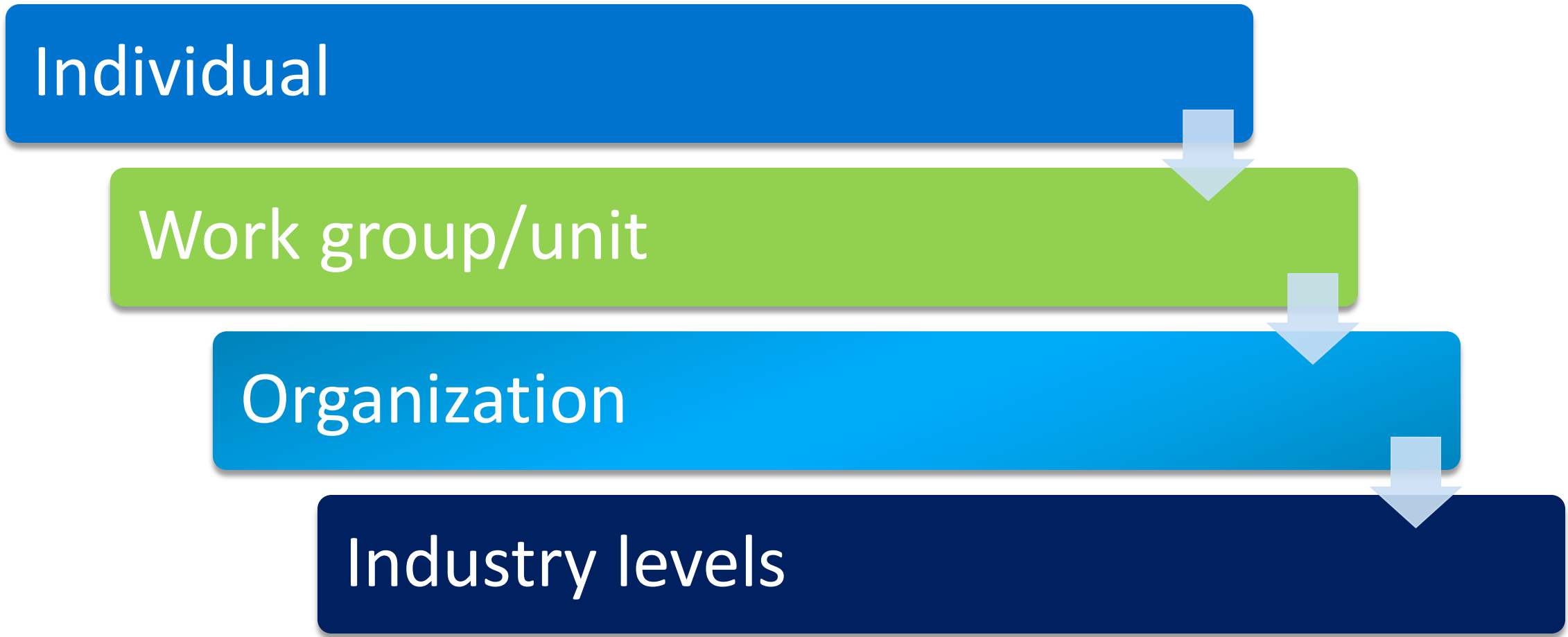
Ratwani et al. JAMIA July 2018.

# Electronic Clinical Decision Support for UTIs



The pre-post study difference in antibiotic prescriptions per 1000 resident-care days was -0.95 in the intervention group NHs and 0.05 in the control group NHs ( $P < .02$ )

# Multilevel workflow in NHs



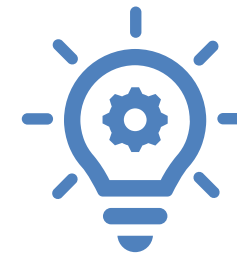
# Special Considerations in Context of Multilevel Workflow



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



Resident-centeredness of care



Impact of staff members' preferences on work activities

# 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.

Focus: Luchtwegen  
Triage

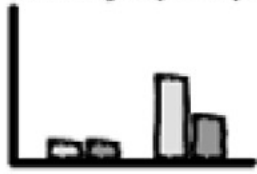
Temperatuur	<input type="text"/>
Hartfrequentie	<input type="text"/>
Ademfrequentie	<input type="text"/>
Bloeddruk	<input type="text"/>

Verwekker onbekend

Input patient data (e.g. temperature)

Focus: Luchtwegen  
Aanbevelingen

Meeste kans op:  
Chlamydomphila pneumoniae



Antibiotica therapie:  
1. Keuze:  
Amoxicillin  
≥70 kg KG: 3 x 1 g 5-7dagen  
< 70 kg KG: 3 x 750 mg

**Bij allergie**

**Aanbevolen diagnostische testen**

Verwekker onbekend

Most likely pathogen

Recommended antimicrobial therapy

# 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.

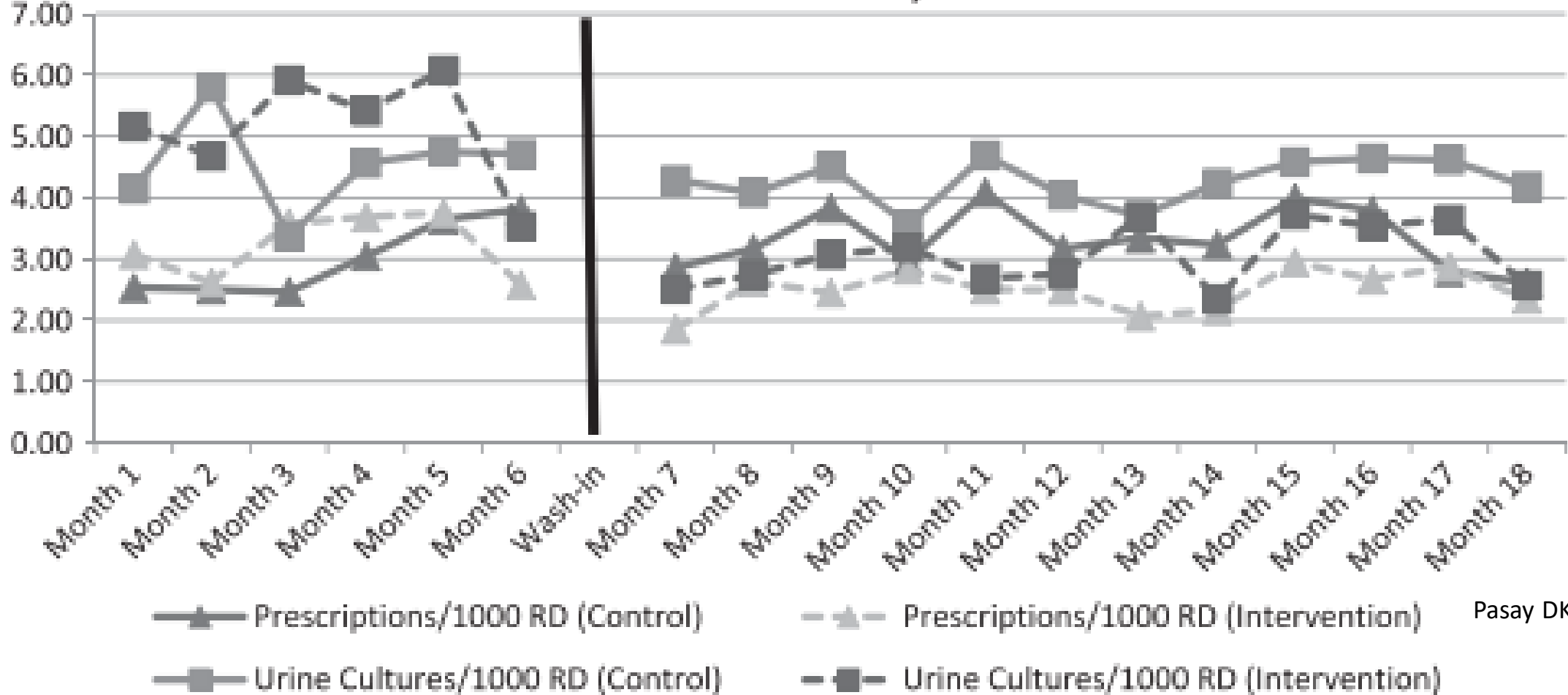


Goal: to reduce the number of urinary cultures and improve antibiotic prescribing

# 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**



Pasay DK et al IC & HE 2019.



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



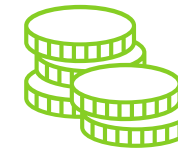
Assess facility needs



Get Leadership  
Buy-in



Consider a Pilot  
Project



Secure funding for  
implementation



Flexible &  
customizable CMS  
that meets needs

# Tips for successful implementation of a CDSS in a nursing home

## ► Provide adequate training for all staff




- Involve all stakeholders early and often
- 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

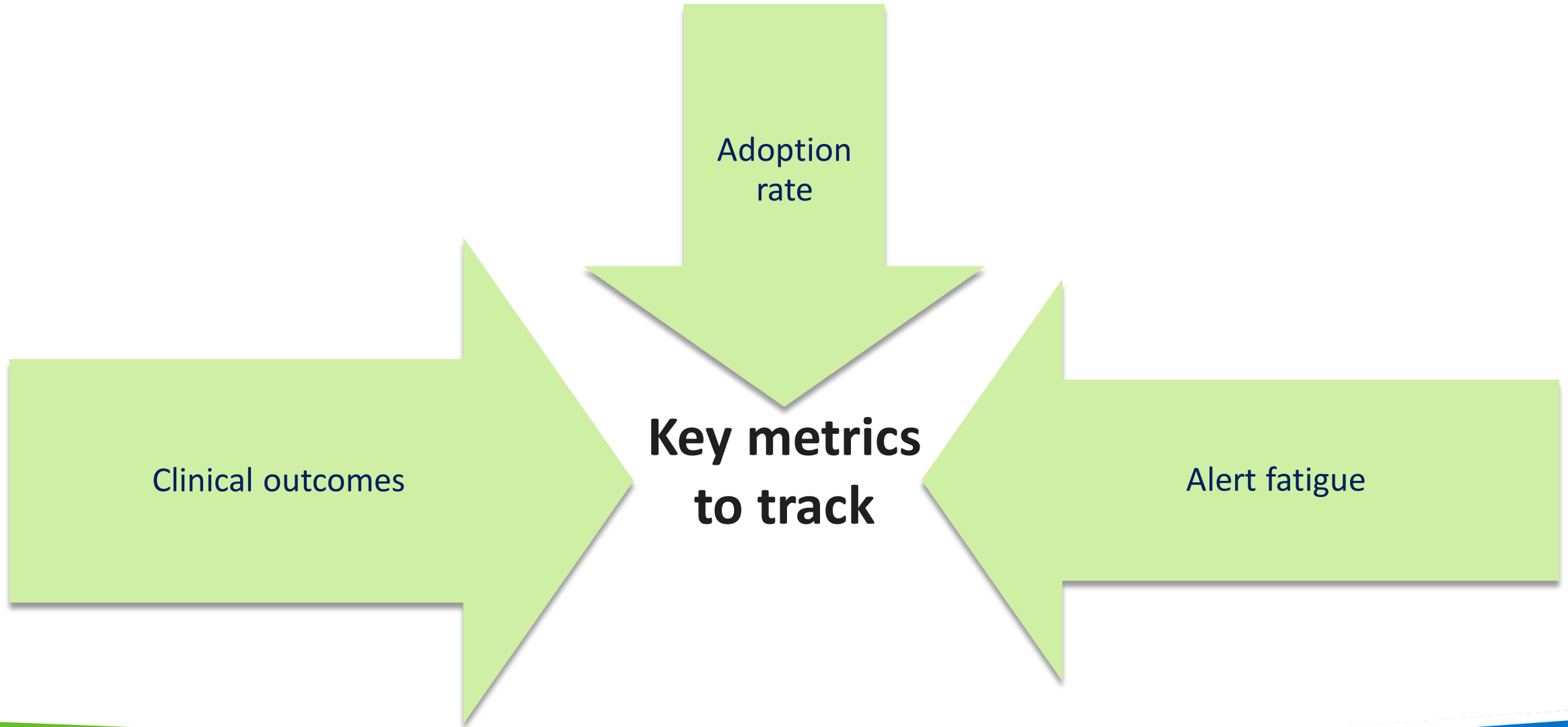
Lapp L et al J Med Internet Res 2022 Sep.

## 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



# The future of CDSs in nursing homes



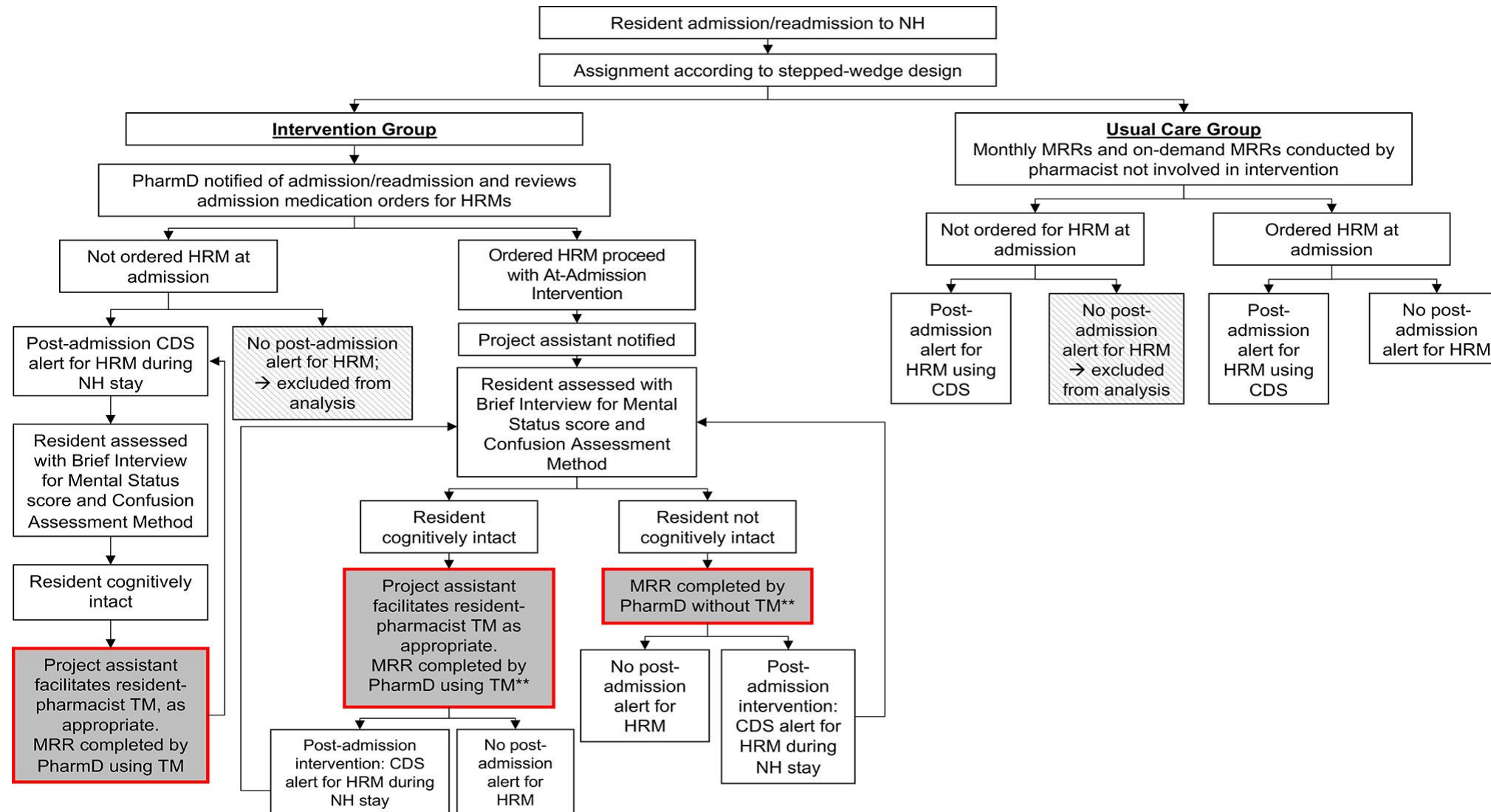
CDSs are becoming increasingly sophisticated and integrated with other healthcare information technology systems.



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

# Implementation of a Pharmacist-led CDS in Nursing Homes

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





**Thank you**



Questions?



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**North Carolina  
Clinical Antibiotic  
Stewardship Partners**