

National Web-Based Teleconference on Utilizing Health IT to Improve Medication Management for the Care of Elderly Patients

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Potential of Health IT for Prescribing and Monitoring Medication for Older Adults

Presented by

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Gurwitz and Field do not have any relevant financial relationships with any commercial interests to disclose.



It is much easier to write upon a disease than upon a remedy. The former is in the hands of nature and a faithful observer with an eye of tolerable judgement cannot fail to delineate a likeness. The latter will ever be subject to the whim, the inaccuracies and the blunder of mankind.

William Withering (1741-1799)



Case Study

E.G. is an 85 year-old female nursing home resident with a history of atrial fibrillation, stroke, dementia, and hypertension, who is receiving chronic therapy with warfarin. Her primary care provider has been dosing her warfarin to maintain her at an INR of 2.0 to 2.5.

Case Study

One evening, a covering physician is called with a report that the patient has developed a fever. The patient is initiated on antibiotic therapy to treat a presumed urinary tract infection.

Case Study

The next morning the primary care physician is called with the previous day's INR, 1.75. She increases the daily warfarin dose from 4 mg to 5 mg per day. She is not notified of the antibiotic ordered the previous evening by the covering physician.



Case Study

One week later, the INR comes back at 13.8 and another covering physician is notified. That evening's warfarin dose is held.

Case Study

The primary care physician is notified, and vitamin K is administered for 3 days with a reduction in the INR to 0.9. The physician writes in the record that warfarin will not be reinitiated **because anticoagulation has been difficult to control for unclear reasons.**



What factors placed this older patient at risk for an adverse drug event?

- Warfarin is a drug that requires careful dosing and monitoring.
- Older patients are at risk for drug-drug interactions.
- Older patients are at increased risk of close calls and near-misses in medication management.
- Communication errors between health care providers are common in the care of older patients.
- All of the above.



Analysis of the Case

- Covering physician was not familiar with the patient.
- Important drug interaction was not recognized.
- Primary care physician was not aware that a new medication (the antibiotic) had been prescribed.
- High INR was due to multiple errors.
- Patient was denied an important and beneficial therapy.

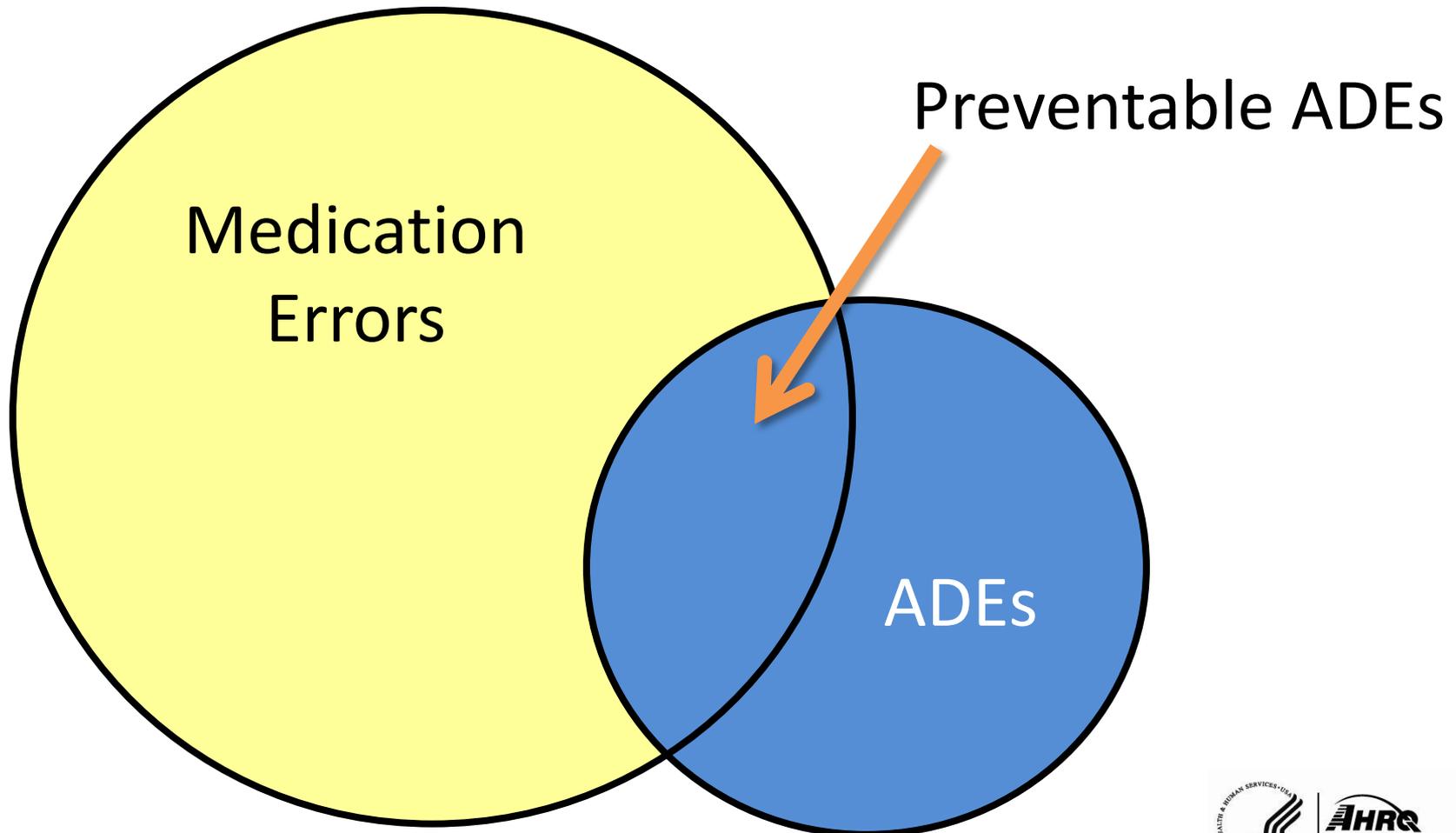


The Incidence and Preventability of Adverse Drug Events in Two Large Academic Long-term Care Facilities



Adverse Drug Events

injury resulting from a medical intervention related to a drug



Methods

- Study conducted in two large academic long-term care facilities
- Total of 1229 beds

Methods

- Chart reviews were performed by trained clinical pharmacist investigators
- Incidents were classified by two independent physician reviewers:
 - adverse drug event
 - severity
 - preventability

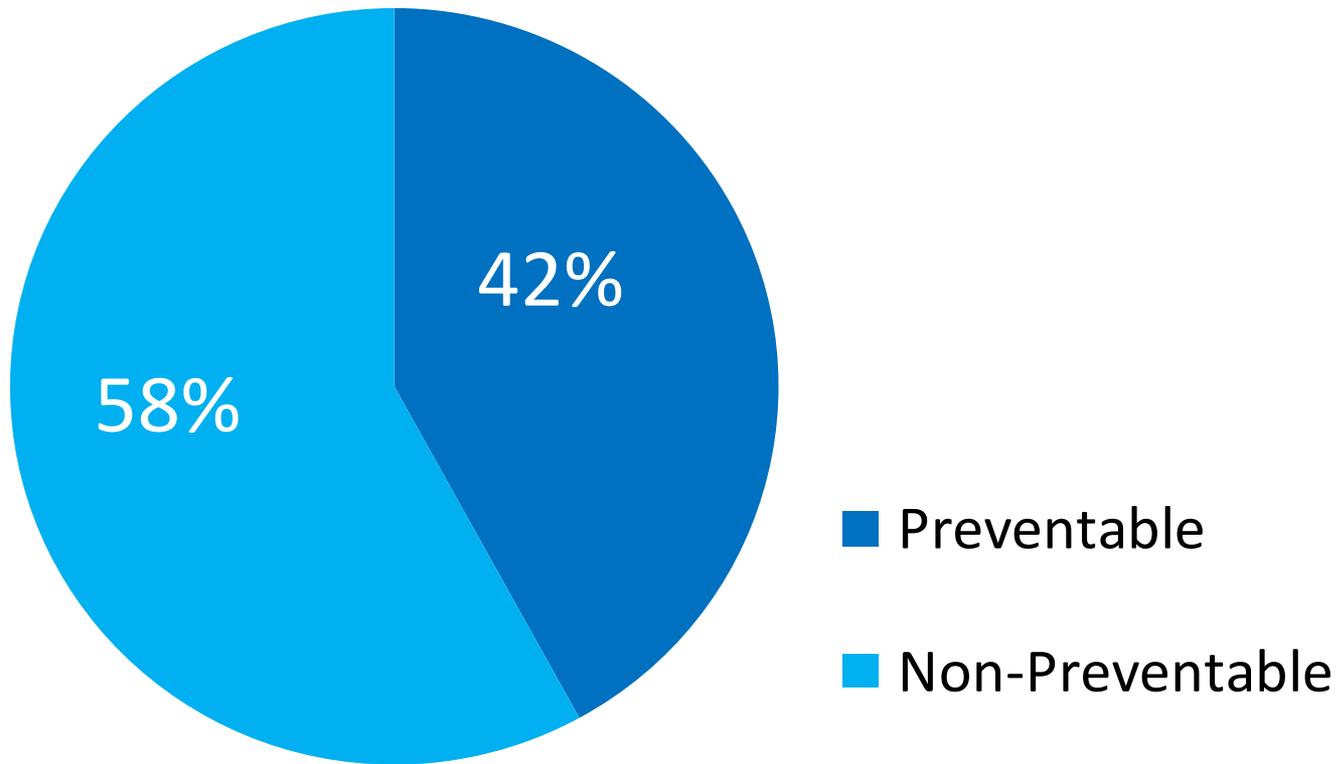
Results - Event Rates

- **Adverse drug events**
 - Events: **815**
 - Rate: 9.8 per 100 resident-months

- **Preventable adverse drug events**
 - Events: **338**
 - Rate: 4.1 per 100 resident-months



Adverse Drug Events (n=815) *Preventable vs Non-Preventable*



Adverse Drug Events by Severity

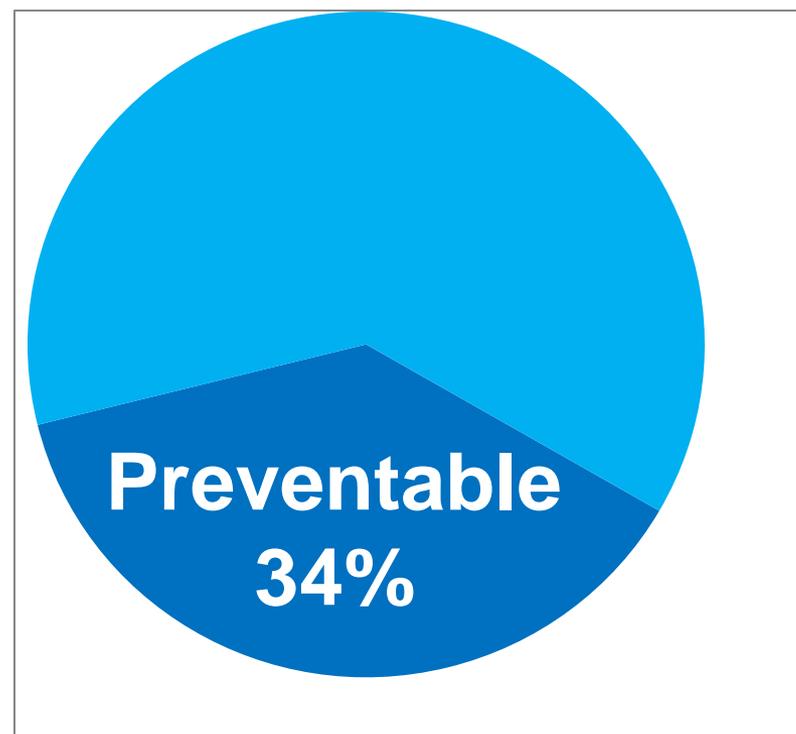
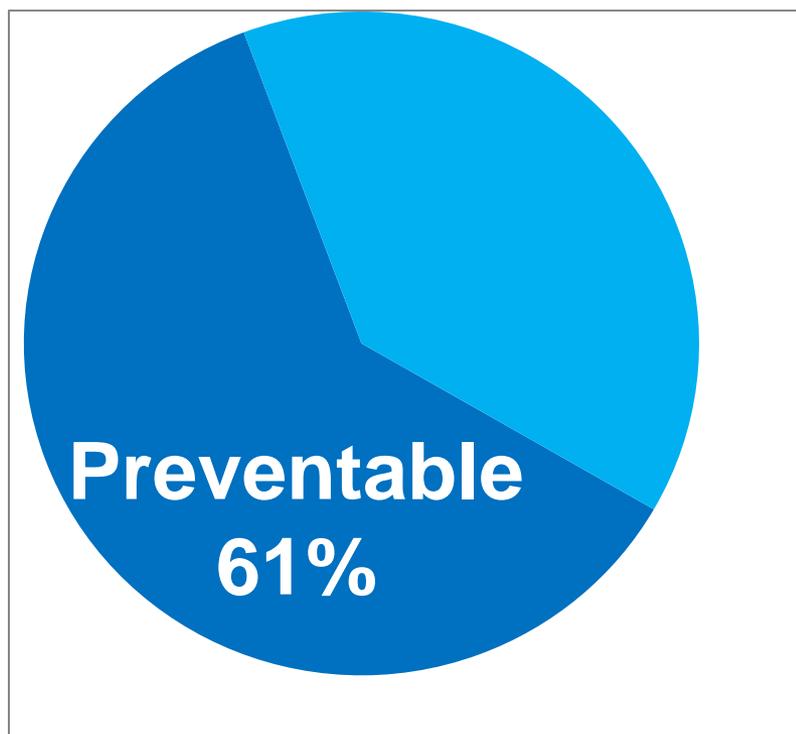
(n=815)

| <u>Category</u> | <u>Number</u> | <u>Percentage</u> |
|------------------|---------------|-------------------|
| Fatal | 4 | <1% |
| Life-threatening | 33 | 4% |
| Serious | 188 | 23% |
| Less serious | 590 | 72% |

Preventability of Adverse Drug Events

Of fatal, life-threatening
& serious events

Of less serious events



Error Stage for Preventable ADEs

(n=338 preventable ADEs)

| <u>Category</u> | <u>Number</u> | <u>Percentage</u> |
|-----------------|---------------|-------------------|
| Ordering | 198 | 59% |
| Dispensing | 16 | 5% |
| Administration | 43 | 13% |
| Monitoring | 271 | 80% |

Event Categories - Preventable

| | |
|---------------------|-----|
| Neuropsychiatric | 29% |
| Hemorrhagic | 16% |
| Gastrointestinal | 16% |
| Renal/electrolytes | 12% |
| Fall with injury | 5% |
| Cardiovascular | 4% |
| Fall without injury | 3% |
| EPS | 2% |
| Syncope/dizziness | 2% |



Event Rates

- **Extrapolation to total US nursing home population (n=1.6 million)**
 - 1,900,000 ADEs per year in nursing home setting (40% preventable)
 - **86,000 life threatening or fatal ADEs (70% preventable)**

Possible Interventions – HIT

- Bar-coding
- Automated dispensing
- Computerized medication administration records
- Computerized Provider Order Entry (CPOE)
- Computerized clinical decision support systems

CDSS in the Long Term Care Setting – Study 1



Computerized Clinical Decision Support System (CDSS)

- High-severity drug interactions
- Potentially problematic laboratory test results
- Early identification of adverse drug effects through increased monitoring
- Recommendations regarding geriatric-appropriate dosing
- Recommendations for prophylactic measures



CPOE with Clinical Decision Support

Enter Orders 1 Marked (of 1) Tue, Feb 10

E.G. - 89/F HC3E H3E82/A Unit No: M0000004
180.3cm 86.182kg ADM IN Acct No: IC000003/03
Allergies/ADRs: [],

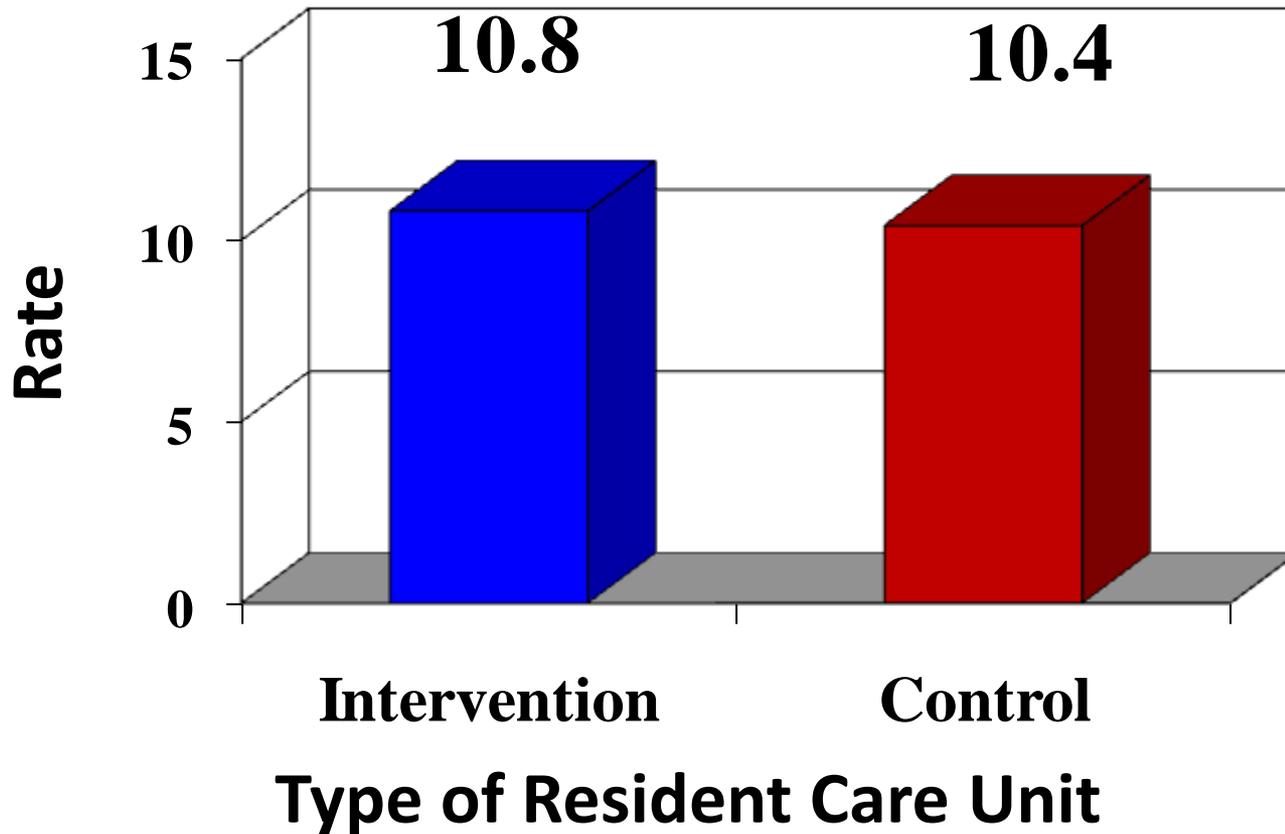
| Order | Pri | Ser | Date | Time | Allergies |
|---|--------------------------|--------------------------|----------|------|--------------------------|
| 1 <input type="checkbox"/> <input checked="" type="checkbox"/> Cephalexin 500 Mg Po Qid | <input type="checkbox"/> | <input type="checkbox"/> | 10/02/04 | 1800 | <input type="checkbox"/> |
| 2 <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | <input type="checkbox"/> |
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More

Rule Processing

WARNING - BLEEDING RISK DRUG INVOLVED: CEPHALEXIN
This drug interacts with WARFARIN. Repeat the INR in 3 days.
Consider reducing warfarin dose.

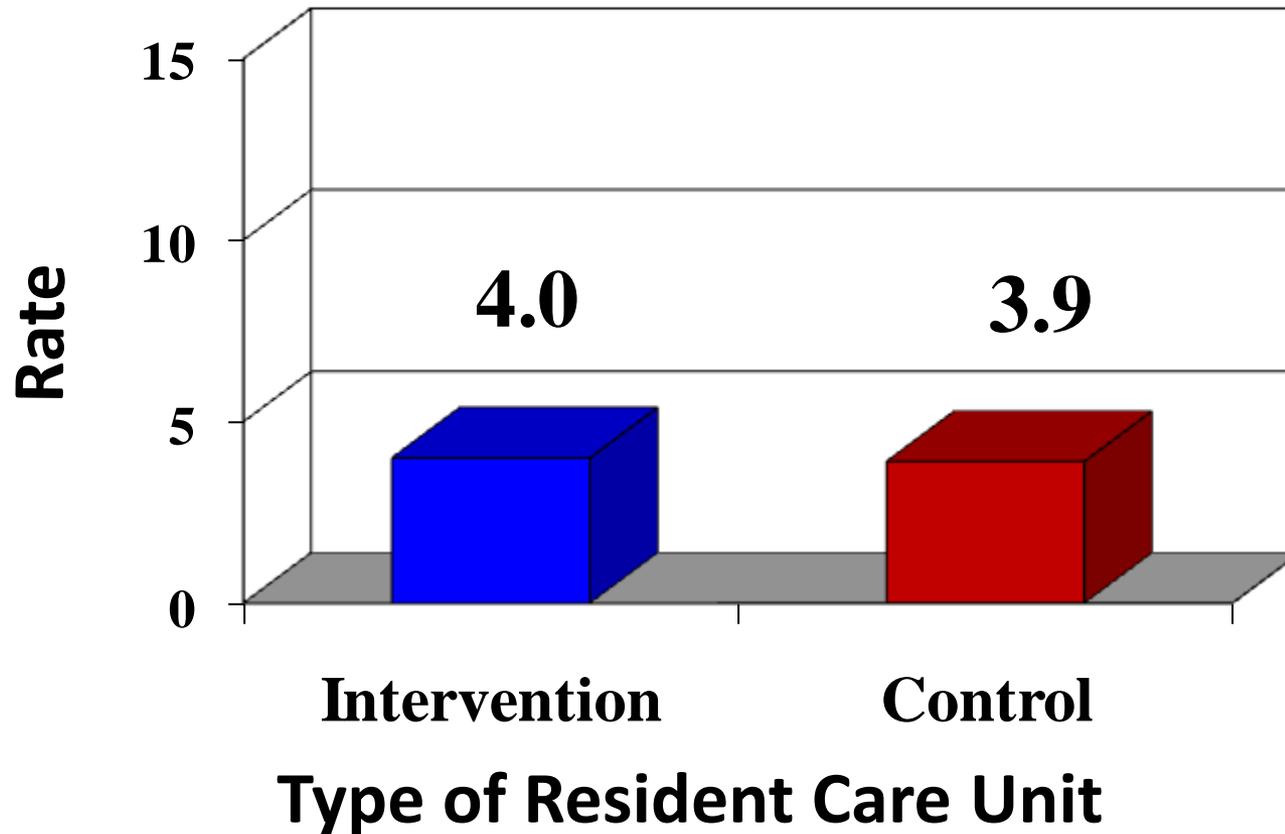
Effect on Adverse Drug Event Rates



Rate Ratio = 1.04 (95% CI 0.89, 1.20)



Effect on Preventable Adverse Drug Event Rates



Rate Ratio = 1.03 (95% CI 0.81, 1.32)



Conclusion

Use of CPOE with this particular computerized clinical decision support system was not found to reduce the occurrence of adverse drug events in the long-term care setting.

Why?...

- The limits of a first-generation system
- Lack of specificity of alerts – alert burden
- Need to increase scope of system to address a broader range of ADEs
- Need to integrate more clinical information into the clinical decision support system
- Setting the bar too high: ADEs vs errors



CDSS in the Long Term Care Setting – Study 2



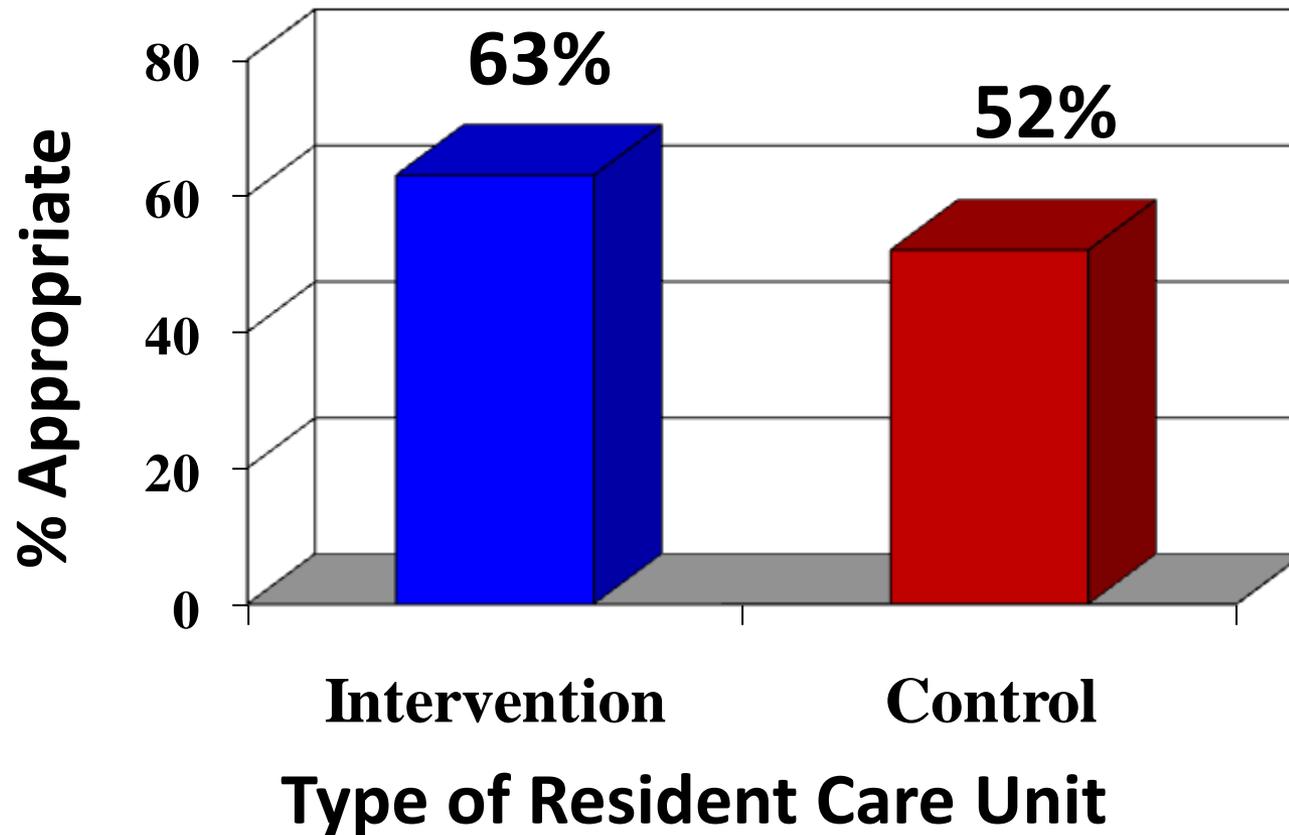
Prescribing for Residents with Renal Insufficiency

- Complex association between levels of renal insufficiency and dosing recommendation a challenge for prescribers - substantial rates of inappropriate dosing
- Dosing requires information on
 - creatinine clearance and
 - drug-specific dose recommendations by level of renal impairment
- Study: RCT with 22 long term care units randomly assigned to intervention and control

Clinical Decision Support System to Guide Medication Ordering for Nursing Home Residents with Renal Insufficiency

- Recommendations for dosing
- Recommendations for drug frequency
- Recommendations to avoid drug
- Alerts to order serum creatinine

Effect on Medication Ordering for Nursing Home Residents with Renal Insufficiency



RR = 1.2 (95% CI 1.0, 1.4)



Conclusion

Clinical decision support for physicians prescribing medications for nursing home residents with renal insufficiency can improve the quality of prescribing decisions.

Why?...

- Providers recognize difficult of prescribing for patients with renal insufficiency
- Prescribing demands detailed, patient-specific information combined with specific dosing recommendations – information and calculations can be more easily done by computer
- Alerts are highly specific and always relevant
- Are we setting the bar at a more appropriate level? (errors vs ADEs)



Adverse Drug Events among Older Adults in the Ambulatory Setting

*Gurwitz, J. H., Field, T.S., et al.
Incidence and preventability of adverse drug events among older persons in the ambulatory setting. JAMA
2003;289:1107-1116.*

Study Design, Population, and Setting

- Over 30,000 older Medicare enrollees cared for at a large multispecialty group practice
- Followed for 1 year
- ADEs identified through a variety of techniques

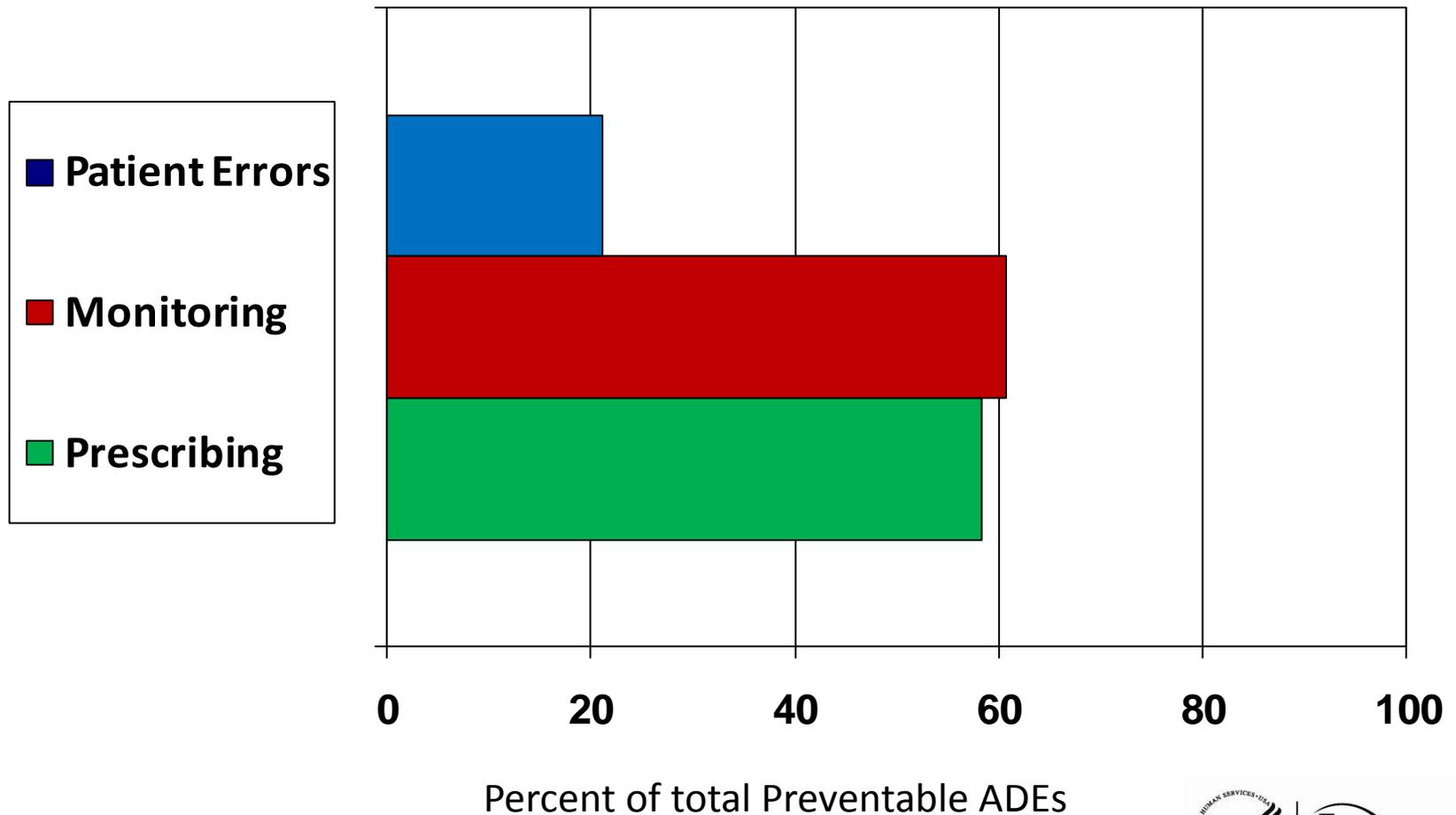
ADEs in the Ambulatory Setting

Rates

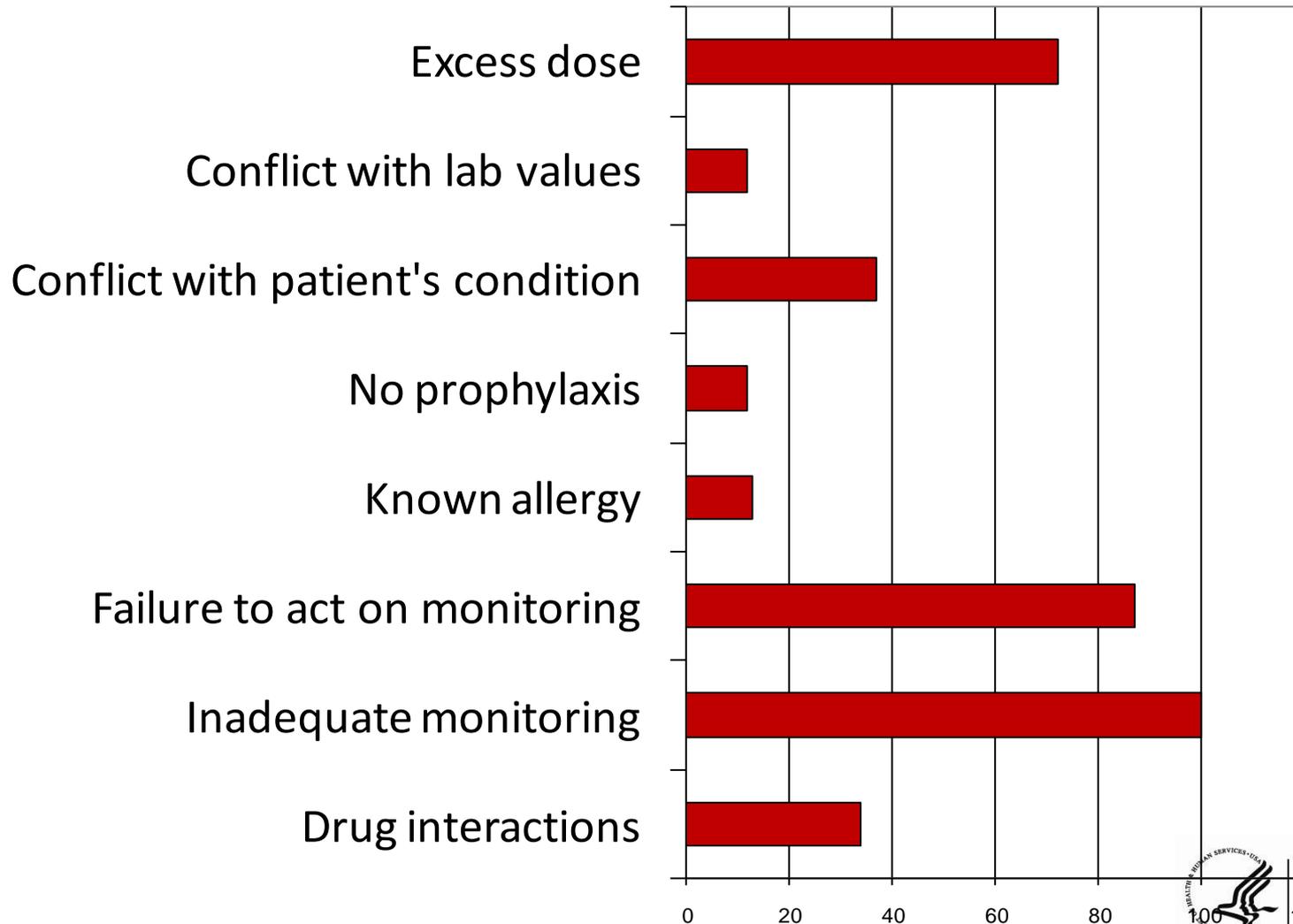
- ADEs
45.1 per 1000 person years
- Preventable ADEs
13.6 per 1000 person-years
- Extrapolated to total Medicare 65+
1,446,949 ADEs per year
438,046 preventable ADEs
- This is likely to be an underestimate



Stages In Which Errors Occurred

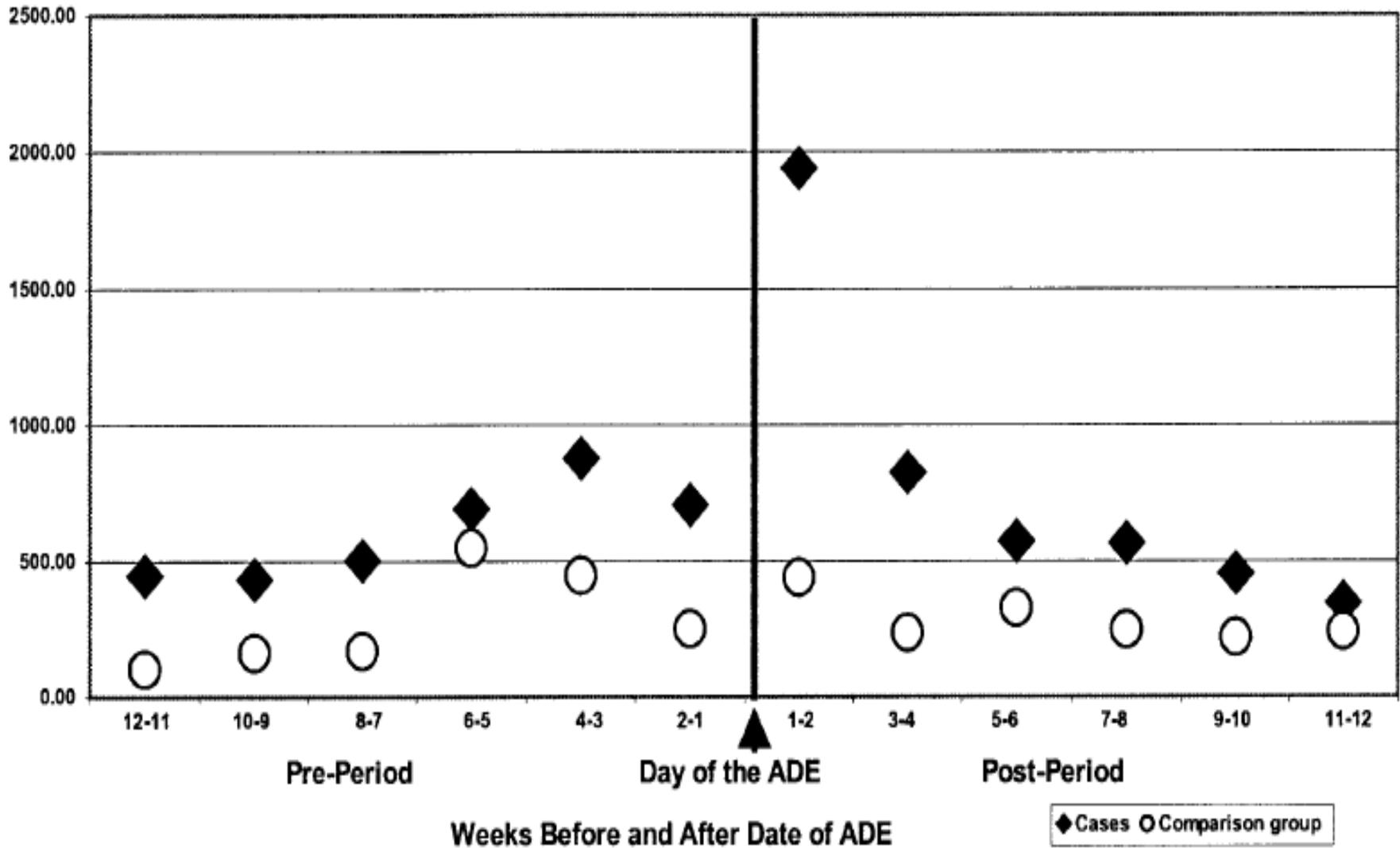


Types of Errors Leading to Serious ADEs



ADEs in the Ambulatory Setting

Costs



ADEs in the Ambulatory Setting

Implications for Interventions

- ADEs are common and often preventable
- Types of errors suggest interventions should focus on prescribing and monitoring
- Fault tree analyses with clinicians highlighted problems with information flow to PCPs for patients discharged from hospitals and SNFs

Ambulatory HIT Studies Underway

1. Ambulatory Medication Reconciliation Following Hospital Discharge
 - data collection underway
2. Using HIT to Improve Transitions of Complex Elderly Patients from SNFs to Home
 - intervention underway
3. Components:
 - notification to PCP of discharge, reminder to schedule visit, list of new medications, alerts of interactions, recommendations about dosing issues, lab monitoring



VCU Medical Center

Tales from the Trenches: From the Mouths of A Diverse Group of Older Adults to IT Based Solutions



Presented by: Kate L. Lapane, PhD, MS

AHRQ- R18HS017281, 1R18HS017150, 1U18 HS016394

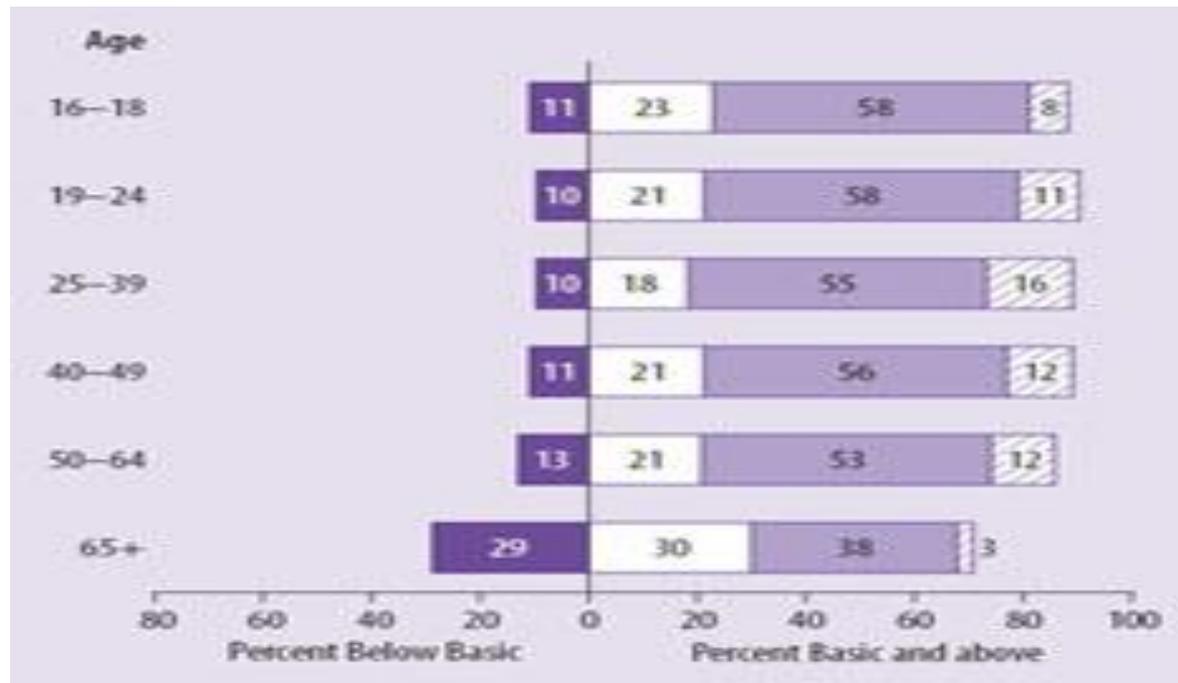
I do not have any relevant financial relationships with any commercial interests to disclose.



Importance of improving medication management in ambulatory settings

- Outpatient office visits are highly likely to result in prescribing at least one medication
- 40%-75% of older adults do not take their medication as prescribed
- Incidence of adverse drug events in community dwelling adults non-trivial
- Costs of adverse-events among Medicare beneficiaries in outpatient settings substantial

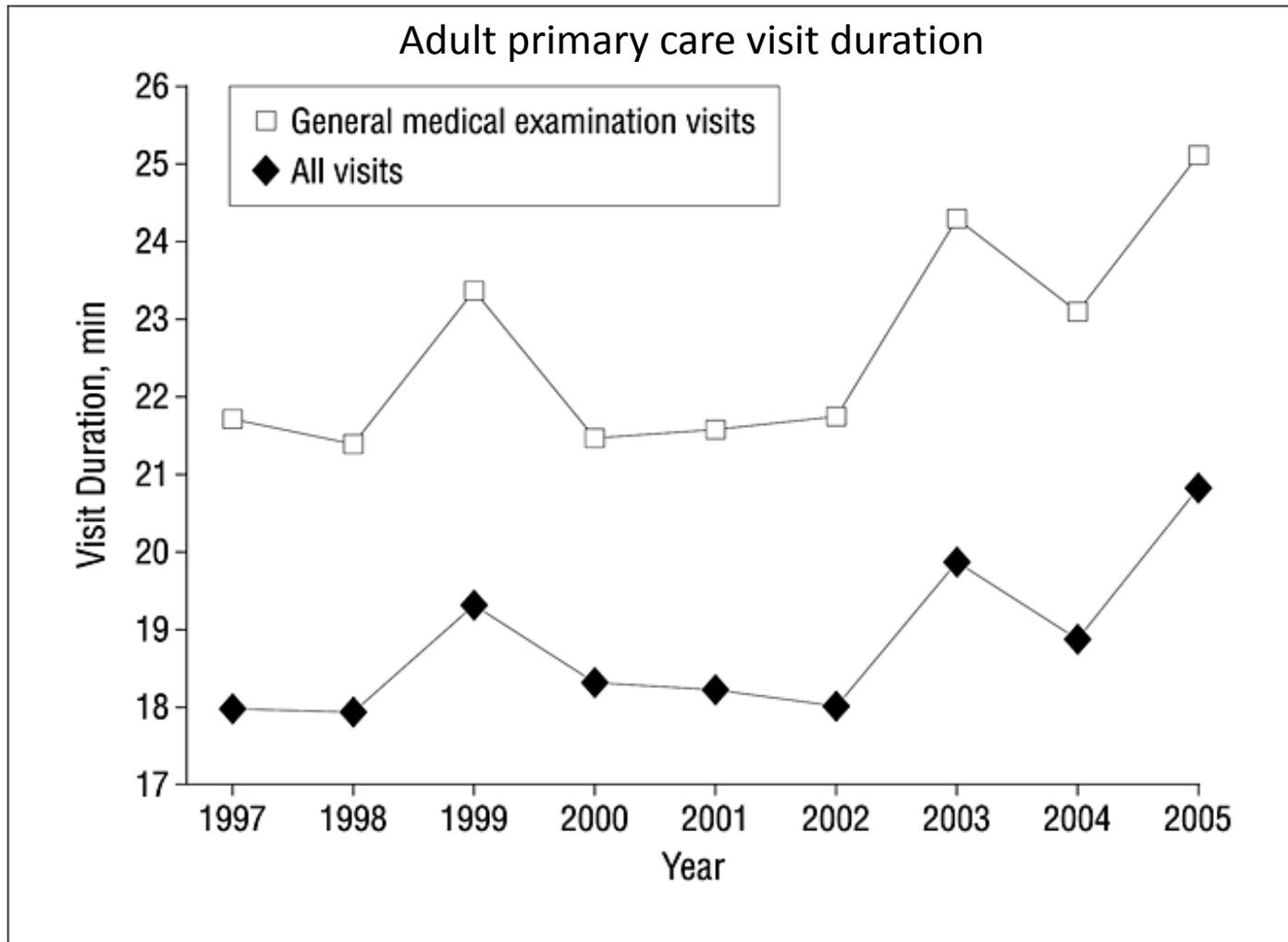
A greater proportion of older adults have below basic health literacy levels



Who Is at Risk for Low Health Literacy?

- Anyone in the US – regardless of age, race, education, income or social class – can be at risk for low health literacy
 - Ethnic minority groups
 - Older adults
 - People with low socioeconomic status
 - Immigrants
 - People with chronic diseases

Duration of a typical primary care visit



Chen, L. M. et al. Arch Intern Med 2009;169:1866-1872.

NOTE: PCPs spent less time with patients of racial/ethnic minority groups.

ARCHIVES OF
INTERNAL MEDICINE



AHRQ
Agency for Healthcare Research and Quality
Advancing Excellence in Health Care • www.ahrq.gov

What happens as a result?

- Limited informed decision making
- Lack of confirmation of patient understanding
- Omission of discussion of adverse medication effects and costs



Room for Improvement...

- 26% did not mention name of medicine prescribed
- 13% did not mention its purpose
- 34% did not mention how long to take the medicine
- 45% did not say what dosage to take
- 42% did not mention the timing or frequency of doses
- 65% did not mention adverse side effects

Archives of Internal Medicine, Sept. 25, 2006

Health Literacy and Medication Management

- Reading level of average American: 8th-9th grade.
 - (Kirsch IS, Jungeblut Washington A, Jenkins L, Kolstad A. *Adult Literacy in America: A First Look at the Results of the National Adult Literacy Survey*. 1993)
- Reading level of instructional materials about medication management: 9th-14th grade.
 - (Brown P, et al. *J Natl Cancer Inst* 1993;24:157-163.
- Up to 56% of Latinos are illiterate in English.
 - (Williams et al. *JAMA* 1995;274:1677-1682.)
- Low literacy contributes to medication non-adherence.

Misinterpretation of prescription drug warning labels

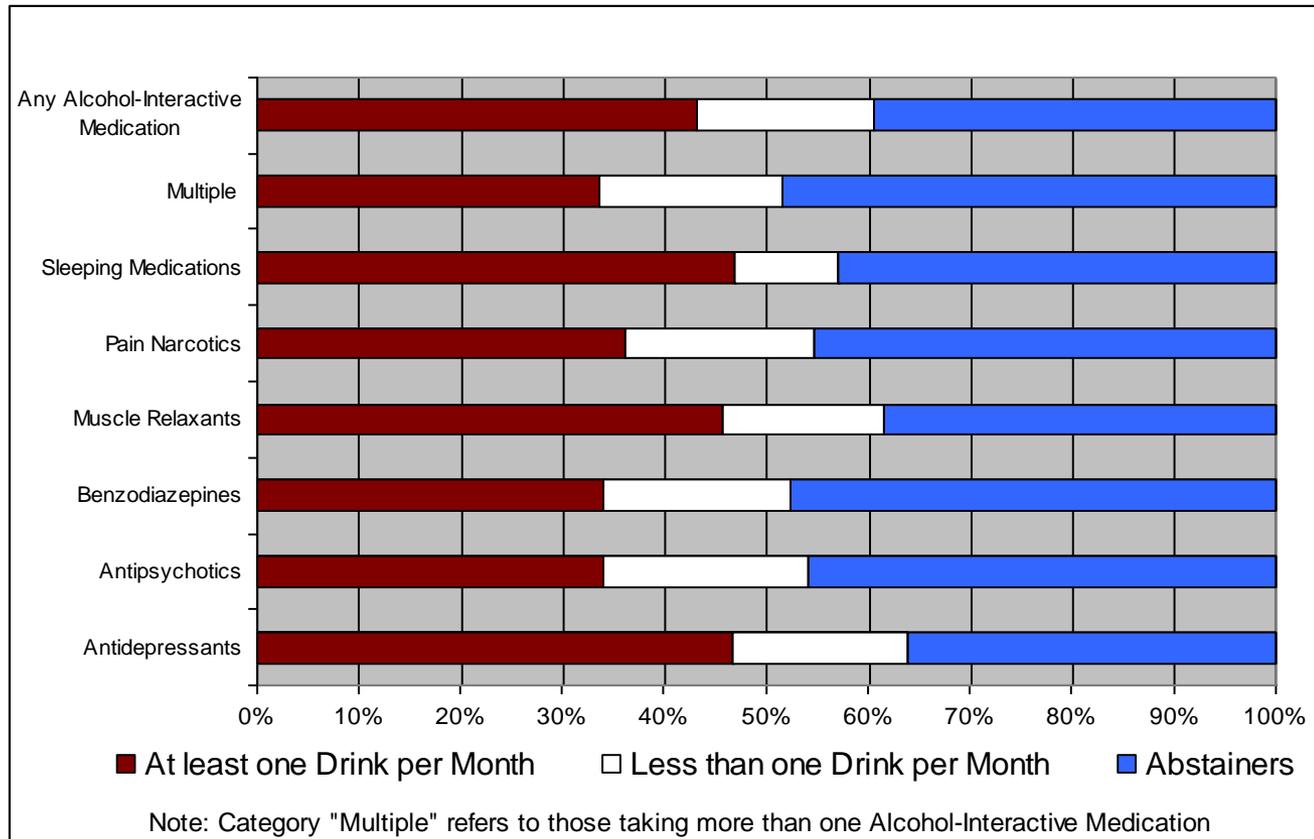
- **Do Not Chew or Crush; Swallow Whole**
 - Chew it up so it will dissolve
 - Don't swallow whole or you might choke
 - Medication should be taken with plenty of water
- **For external use only**
 - Medicine will make you feel dizzy
 - Use extreme caution in how you take it.

Misinterpretation of prescription drug labels

- Take Two Tablets Twice Daily
 - 70.7% of low literate persons correctly stated
 - BUT ONLY 35% could correctly show the number of pills

Davis et al. Literacy and Misunderstanding Prescription Drug Labels. *Ann Intern Med* 2006;145:887-894.

Alcohol Consumption Patterns Among Alcohol-Interactive Medication Users (n=22,840,389)



Jalbert, Quilliam, Lapane. JGIM 2008

OBJECTIVE

- To use qualitative methods to investigate a racially/ethnically diverse sample of low-income older adults' attitudes and behaviors regarding medication management.

QUALITATIVE APPROACH

- **Design:** Exploratory, qualitative focus groups
- **Sample:** Maximum variation purposive stratified sample
- Recruited in community settings Boston & RI:
 - senior centers
 - senior housing
 - ethnic community centers in low-income areas
- Participants:
 - Aged ≥ 65
 - Spanish-speaking Hispanic, non-Hispanic Black, or non-Hispanic White.

RESULTS

Perceptions of physicians' knowledge of patients' medications:

- Older patients overwhelmingly believe that their primary care physician is automatically and fully informed about prescriptions from multiple prescribers, even if no medication review was conducted in the office.
 - “When you go to another specialist they [PCP and specialist] communicate, because you don’t go to the specialist unless your primary doctor tells you.”
 - “It is in the computer, it is something they see. So when you go to your primary doctor he looks at your chart and he knows where you’ve been. So the primary doctor knows what is going on.”

RESULTS

INTENTIONAL NON-ADHERENCE:

- Participants made varying yet concerted *decisions* about taking their medications *differently than prescribed*
- They usually did not disclose these modifications to their physicians
- They did not recognize the potential dangers that can ensue.
 - “Yeah, I take it regularly Monday, Wednesday, Friday, so I figure you know, if I skip or didn't take it anytime that would probably harm me. But as long as I keep taking it regularly that way I figure it's OK.”
 - “I'm supposed to be taking them at 2:00 and 5:00 in the afternoon. I take every single one in the morning. I don't want nothing to do with pills after 8:00 in the morning because I've always been that way . . . “
 - “Because I was taking so much medicine, and I was just overwhelmed, and I just said, “Oh, I'll drop that one.”

RESULTS

Physician-patient communication about medications:

- Only a minority of participants mentioned that their doctor *asks them* if they are having any problems with their new medications, and these participants were fastidious in telling their doctor when they had side effects and wanted to stop the medication.
- Most said their primary care physicians rarely explain much to them about their medications.
- They claimed to have little understanding about why they were taking each one, the specific benefits of each one, and the dangers of skipping particular medications.
- No participant had discussed with their physician which medications were most important never to skip.
 - “Sometimes I forget to take them, and I don’t feel no worse. So why am I spending the money taking them?”
 - “He never told me which not to skip, he never told me that. I do that on my own. I know if I stay off my Verapamil for angina and high blood pressure too long I will start to get pressure here [in my chest].”

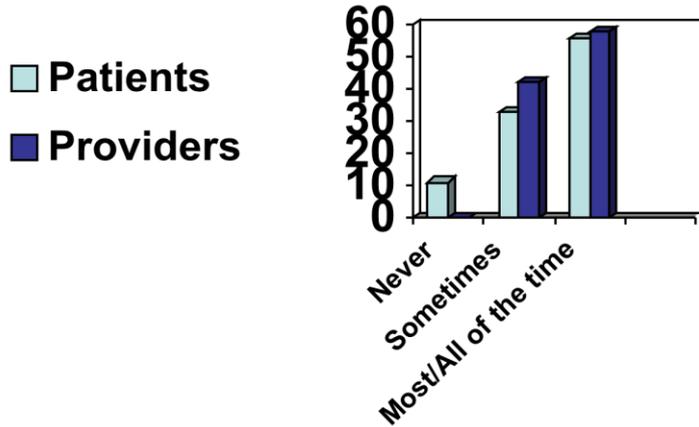
RESULTS

Package inserts:

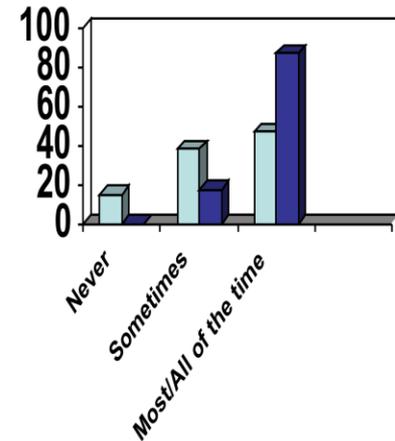
- Most participants said that they always read the prescription package inserts
 - 1st found out about side effects after filling the RX and reading the inserts
 - some decided at that point not to take the medication, and were irritated that they had purchased it
 - “That’s what scares us sometimes when you read those side effects.”
 - “Every new medication you get if you read those papers that have all the different side effects...one of these medications you wouldn’t take them. You would be dead.”
 - “If you read all that printout from the pharmacy you wouldn’t take no medicine.”
- While older adults said they want more complete information about their medications than they are receiving from their physicians, they expect that busy physicians will be unable to provide this.

Poor communication on medication issues

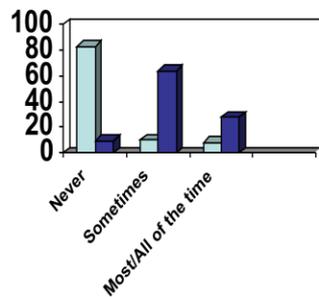
Frequency discuss importance of meds



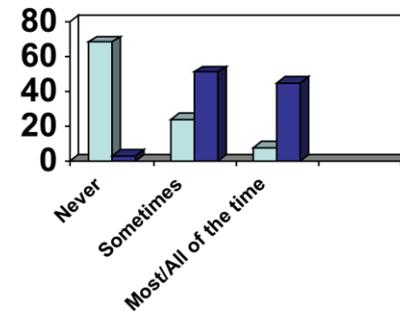
Frequency discuss potential side effects



Frequency tell if will not buy drug

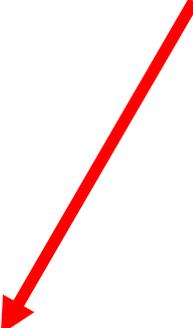


Frequency tell if do not want drug

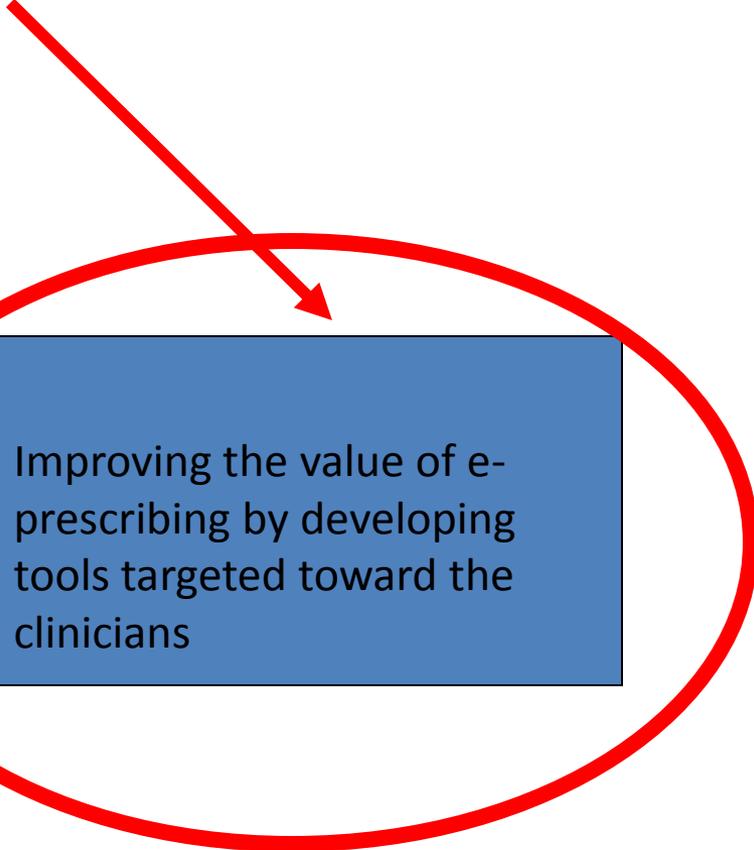


Lapane KL, Dube C, Schneider K, Quilliam BJ. (Mis)Perceptions of Patients and Providers Regarding Medication Issues. Am J Manag Care. 2007 Nov;13(11):613-8.

Project Objectives



Improving the value of e-prescribing by creating tools targeted toward the patient



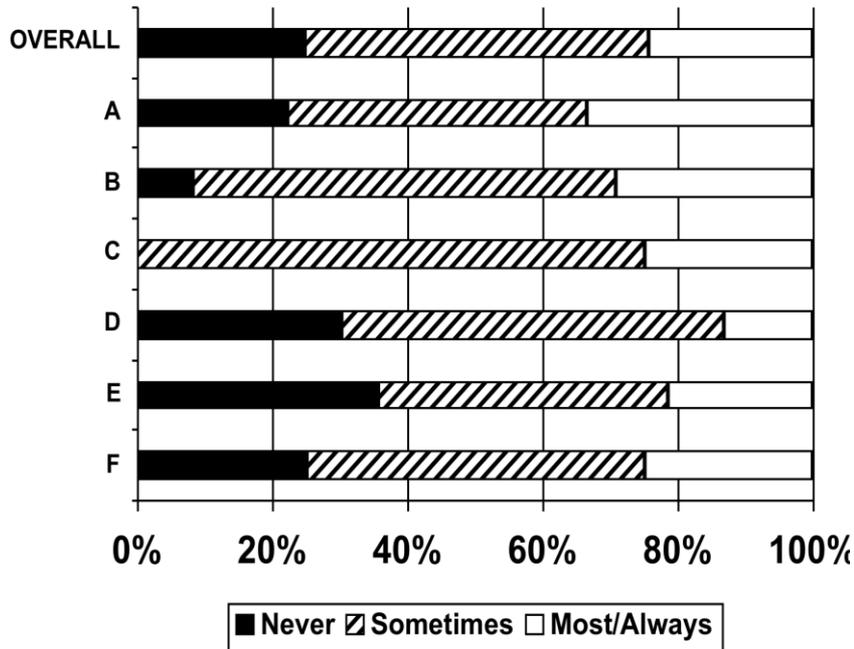
Improving the value of e-prescribing by developing tools targeted toward the clinicians

IMPROVING MEDICATION MANAGEMENT OF OLDER ADULTS

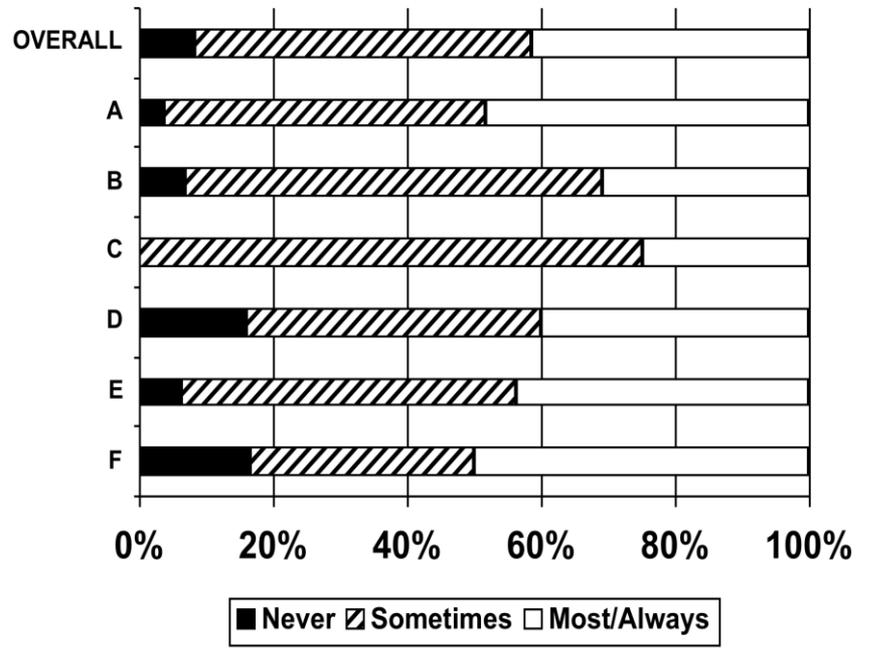
PHYSICIANS AS POINT OF INTERVENTION: ALERT FATIGUE

Physician Software Vendor

DOSE CHECKS



DRUG-DRUG INTERACTIONS



Improving drug alerts

- Drug-drug interactions:
 - interaction alerts were beneficial to patient safety
 - Highly regarded for drugs prescribed by other providers
 - But... number of trivial or unnecessary alerts
 - “as a result of the unnecessary volume of warnings, the warnings themselves get ignored.”
 - “...it’s one of the things that should be fixed somehow because right now this is the boy who is crying wolf, and nobody pays attention to any warnings.”

Lapane, Waring, Schneider, Dube, Quilliam. A MIXED METHOD STUDY OF THE MERITS OF DRUG ALERTS AT POINT OF E-PRESCRIBING IN PRIMARY CARE JGIM 2008

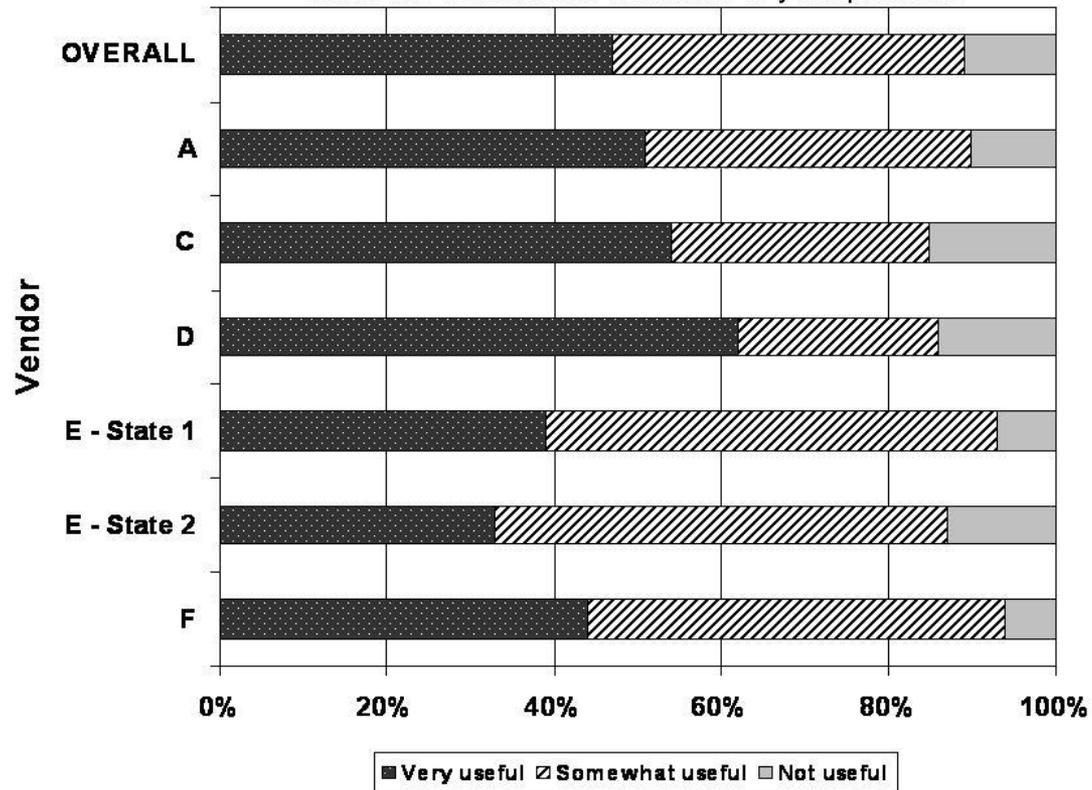
Improving drug alerts

- Removing drug-drug interaction alert for a drug the patient was no longer taking (for example, a short course of antibiotics).
- Running the drug alerts against a current drug regimen instead of the entire medication history to reduce the volume of warnings.
- Making the program less sensitive or more sensible, or allowing providers to set their own level of severity.
- “What they need to do and what some electronic medical record software systems have done is they prioritize the interaction alerts, maybe ten being the most serious and one being the least serious. And then each physician or each practice can kind of set their threshold.”

Lapane, Waring, Schneider, Dube, Quilliam. A MIXED METHOD STUDY OF THE MERITS OF DRUG ALERTS AT POINT OF E-PRESCRIBING IN PRIMARY CARE JGIM 2008

Do doctors really want to know?

Figure D3: Some e-prescribing software has the capability of alerting the physician when the patient has **NOT** picked up a prescription. How useful do you think this information would be to your practice?



Lapane et al. Final report – ERX standards 2007)

USING ELECTRONIC MEDICATION HISTORY – INCORPORATE ADHERENCE ALERTS INTO E-PRESCRIBING SOFTWARE

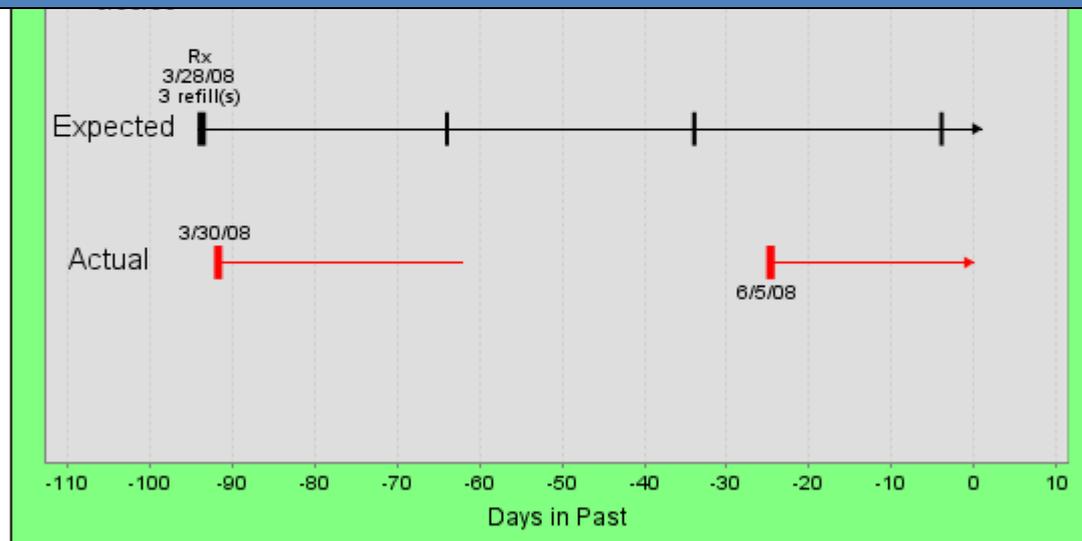
Diovan (valsartan) Tablet 320 mg : 1 tablet by mouth once a day Disp. 30 Rfl #3 (last: 06/25/2008) stop on: 10/23/2008
Actions: [\[Renew\]](#) [\[Prescribe\]](#) [\[Stop\]](#)
Adherence:  Patient is 58% compliant to the treatment regimen. [\[Details\]](#)

Allergies/Adverse Reactions [\[Manage Allergies\]](#)
No known drug allergies (NKDA) .

Problems [\[Manage Problems\]](#)
None.

Pending Prescriptions for this Patient [\[Show All Prescriptions\]](#)

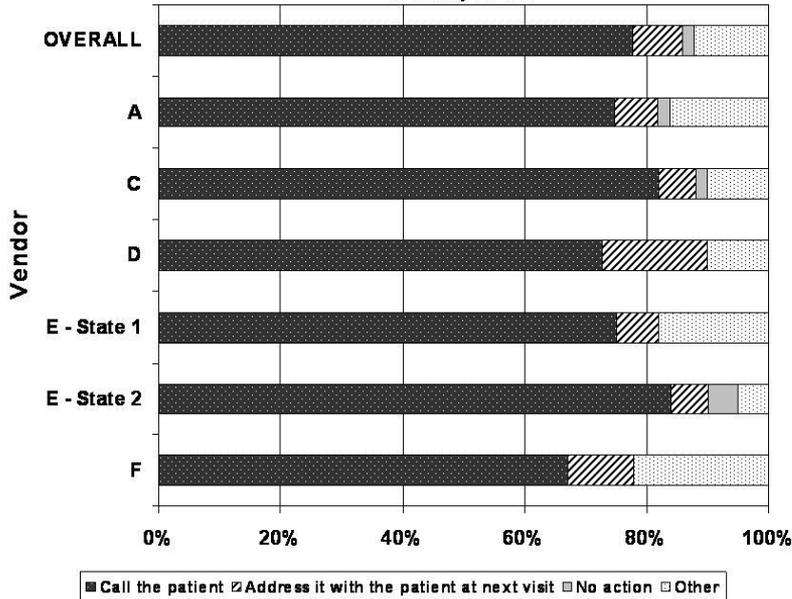
ALLOW FOR CLINICIAN TO "DRILL DOWN" TO SEE A MORE DETAILED FILL PATTERN



Window will close in 294 seconds.

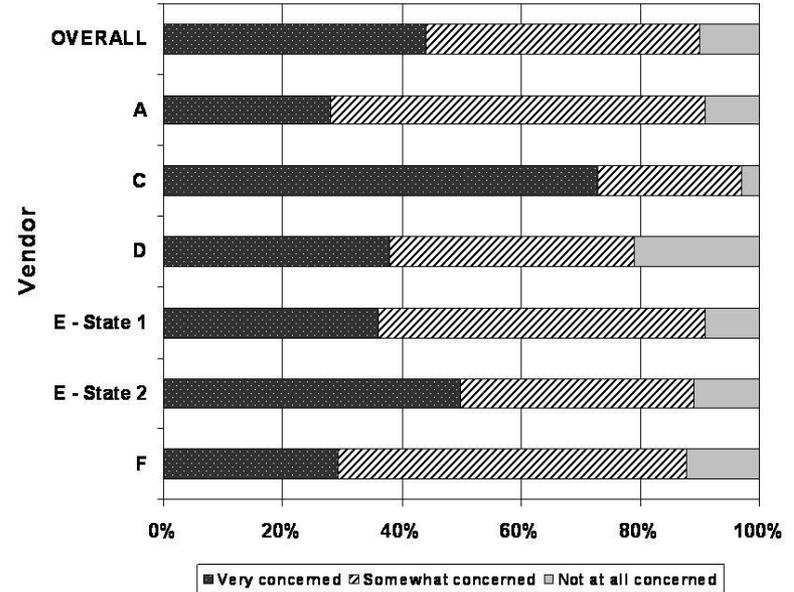
Actions and concerns....

Figure D4: If the e-prescribing software alerted you to when patients did **NOT** pick up prescriptions that would have serious medical consequences if not taken, what would you do?



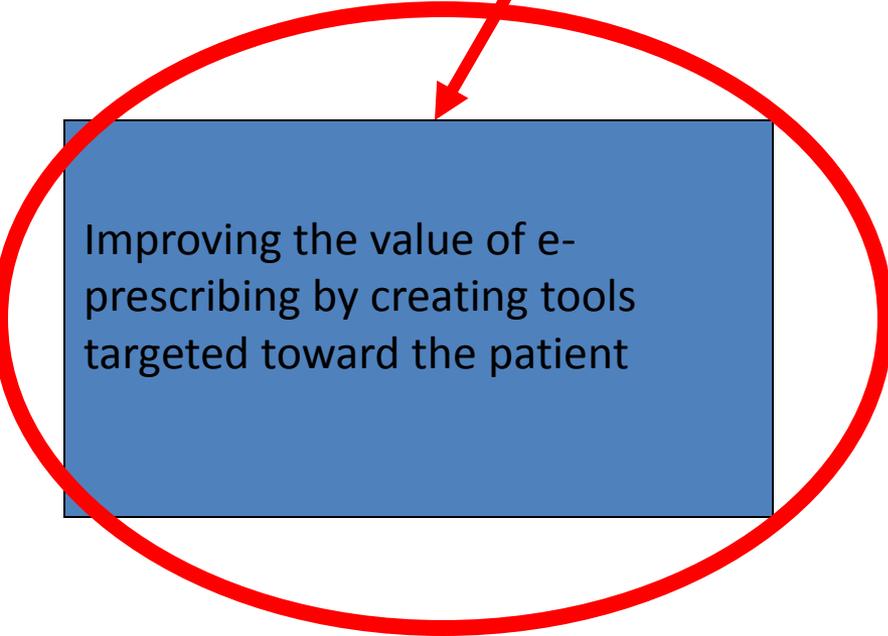
Most clinicians would call patients

Figure D5: How concerned are you about liability if you know a patient did not pick up a prescription?

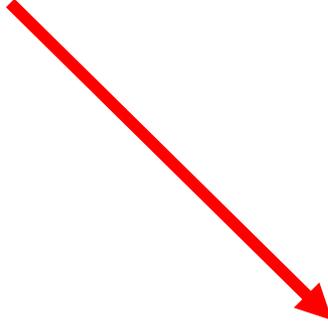


Many clinicians are at least somewhat concerned about liability issues

Project Objectives



Improving the value of e-prescribing by creating tools targeted toward the patient



Improving the value of e-prescribing by developing tools targeted toward the clinicians

IMPROVING MEDICATION MANAGEMENT OF OLDER ADULTS

Specific Aims

- Use Health IT to develop personalized materials in English and Spanish to increase knowledge, self-efficacy, and behaviors related to medication use

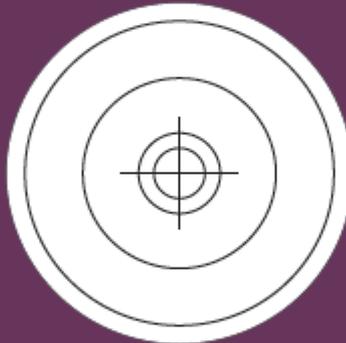
Use formative research approach

- We learned:
 - Readability (English and Spanish)
 - To use vignettes
 - To use testimonials
 - To use actors from different cultures
 - To include doctors in white coats
 - To reinforce participation in health care team

“We need to know, and you need to know.”



It's
your
medicine.

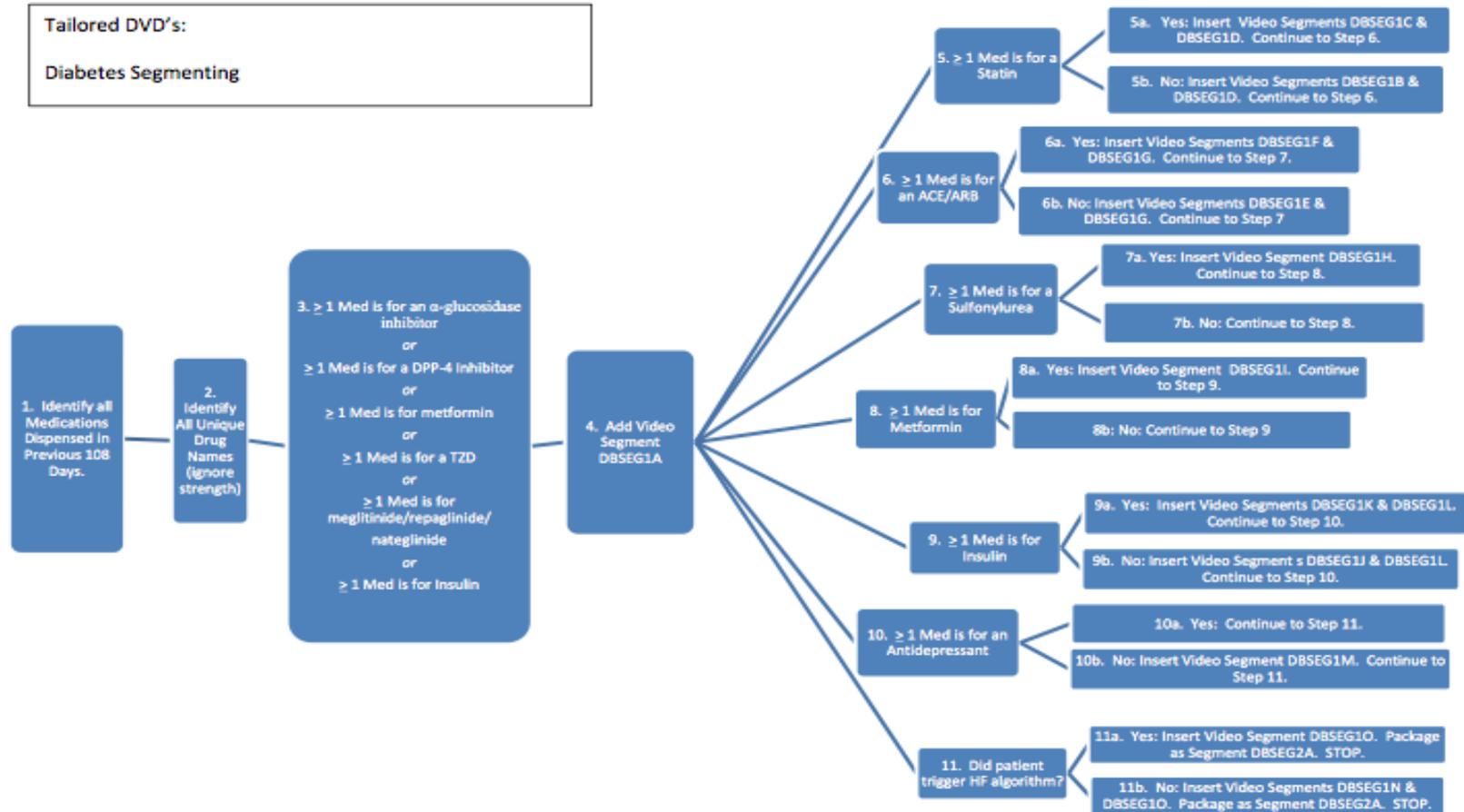


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General Tips

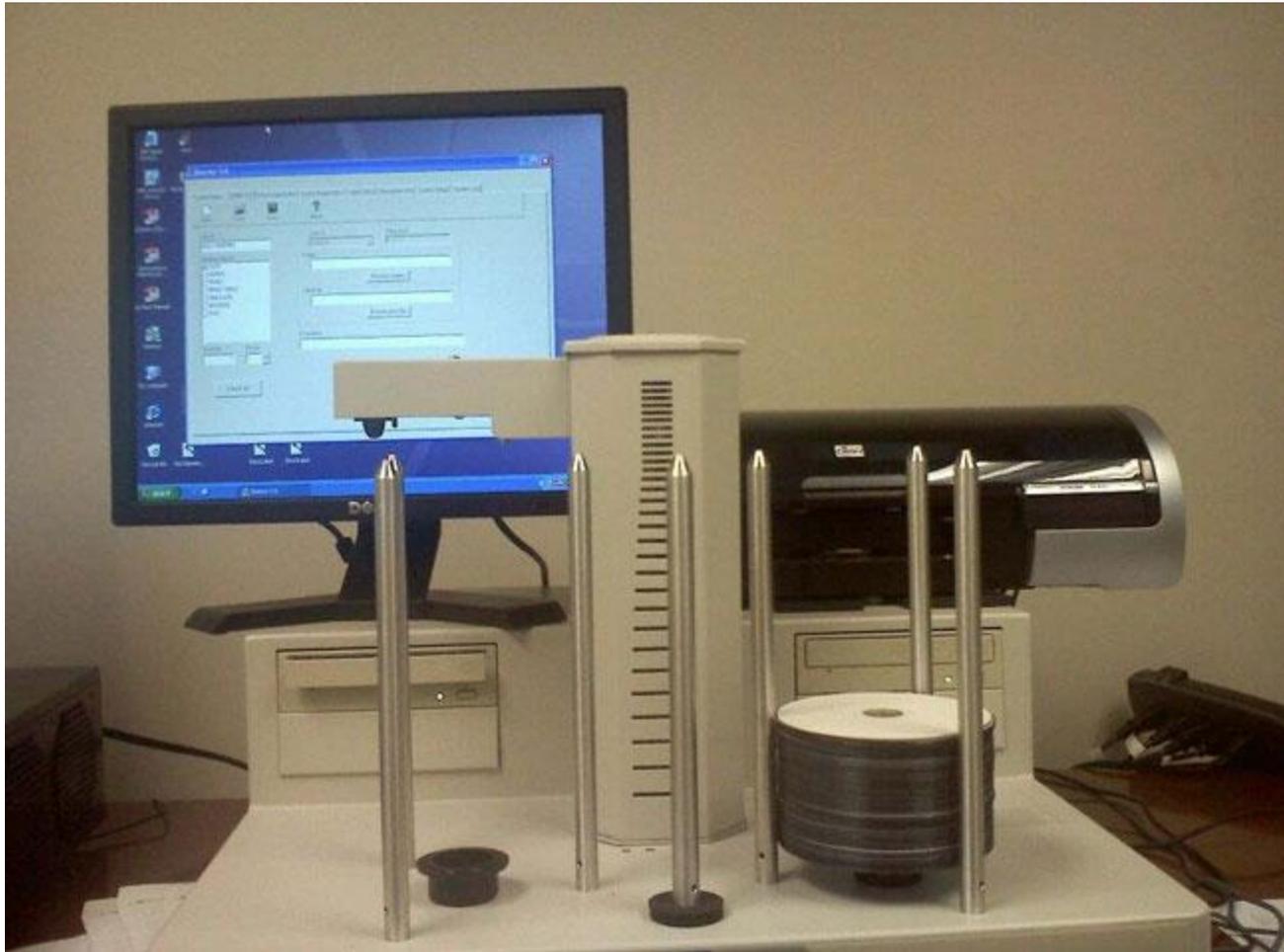
Develop Algorithms to Generate DVDs

Tailored DVD's:
Diabetes Segmenting





It's **your** medicine.





It's *your* medicine.





RESULTS

- 68% found the DVDs to be very helpful, with 62% reporting that the content was very relevant to their lives.
- 95% said DVD lengths were just right.
- 97% preferred having the DVDs given to them spaced apart, rather than all at once.
- 88% said they would have watched the "Shows" on TV if offered
- 12% watched DVDs with friends; 28.3% with family
- 51.6% watched DVDs only once, 39.5% watched twice
- 25% shared the DVDs with family member; 11% with friends

RESULTS

- In general, follow-up questionnaires revealed changes in a positive direction for medication self-management including self-efficacy, reading labels, storing medications, and getting help with medications.
- After viewing of DVDs, diabetes knowledge scores changed significantly ($p=0.008$) with similar effects regardless of language spoken.
- Participants sleep knowledge and sleep hygiene scores changed significantly after viewing the DVDs ($p<0.0001$) with stronger effects observed in those who spoke Spanish relative to the English speakers.

Conclusions

- Use of IT to improve medication management for older adults in ambulatory care settings is possible
- Improvements in e-prescribing software for clinicians are needed and can help the provider understand more about patients' medication-taking behaviors
- Use of IT possible to educate older adults about:
 - the anticipated beneficial effects of medications
 - Effectively communicating with their clinicians
 - Their role in their health care