



EQUIPPED for Age-Friendly Prescribing in the ED



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US Deprescribing Research Network

Disclosure

- Funding for this project from
 - VA Health Services Research & Development
 - AHRQ
 - BCBS Rhode Island
 - VA Office of Geriatrics & Extended Care, Office of Rural Health
 - John A. Hartford Foundation
- Previous consultant for Becton Dickinson & Co. Mar 2021 – Mar 2022
 - Not relevant for today's presentation

Objectives

- Describe prescribing safety concerns for older adults in the emergency department (ED)
- Identify frameworks available to understand factors influencing implementation of quality improvement projects
- Identify effective strategies to promote prescribing behavior change in the ED
- Determine resources needed to implement an age-friendly prescribing safety program in the ED





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EQUIPPED

BACKGROUND



30.9% of adults
75 years and
older visited an
ED in 2019

26% of 65+ adults



The majority of
older adults
evaluated in the
ED are not
admitted to the
hospital



45-65% of older
adults are
prescribed at
least one new
medication at the
time of ED
discharge

[Health, United States 2020–2021 \(cdc.gov\)](https://www.cdc.gov)

Hastings, Smith et al. J Am Geriatr Soc 2013; 61:1515-1521.

Aminzadeh and Dalziel. Ann of Emerg Med, 2002;39:3,238-247

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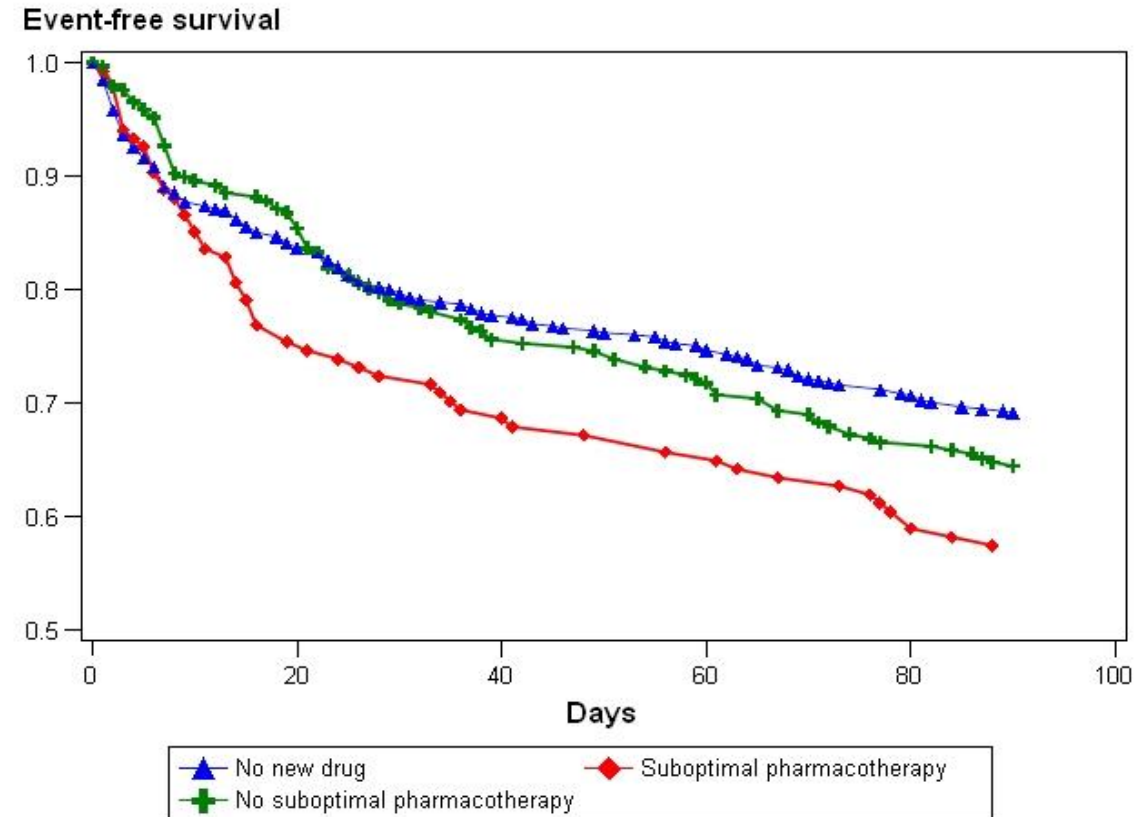
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EQUIPPED

BACKGROUND

- ▲ No new drug
- ⊕ No suboptimal pharmacotherapy
- ◆ Suboptimal pharmacotherapy

Time until first adverse event



Hastings, J Am Geriatr Soc, 2008

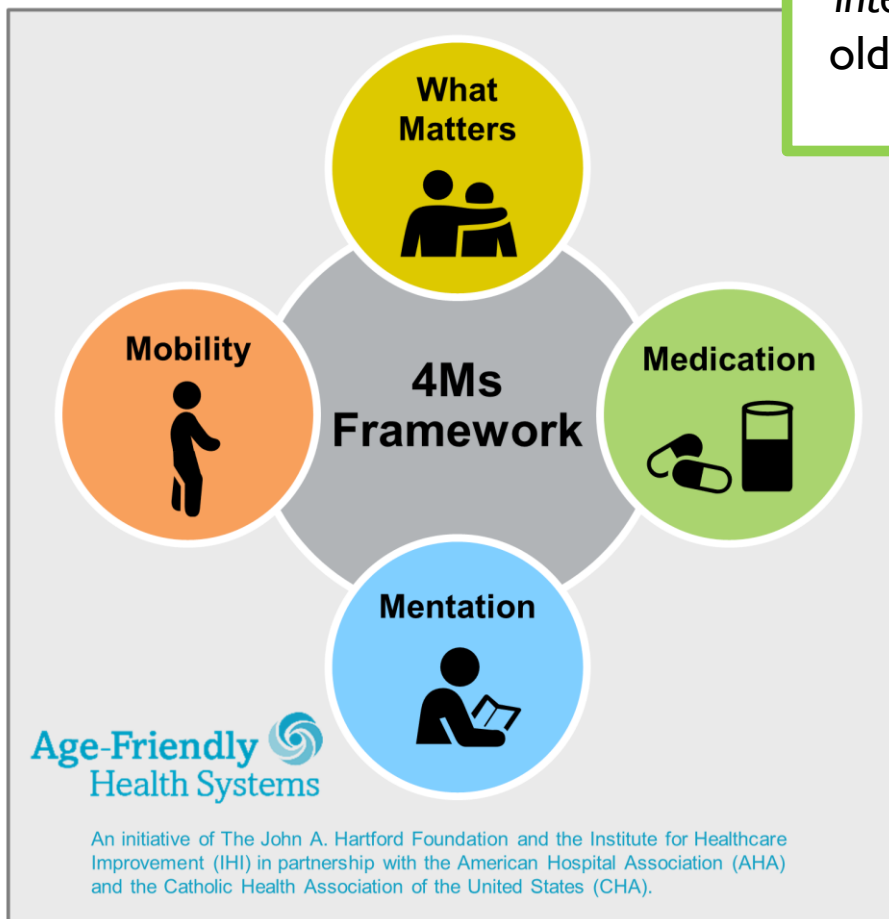


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AGE-FRIENDLY HEALTH SYSTEMS

If medication is necessary, use **Age-Friendly medications** that *do not interfere* with **What Matters** to the older adult, **Mobility**, or **Mentation** across settings of care.



For related work, this graphic may be used in its entirety without requesting permission.
Graphic files and guidance at ihi.org/AgeFriendly

GERIATRIC EMERGENCY DEPARTMENTS

Accreditation
process began in
2018 through ACEP

All levels (1,2,3)
require QI
initiatives aimed at
improving care for
older adults



THE BEERS CRITERIA



Developed

In 1991 by Mark Beers,
MD



Used in **EQUIPPED**

To define potentially
inappropriate
medications



Revised

In 1997, 2003, 2012,
2015, 2019, 2023 by an
evidence-based
consensus panel



Describes

Medications, as well as
medication/disease
combinations, to avoid in
the elderly

THE BEERS CRITERIA

Most widely cited criteria to assess inappropriate prescribing

Initially proposed for long-term care

Now promoted for all sites of geriatric care

Evaluated as a proxy for quality of prescribing

Examples include most muscle relaxants, chronic NSAIDS, many anticholinergic medications

Lund et al, Ann Pharmacother, 2011



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Aim Statement

Primary Goal

To decrease the proportion of potentially inappropriate medications (PIMs)* prescribed to Veterans aged 65 years of age and older at the time of discharge from the ED to 5% or less

Stevens, J Am Geriatr Soc, 2015

*PIMs defined by the American Geriatrics Society Beers Criteria® and adapted for the ED



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The EQUIPPED program

Collaborative between Geriatric Research, Education and Clinical Sites (GRECCs) at 3 VAMCs
 Now expanded to 20 VA sites (8 new sites in FY20) and 5 civilian hospital systems

Focus

Medication Safety
 QI Benchmark: Beers Criteria

Target

ED Providers

Funding

VHA Office of Geriatrics and Extended Care
 VHA Office of Rural Health & AHRQ
 VA HSR&D
 BCBS-Rhode Island



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Influencing Prescribing Behavior: 3 Core Components



EDUCATION

Didactic education and academic detailing focused on reducing potentially inappropriate medications



CLINICAL DECISION SUPPORT

Discharge medication order sets designed to promote safer prescribing and provide alternatives to potentially inappropriate medications



INDIVIDUAL PROVIDER FEEDBACK

Providers receive monthly prescribing feedback reports that include individual prescribing habits, peer benchmarking, and alternate prescribing recommendations

Providers meet with the site champion at least once for 1:1 academic detailing

Clinical Decision Support: Discharge Order Sets

Electronic Decision Support Tools

Discharge medication order sets

- Point of prescribing education
- Links to online geriatric content

Avoid drug alert messages that require acknowledgement

EMERGENCY DEPT GERIATRICS CARE		
ANTIBIOTICS **Empiric choices if no culture data available** SKIN/SOFT TISSUE INFECTIONS	DIABETES MELLITUS DIABETES DRUGS/SUPPLIES	PAIN/RHEUMATOLOGY ARTHRITIS/CHRONIC PAIN GOUT
GI Antibiotics CLOSTRIDIUM DIFFICILE INFECTION INFECTIOUS DIARRHEA	GASTROINTESTINAL GI Constipation *Patient info chronic constipation *Patient info firmer bowel movements *Patient handout for fiber *Patient handout for lifestyle modification GERD/PEPTIC ULCER DISEASE NAUSEA	PSYCHIATRY DEPRESSION GENERAL WARNINGS and CONSULTS
Respiratory Antibiotics COPD/BRONCHITIS PNEUMONIA SINUSITIS	GYNECOLOGY GYNECOLOGY (IP) GYNECOLOGY (OP)	PULMONARY ALLERGIC RHINITIS URI
GU Antibiotics STD UTI WOMEN ORDER SET UTI ORDER MEN	NEUROLOGY DEMENTIA/AGITATION NEUROPATHY SEIZURES VERTIGO PARKINSONS	UROLOGY ERECTILE DYSFUNCTION INCONTINENCE URINE RETENTION *Patient info urge suppression *Patient info scheduled toileting *Patient info bladder diary *Patient info fluid management
ANTICOAGULATION ANTICOAGULATION GUIDELINES DVT W/COUMADIN *Patient info coumadin diet *Patient info general precautions	OTHERS GERIATRIC AND EXTENDED CARE OUTPT HISTORY OF FALLS *Patient info risk of falls VACCINE ORDERING MENU *PATIENT INFO HANDOUTS AVAILABLE ON DESKTOP	
CARDIOLOGY ANTIARRHYTHMICS ORDER SET HYPERLIPIDEMIA HYPERTENSION CHF		
DERMATOLOGY CONTACT DERMATITIS ECZEMA *Patient info for Eczema POISON IVY *Patient info for poison ivy SHINGLES *Dermatome map for shingles *Patient info for shingles TINEA URTICARIA WOUND CARE *Patient info wound care dressings *Patient info skin care guidelines		



Stevens, J Am Geriatr Soc, 2015

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Clinical Decision Support: Discharge Order Sets

ER Geriatrics Pain/Rheumatology: Arthritis/Chronic Pain
*****Consider Palliative Care Consult for Pain Management*****

AVOID

1. Avoid Toradol (Ketorolac) Use
2. Avoid Muscle Relaxants:
 Poorly tolerated, anticholinergic, sedation, increase risk of fractures and of questionable efficacy
3. Avoid High Dose NSAIDS

OPIATES

***The American College of Rheumatology recommends caution with the use of narcotics for OA. Please follow the hospital's opiate policy for the use of narcotics for acute and chronic pain

***Opiates can cause constipation, seizures, confusion, sedation, cardiorespiratory depression

***Codeine, meperidine and butorphanol are poor choices

Acetaminophen/hydrocodone 5/325mg tab Q8H PRN for 3 days
 Tramadol 50mg tab PO Q6H PRN for 3 days

For patients on OPIATES consider drugs for constipation

Senna 2 tabs PO daily PRN
 Bisacodyl 10mg suppository BID PRN for 5 days
 Polyethylene glycol PO daily for 7 days

Acetaminophen 650mg PO Q6H PRN for 10 days
 DO NOT EXCEED 3000mg in a 24 hour period. Also check OTC drugs to be sure they don't contain Acetaminophen or Tylenol

NSAID

***INDOMETHACIN is more likely than other NSAIDs to have adverse CNS effects
 GI bleeding, acute kidney disease

***May cause fluid retention and exacerbate heart failure

Ibuprofen 200mg tab PO Q6H PRN for 5 days
 Ibuprofen 400mg tab PO Q6H PRN x 5d

1664 - CDRS issues by Steven M. Lipp, MD (http://www.medscape.com)

Outpatient Medications

AMITRIPTYLINE TAB

USE WITH CAUTION IN PTS >= 65 YEARS

Dosage	Complex
10MG	0.0143
20MG	0.0286
25MG	0.0163
50MG	0.0196
75MG	0.0359
100MG	0.041
150MG	0.0776
200MG	0.082

Discharge Order Set – Cerner Site

Topical Medications		
<input type="checkbox"/>	lidocaine topical (lidocaine 4% topical cream)	See Directions, Topical, TID, # 30 gm, Apply to affected area. Avoid application on sensitive areas, wash hands with soap and water after ...
<input type="checkbox"/>	lidocaine topical (Lidoderm 5% topical film)	See Directions, Topical, qDay, PRN pain-mild, # 14 patch(es), Apply 1 patch to affected area up to 12 hours per day and remove, maxim...
	Out of pocket cost > \$100, consider social work consult if necessary.	
<input type="checkbox"/>	diclofenac topical (Diclofenac 1% topical gel)	See Directions, Topical, q6hr, PRN pain-mild, # 100 gm, Apply 2 grams to the skin over affected area. Not to exceed 8g in any single join...
Oral Medications		
	Acetaminophen	
<input type="checkbox"/>	acetaminophen (acetaminophen 325 mg oral tablet)	= 2 tab(s), PO, q6hr, PRN pain-mild, # 28 tab(s), X 7 day(s) Do not combine with other acetaminophen products or exceed more than 3000 mg in 24 hours.
	NSAIDS	
<input type="checkbox"/>	ibuprofen (ibuprofen 200 mg oral tablet)	= 1 tab(s), PO, q6hr, PRN pain-mild, # 12 tab(s)
	Avoid use with GFR < 30 ml/min, h/o recent MI, HTN, and HF.	
	Muscle relaxant	
	Do not use in ESRD on peritoneal dialysis.	
	Avoid in lieu of topical agents or superficial heat/ice.	
<input type="checkbox"/>	baclofen (baclofen 5 mg oral tablet)	= 1 tab(s), PO, TID, PRN pain-mild, # 9 tab(s)
	For CrCl > 80 mL/min	
<input type="checkbox"/>	baclofen (baclofen 5 mg oral tablet)	= 1 tab(s), PO, BID, PRN pain-mild, # 6 tab(s)
	For CrCl 51-80 mL/min	
<input type="checkbox"/>	baclofen (baclofen 5 mg oral tablet)	= 0.5 tab(s), PO, TID, PRN pain-mild, # 5 tab(s)
	For CrCl 30-50 mL/min	
<input type="checkbox"/>	baclofen (baclofen 5 mg oral tablet)	= 0.5 tab(s), PO, BID, PRN pain-mild, # 3 tab(s)
	For CrCl < 30 mL/min	
	Opioid pain management	
	If prescribing opiate pain medication, consider prescribing prophylactic medication to treat constipation. Do not combine with other acetaminophen products or exceed more than 3000 mg in 24 hours.	
<input type="checkbox"/>	acetaminophen-hydrocodone (Norco 5 mg-325 mg o...	= 0.5 tab(s), PO, q6hr, PRN pain-severe, # 9 tab(s), May increase to 1 tab po q 6 hr for uncontrolled pain.
<input type="checkbox"/>	oxyCODONE (oxyCODONE 5 mg oral tablet)	= 0.5 tab(s), PO, q8hr, PRN pain-severe, # 9 tab(s), May increase to 1 tab po q 8 hr for uncontrolled pain.
	Constipation	
	Please use shortest effective dose and duration of treatment. Polyethylene glycol can be combined with prune juice or sennosides.	
<input type="checkbox"/>	polyethylene glycol 3350 (MiraLax oral powder for rec...	= 1 packet(s) 17 gm, PO, qDay, # 14 packet(s), Dissolve one packet in 4-8 oz of liquid.
<input type="checkbox"/>	bisacodyl (Dulcolax Laxative 10 mg rectal suppository)	= 1 supp, PR, Once, # 2 supp, May repeat in 24 hours if no BM.
<input type="checkbox"/>	senna (Senokot 8.6 mg oral tablet)	= 2 tab(s), PO, qHS, # 60 tab(s), X 30 day(s)

Test Patient, ... MRN: 20154597 Age: 66 yrs Blood Type: ... 36 °C (96.8 °F) CC: Diabetes TT: 15125:08 Isolation: ...
AKA: None Sex: Female Unit: GHS EMERGENCY... Special Need... 48bpm, 90/55, 14 Allergies: Lexiscan, P... Code: FULL Infection: ... PCP w/ Phone: SCHMI...
CSN: 1014605574 DOB: 10/10/1950 Room and Bed: OTF1 OTF SaO2: 96% Weight: 65.772 kg (145... Suicide Risk: None Active F... LOS: 0 (H:0 E:1 M:0)

- Snapshot
- Summary
- Chart Review
- Results Review
- Problem List
- History
- Notes
- Demographics
- Medications
- Allergies
- Orders
- Admit
- Discharge
- Immunizations
- MAR
- Flowsheets
- Patient Events L...
- ED Navigator
- Consents
- FYI
- More Activities

- ED Navigator
- Charting
 - MSE
 - Pre-Arrival Info
 - Tx Team
 - AVS
 - Request Outside Records
- Active Home Meds (0):
None
- Allergies (6):
Lexiscan
Pcn-200
- Problems (16):
Chronic Pain - Se*
Diabetes Mellitus
- Provider Notes
 - ED Notes
 - CDU Provider Notes
 - Consults
 - Annotated Images
 - Consents
- Orders
- Order Review
 - Order Sets
 - Orders
- Disposition
- Final Diagnosis
 - Second Signature
 - Follow-Up
 - Discharge Inst
- Geriatric OrderSet
- Work/School Excuse
 - Comm Mgt
 - Disposition
 - Charge Capture
- Review
- Triage Summary
 - Chief Complaint
 - Ten
 - Triage Plan
 - Vitals
 - Allergies
 - Weight
 - Home Medications
 - History
 - Patient FYI Flag
 - SBIRT
 - HIV Results
 - HIV Screening
 - Travel Screen

Alcohol Withdrawal

Pain/Rheumatology

Arthritis 0 of 3 selected

Chronic Pain

- Avoid ketorolac (Toradol) use
- Avoid muscle relaxants
- Avoid high dose NSAIDS

- Drugs for Pain
 - acetaminophen (TYLENOL) 325 MG tablet
Disp-120 tablet, R-0, Normal
 - hydrocodone-acetaminophen (LORTAB, VICODIN) 5-325 MG per tablet
Disp-9 tablet, R-0, Normal
 - traMADol (ULTRAM) 50 mg tablet
Disp-60 tablet, R-0, Normal
 - ibuprofen (MOTRIN) 200 mg tablet
Disp-20 tablet, R-0, Normal
 - oxyCODONE IR (ROXICODONE) 5 mg immediate release tablet
Disp-18 tablet, R-0, Normal
- Drugs for Bowel Regimen
 - bisacodyl (DULCOLAX) 10 mg suppository
Disp-10 suppository, R-0, Normal
 - docusate sodium (COLACE) 100 mg capsule
Disp-30 capsule, R-0, Normal
 - polyethylene glycol (MIRALAX) packet
Disp-7 packet, R-0, Normal
 - sennosides (SENNA-GEN) 8.6 MG tablet
Disp-60 tablet, R-0, Normal
- Topical Treatment
 - capsaicin (ZOSTRIX) 0.025 % cream
Normal
 - lidocaine (ASPERCREME) 4 % cream
Normal
 - diclofenac (VOLTAREN) 1 % gel
Normal

Gout 0 of 4 selected

Neuropathy 0 of 3 selected

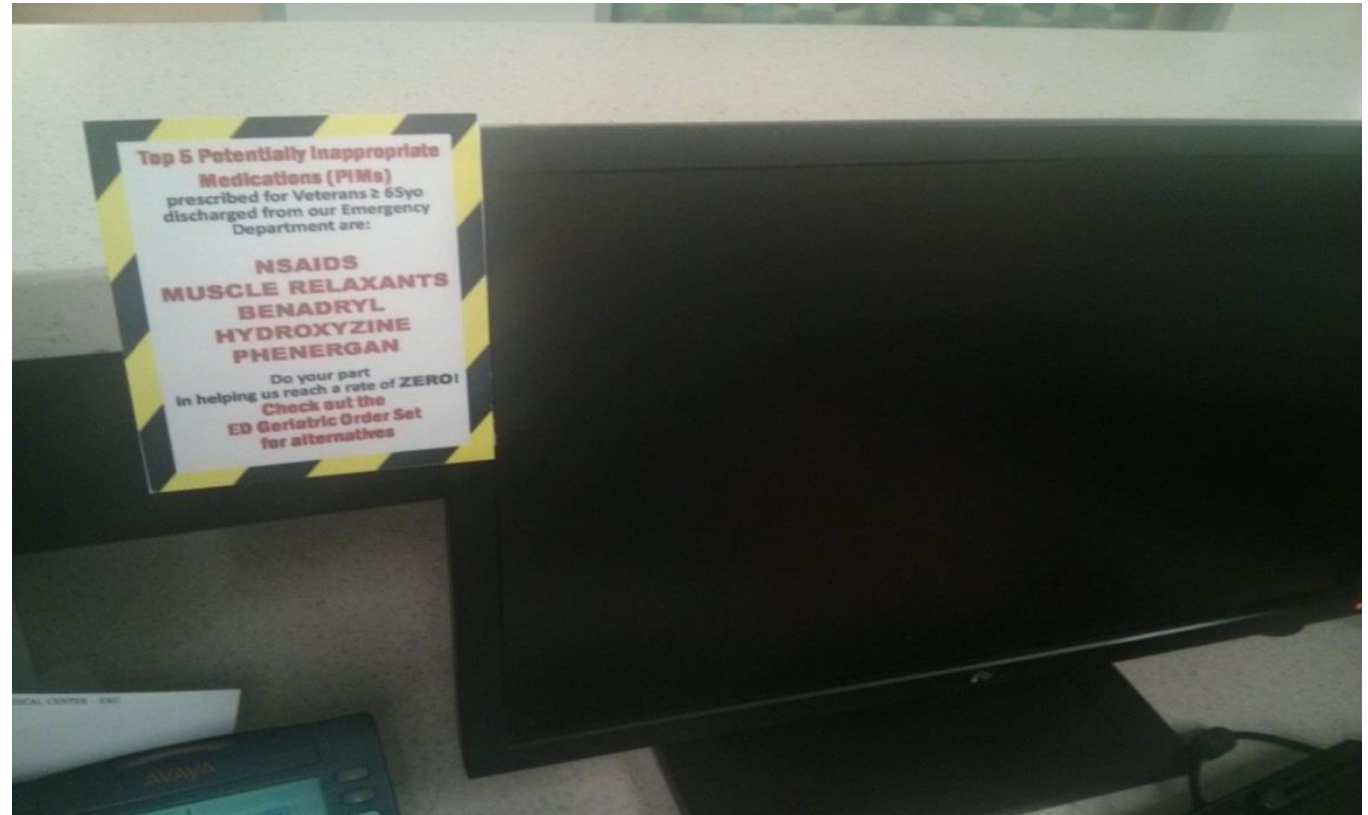
Pulmonary

Adaptation of Clinical Decision Support

Top 5 Potentially Inappropriately Medications (PIMs)
prescribed for Veterans \geq 65yo
discharged from our Emergency
Department are:

NSAIDS
MUSCLE RELAXANTS
BENADRYL
HYDROXYZINE
PHENERGAN

Do your part
in helping us reach a rate of ZERO!
Check out the
ED Geriatric Order Set for
alternatives



EQUIPPED Provider Feedback



Potentially Inappropriate Medication (PIM) Dashboard

Informed by an Evidence-Based List of Medications to Avoid in Older Adults [Link to Publication](#)



Provider Name:

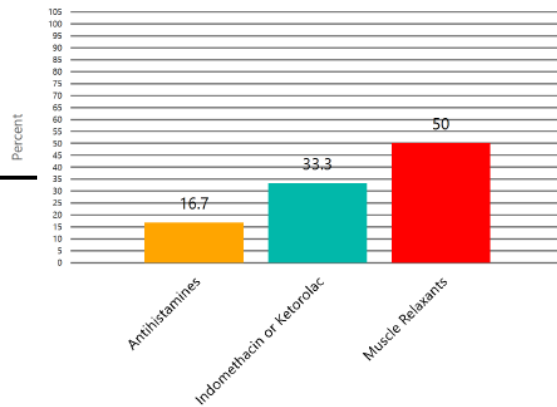
In the last 30 days...

[30](#) patients have been seen in ED (65+)

[19](#) discharge Rx's written

Distribution of PIMs Prescribed in the Last Year
by Therapeutic Class

(Select Bar to Drill Down)



Percentage of PIMs Prescribed in the last 30 Days

(Select Percentage to Drill Down)



Last 30-Day Site Average: 6.1%

Key Performance Indicators

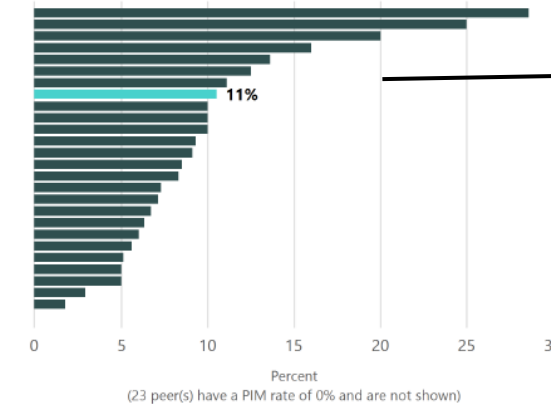
30-Day PIM Rate has ↓ by -3.8 Percentage Points Compared to Prior 30 Days



30-Day PIM Rate has ↑ by 9.0 Percentage Points Compared to Prior 6m Avg



Site Peer to Peer Benchmarks:
Percentage of PIMs Prescribed in the last 30 Days



(23 peer(s) have a PIM rate of 0% and are not shown)

Past Prescribing History: Monthly Percent of PIMs Issued

(Select Data Points to Drill Down)



Report User: VHA07/VHAATGVaughE1

Data Last Refreshed: 7/12/2021 12:00:00 AM

Problems? Feedback is Welcome!

[Click here to contact us.](#)



Monthly PIM Percentage

Peer Benchmarking

Monthly Prescribing Trends

Percent of PIMs written in the last year, organized by drug class

Stevens, J Am Geriatr Soc, 2015
Burningham Z Clin Ther, 2020



EQUIPPED Provider Feedback



Potentially Inappropriate Medication (PIM)

Informed by an Evidence-Based List of Medications to Avoid in Older Adults [Link to Publication](#)



GO BACK

Provider Name:

Drug Name	VA Drug Class	Rx Number	Issue Date	Fill Date	Days Supply	QTY Per Day	Recommendation	Quality of Evidence	Alternative Therapies
CYCLOBENZAPRINE HCL 10MG TAB	SKELETAL MUSCLE RELAXANTS				5	3.00	Avoid	Moderate: Risk of adverse events identified, but study consistency needs improvement	For acute mild or moderate pain—acetaminophen, nonacetylated salicylate (e.g., salsalate), propionic acid derivatives if no heart failure or eGFR >30 mL/min and given with PPI for gastroprotection if used for >7 days
MECLIZINE HCL 12.5MG TAB	ANTIVERTIGO AGENTS				4	8.00	Avoid	Moderate: Risk of adverse events identified, but study consistency needs improvement	Intranasal normal saline; Second-generation antihistamine (e.g., cetirizine, loratadine); Intranasal steroid (e.g., fluticasone, over the counter)

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Problems? Feedback is Welcome!
[Click here to contact us.](#)

If the provider has prescribed any PIMs that month, the feedback form will include the list of specific drugs prescribed



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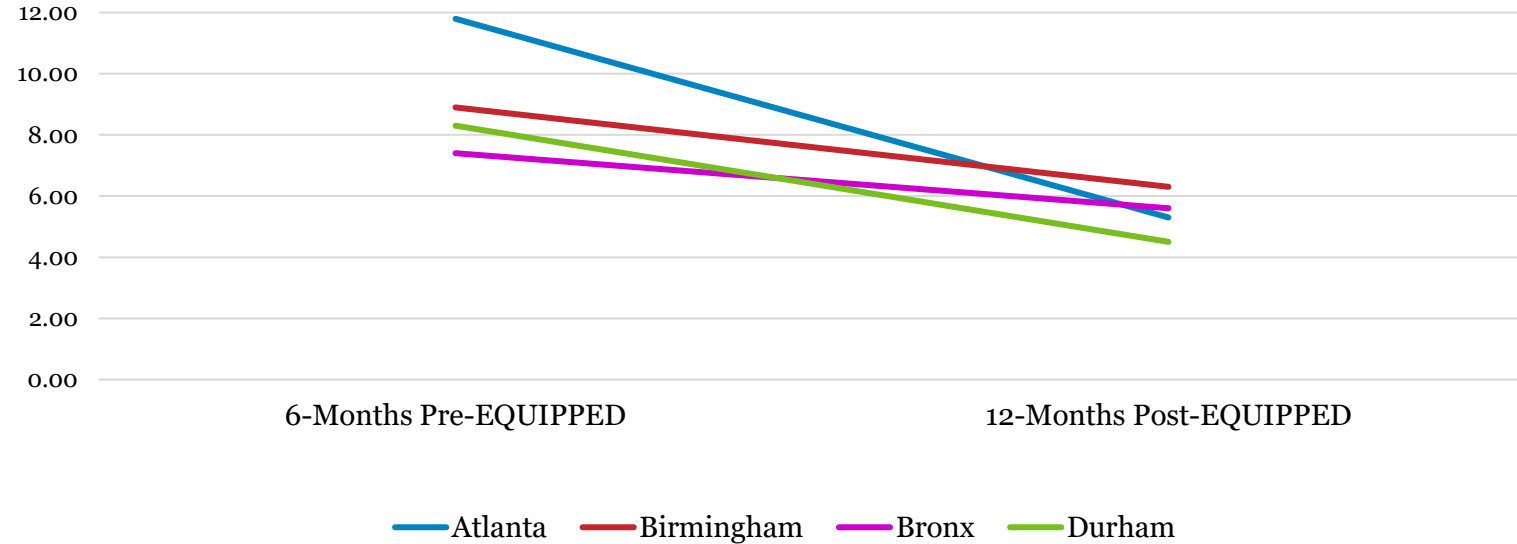
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EQUIPPED VA Outcomes

Site	Pre-EQUIPPED	Post-EQUIPPED	p value*
Atlanta	11.8 (SD 1.8)	5.3 (SD 1.5)	<0.0001
Birmingham	8.9 (SD 1.9)	6.3 (SD 1.4)	0.0025
Bronx	7.4 (SD 1.7)	5.6 (SD 1.0)	0.04
Durham	8.3 (SD 0.8)	4.5 (SD 1.0)	<0.0001

*p-value: Poisson regression including offset term for site's total number of prescriptions

Average Monthly Proportion of PIMs



6.5%

Change in average monthly proportion of PIMs pre and post EQUIPPED in Atlanta

2.6%

Change in average monthly proportion of PIMs pre and post EQUIPPED in Birmingham

1.8%

Change in average monthly proportion of PIMs pre and post EQUIPPED in Bronx

3.8%

Change in average monthly proportion of PIMs pre and post EQUIPPED in Durham



EQUIPPED VA Outcomes

Site	Pre-EQUIPPED	Post-EQUIPPED	p value*
Atlanta 92 months post	8.6 (SD 0.7)	5.5 (SD 1.1)	<0.0001
Birmingham 76 months post	9.7 (SD 2.5)	4.7 (SD 2.1)	<0.0001
Bronx 72 months post	7.6 (SD 1.1)	5.2 (SD 1.5)	<0.001
Durham 81 months post	9.1 (SD 1.1)	4.5 (SD 1.1)	<0.0001
Asheville 69 months post	7.9 (SD 1.3)	5.9 (SD 1.3)	<0.0001
CAVHS 65 months post	11.0 (SD 1.5)	8.7 (SD 1.8)	0.01
TVHS-Nashville 64 months post	6.6 (SD 1.0)	5.8 (SD 1.4)	0.02
TVHS-Murfreesboro 64 months post	11.1 (SD 0.8)	8.8 (SD 1.6)	<0.0001
Orlando 38 months post	8.1 (SD 1.4)	9.1 (SD 1.8)	0.008 (worse)
San Antonio 40 months post	7.7 (SD 1.3)	8.4 (SD 1.6)	0.06 (worse)
Cleveland 22 months post	8.7 (SD 1.0)	5.6 (SD 1.3)	<0.0001
New Orleans 19 months post	9.5 (SD 1.6)	4.4 (SD 1.4)	<0.0001

*Poisson regression with total prescriptions as offset term



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SPREAD

VA EQUIPPED Implementation

VA HSR&D Implementation study funded FY19
FY20 expansion to 8 additional VA sites

Non-VA EQUIPPED Implementation

- AHRQ R18 funding 2016-2019 Expansion to Epic sites, affiliates of VA GRECCs
 - Grady, Mount Sinai Hospital, Duke
- AHRQ R18: 2019-2021 (PI: Vandenberg)
 - Scaling EQUIPPED: Expansion to EUH and at 3 Mount Sinai sites

BCBS Rhode Island 2019 expansion (PI: E. Goldberg)

Evaluation Framework

- Implementation Scientist
Michelle Kegler, PhD (Emory)

- RE-AIM

- Reach
- Effectiveness
- Adoption
- Implementation
- Maintenance

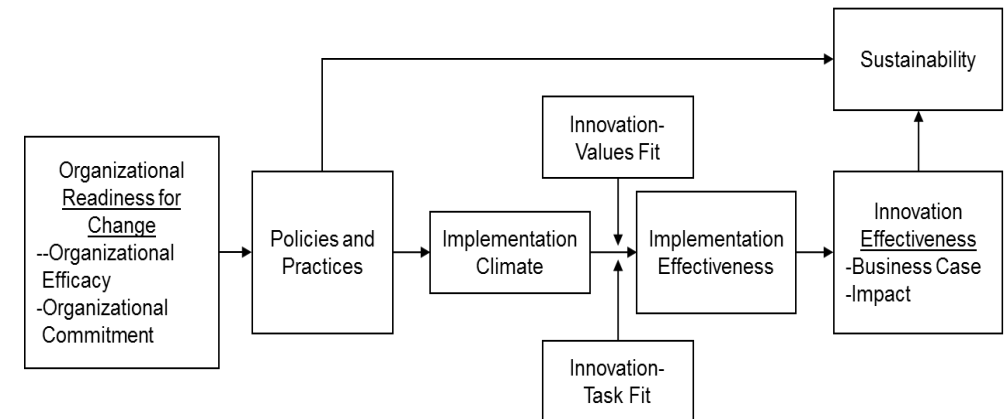


- Implementation Scientist
George Jackson, PhD
(Duke/Durham)

- Organizational Theory of Implementation Effectiveness

- Organizational Readiness for Change as a key factor

Components of the Organizational Theory of Implementation Effectiveness (OTIE)



- Consolidated Framework for Implementation Research

- Understand implementation facilitators and barriers

*Glasgow RE et al. Am J Public Health 1999
Klein K, Sorra J, Acad Manag Rev. 1996*

Methods for Implementation Evaluation

- Focus group with implementation team
- Provider surveys
- Evaluation of prescribing data
- Evaluation of meeting notes
- Combined measure to determine provider education
 - Gathered through attendance records and survey responses

Stevens et al. *J Am Geriatr Soc*, 2017

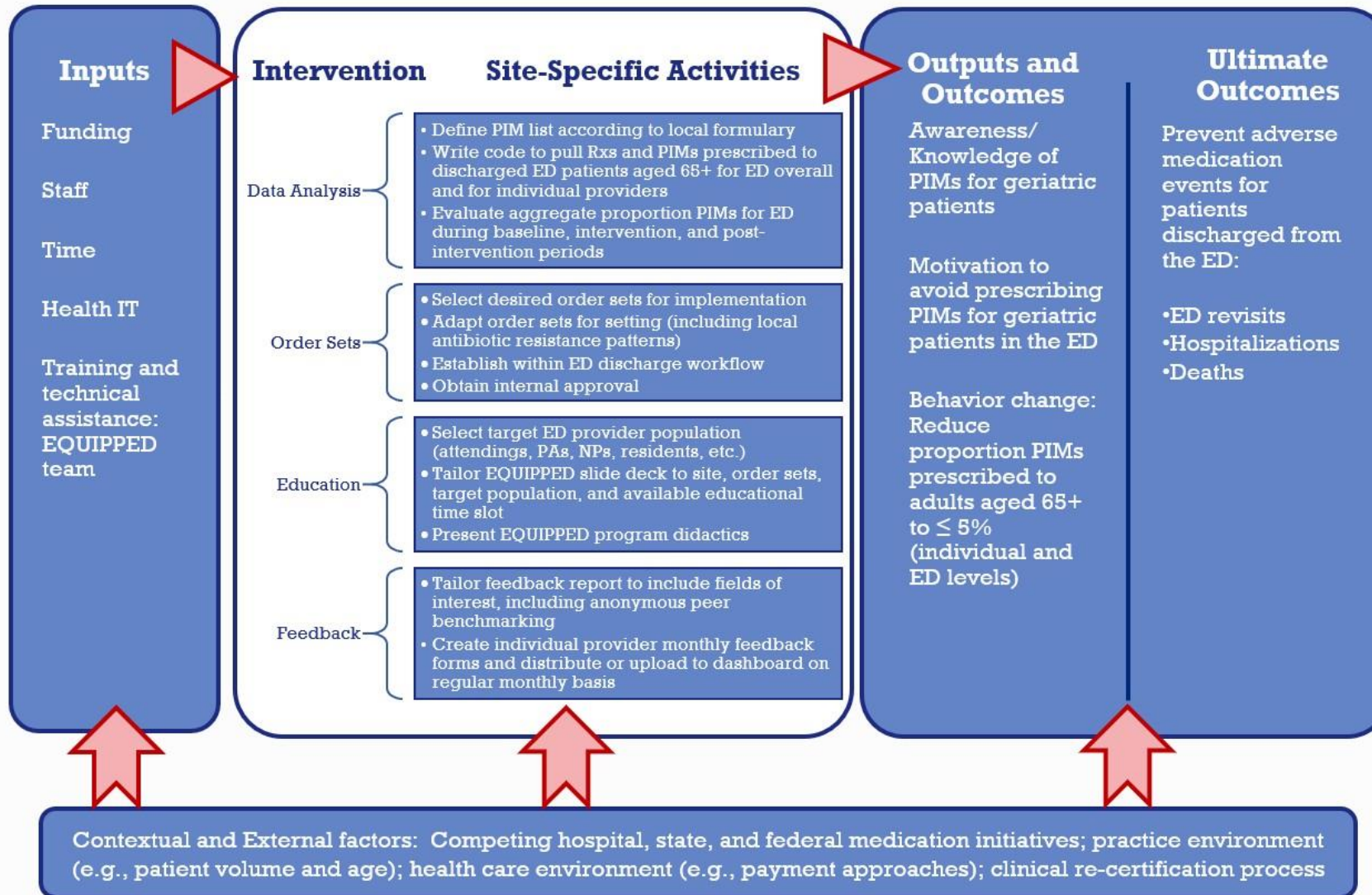
Kegler et al. *Front Health Services Research* 2022

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Toolkit to Assess Readiness for EQUIPPED



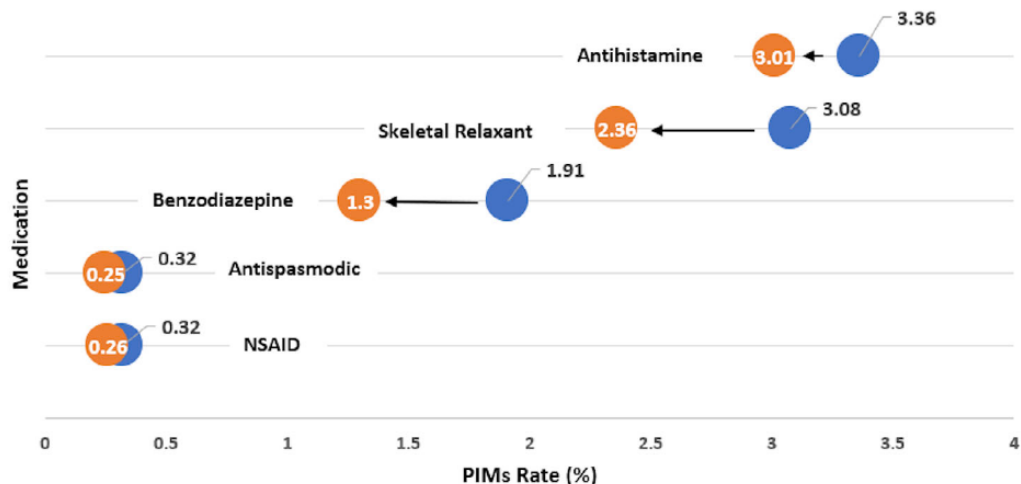
Enhancing the quality of prescribing practices for older adults discharged from the emergency department in Rhode Island

Elizabeth M. Goldberg MD, ScM¹ | Timmy R. Lin MPH¹ |
 Cheston B. Cunha MD² | Nadia Mujahid MD, AGSF³ |
 Natalie M. Davoodi MPH¹ | Camille P. Vaughan MD, MS⁴

TABLE 1 Characteristics of clinicians (n = 247)

Characteristic	n (%)
Credentials	
Attending physician	119 (48.2%)
Resident physician	67 (27.1%)
Advanced practice provider	61 (24.7%)
Participated in intervention	
Yes	224 (90.7%)
No	23 (9.3%)
Clinician prescribed at least one PIM	
Yes	228 (92.3%)
No	19 (7.7%)

Change of potentially inappropriate medications (PIMs) rates by drug class between pre-implementation and post-implementation periods



EQUIPPED Export Results

BMJ Open Quality Early prescribing outcomes after exporting the EQUIPPED medication safety improvement programme

Camille P Vaughan,^{1,2} Ula Hwang,^{3,4} Ann E Vandenberg,¹ Traci Leong,⁵ Daniel Wu,¹ Melissa B Stevens,^{1,2} Carolyn Clevenger,⁶ Stephanie Eucker,⁷ Nick Genes,⁸ Wennie Huang,⁷ Edidiong Ikpe-Ekpo,⁹ Denise Nassisi,⁸ Laura Previl,⁷ Sandra Rodriguez,¹⁰ Martine Sanon,⁸ David Schlientz,⁷ Debbie Vigliotti,¹¹ S Nicole Hastings^{7,12}

Table 1 Aggregate pre-EQUIPPED and post-EQUIPPED PIM prescribing and specific PIM drug classes at each implementation site

	Pre-EQUIPPED (%) (95% CI for All PIMs)*	Post-EQUIPPED (%) (95% CI for All PIMs)*	P value†
Site 1			
All PIMs	5.6 (5.0 to 6.3)	5.1 (4.7 to 5.5)	0.02
Benzodiazepine	16.6	9.5	0.04
Skeletal muscle relaxant	34.4	36.9	0.44
Antihistamine	15.8	13.4	0.15
Site 2			
All PIMs	5.8 (5.0 to 6.6)	5.4 (4.8 to 6.0)	0.62
Benzodiazepine	16.9	10.0	0.09
Skeletal muscle relaxant	21.9	21.3	0.84
Antihistamine	49.3	49.2	0.57
Site 3			
All PIMs	7.3 (6.4 to 9.2)	7.5 (6.6 to 8.4)	0.64
Benzodiazepine	17.3	12.0	0.05
Skeletal muscle relaxant	24.5	14.5	0.04
Antihistamine	38.2	43.2	0.52



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Prescribing Outcomes from EQUIPPED2 (AHRQ: Vandenberg (PI))

- Traditional in New EHR (Cerner)
- Hub and Spoke model at Established Site

**in preparation*

	% of all PIMs at baseline	Pre-EQUIPPED (%) (95% CI for all medications)*	Post-EQUIPPED (%) (95% CI for all medications)*	Pre- to Post change p-value**
Traditional: Site 1				
All PIMs	100	8.86 (8.12-9.60)	3.59 (3.59-9.60)	< 0.0001
Skeletal Muscle Relaxant	37.8 (33.6-42.2)	3.34 (2.89-3.84)	.85 (.59-1.18)	<.0001
Anticholinergic Antihistamine	20.8 (17.3-24.6)	1.8 (1.5-2.2)	1.4 (1.1-1.8)	.1272
Benzodiazepine	15 (12.03-18.34)	1.3 (1.05-1.65)	.33 (.18-.56)	<.0001
Anticholinergic Antispasmodic	10.2 (7.72-13.13)	.9 (.67-1.18)	.74 (.5-1.06)	.473
GI Motility	8 (5.82-10.73)	.7 (.51-.96)	.4 (.22-.63)	.0562
Spread: Site 1				
All PIMs	100	12.20 (11.20-13.19)	7.13 (6.14-8.14)	< .0001
Anticholinergic Antihistamine	32.3 (28.3-36.5)	3.9 (3.4-4.5)	3.4 (2.7-4.1)	.2578
Non-Steroidal Anti-Inflammatory Drugs	29.1 (25.2-33.2)	3.5 (3.0-4.1)	2.0 (1.5-2.6)	.0004
Skeletal Muscle Relaxant	27.1 (23.3-31.2)	3.3 (2.8-3.9)	1.1 (.8-1.6)	<.0001
Benzodiazepine	8.7 (6.46 -11.51)	1.1 (0.77-1.4)	.3 (0.17-0.66)	.0021
GI Motility	1.2 (0.52-0.02)	.1 (0.06-0.31)	.1 (0.01-0.27)	.7186
Spread: Site 2				
All PIMs	100	11.30 (10.14-12.56)	7.48 (6.35-8.78)	.04466
Anticholinergic Antihistamine	32.2 (26.99-37.72)	3.6 (2.96-4.42)	3.9 (3.08-4.90)	.7068
Non-Steroidal Anti-Inflammatory Drugs	30.9 (25.77-36.37)	3.5 (2.83-4.25)	2.0 (1.46-2.78)	.0059
Skeletal Muscle Relaxant	22.5 (18.03-27.61)	2.5 (1.98-3.21)	0.77 (0.45-1.27)	<.0001
Benzodiazepine	9.4 (6.41-13.15)	1.1 (0.72-1.52)	.33 (0.14-0.72)	.0098
GI Motility	2.68 (1.19-5.09)	.3 (.13-.59)	0	.0246
Spread: Site 3				
All PIMs	100	16.16 (14.91-17.40)	11.67 (10.30-13.04)	<.0001
Skeletal Muscle Relaxant	33.3 (29.41-37.48)	5.4 (4.64-6.18)	3.2 (2.51-4.05)	.0003
Anticholinergic Antihistamine	40.4 (36.27- 44.62)	6.5 (5.70- 7.39)	4.9 (4.05- 5.92)	.0183
Benzodiazepine	8.0 (5.85-10.50)	1.3 (0.94-1.72)	.33 (0.15-0.67)	.0006
GI Motility	8.0 (5.85-10.50)	1.3 (0.94-1.72)	.76 (0.46-1.21)	.0897
Non-Steroidal Anti-Inflammatory Drugs	5.6 (3.81-7.80)	0.9 (0.61-1.27)	.95 (0.60-1.45)	.9613

Informing EQUIPPED Dissemination

- Promising early results of EQUIPPED
- Personnel effort to provide academic detailing-based audit and feedback may be challenging

 Time constraints

 Lack of geriatric prescribing expertise

 Challenges reaching all prescribers

- Clinical dashboards have become more available
- Study Question: Could EQUIPPED audit and feedback be delivered in a more automated way and still be effective?

VA HSR&D AWARD (FY19-22)



8 VA Emergency Departments

Randomly assigned to receive EQUIPPED with Academic Detailing or Dashboard Audit and Feedback



Dashboard Feedback

Monthly provider feedback via an electronic dashboard with audit, feedback and peer benchmarking



Academic Detailing Feedback

One-to-one (1:1) in-person academic detailing from a professional colleague that includes in-person audit, feedback, and peer benchmarking and provide on-site engagement

Aims

1

To compare the effectiveness of active vs passive feedback EQUIPPED intervention by comparing the monthly proportion of PIM prescribing as % of individual prescriptions) in each arm.

2

To evaluate the effectiveness of the active vs passive feedback EQUIPPED interventions using semi-structured qualitative telephone interviews and quantitative survey data.

3

Using micro-costing methods, we will calculate the difference in the detailed cost of the passive vs. active feedback versions of EQUIPPED.

Evaluate Provider Audit & Feedback Strategy

Differences between Academic Detailing EQUIPPED and Dashboard EQUIPPED		
Component	EQUIPPED – Academic Detailing	EQUIPPED – Dashboard
Education	Individual 1:1 academic detailing from a local clinical EQUIPPED champion	Emailed individual prescribing reports with suggestions for PIM alternatives provided via a PIM dashboard
Peer Benchmarking	Providers whose monthly PIM percentage is more than 1 standard deviation worse than the site mean, may receive additional 1:1 academic detailing from a local clinical EQUIPPED champion	Email notification regarding peer benchmarking data sent via PIM dashboard
Provider Feedback	EQUIPPED clinical champion intentionally engages ED providers during 1:1 sessions to determine local site factors and processes that impact prescribing behavior	ED providers may elect to notify ED leadership or EQUIPPED site champion regarding local site factors and processes that impact prescribing behavior
Expert Consultation	EQUIPPED clinical investigators will be provide rapid feedback on questions arising from 1:1 sessions (e.g. discussion alternative medications)	General information on the EQUIPPED intervention and Beers Criteria will be provided

Vaughan CP et al. Acad Emerg Med 2023

VA HSRD Results

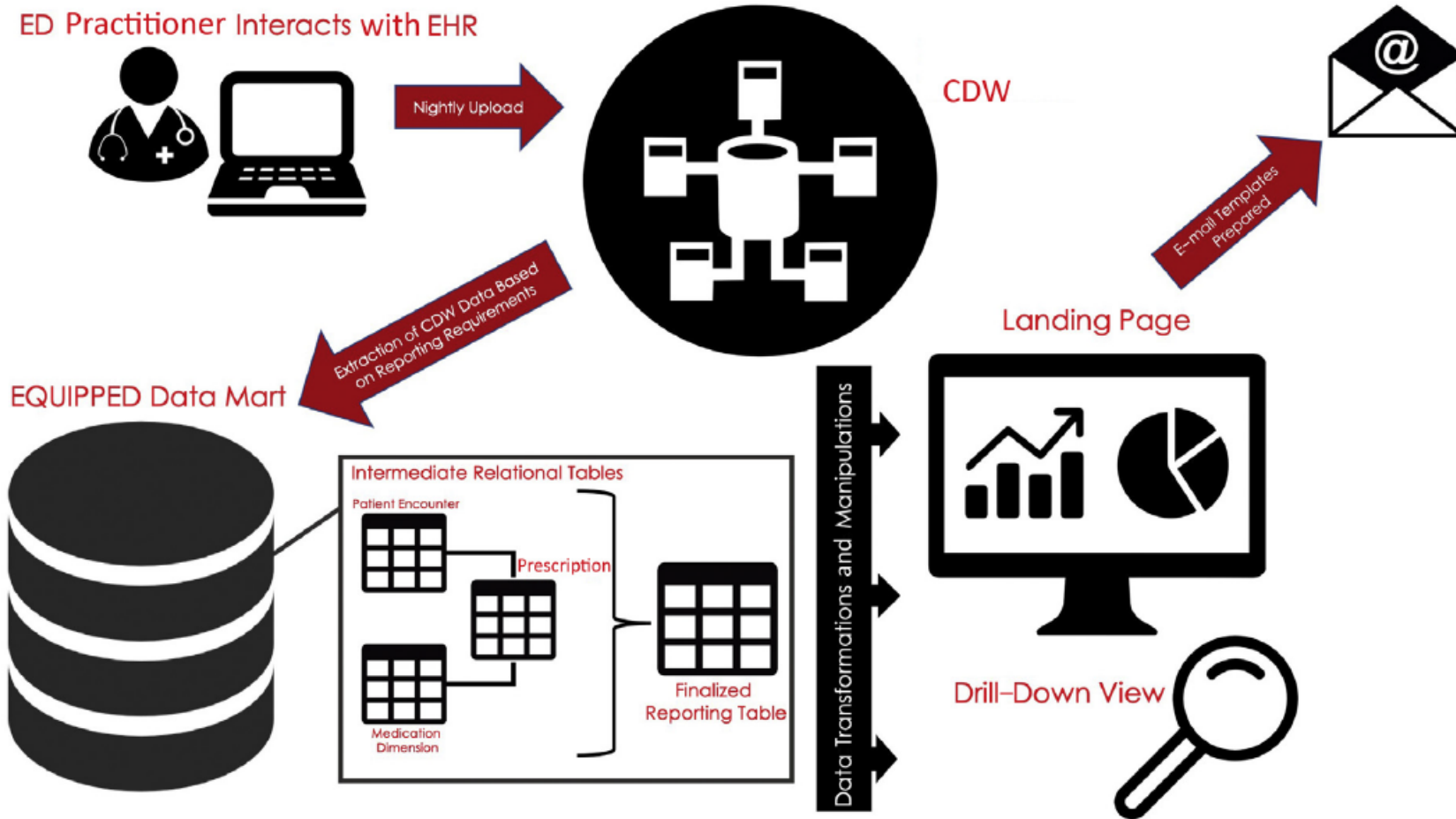
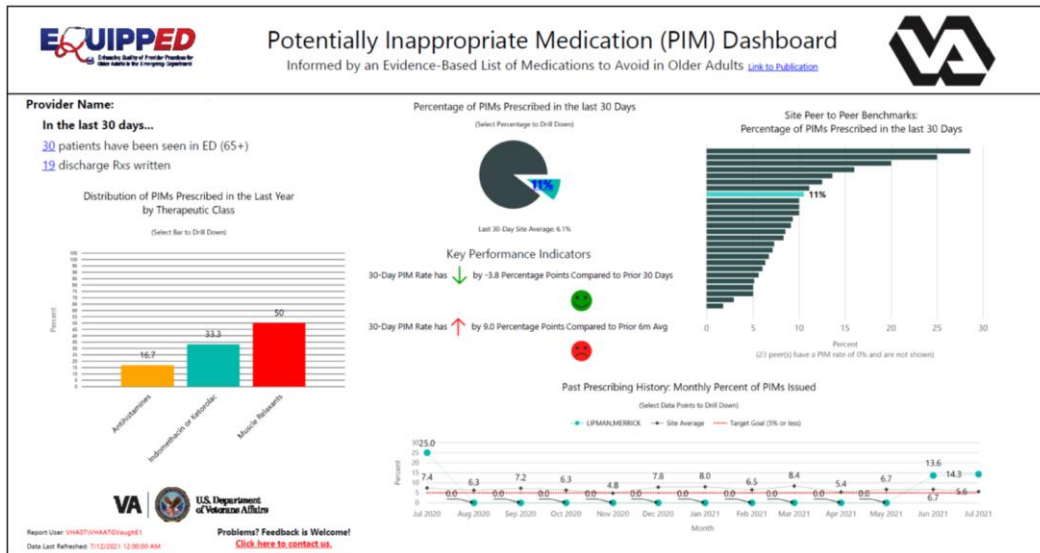


Figure 1. Simplified diagram of the Enhancing Quality of Prescribing Practices for Older Veterans Discharged From the Emergency Department (EQUIPPED) dashboard extract, load, transform process. CDW = Corporate Data Warehouse; ED = emergency department; EHR = electronic health record.

VA HSRD Dashboard Audit and Feedback

- Automated, personalized email to individual prescriber on the first Tuesday of the month
- Provided monthly PIM % relative to baseline and target of < 5%
- Provided link to the dashboard for patient-specific information



EQUIPPED Potentially Inappropriate Medication (PIM)
Informed by an Evidence-Based List of Medications to Avoid in Older Adults [Link to Publication](#)

Provider Name: [Redacted]

Drug Name	VA Drug Class	Rx Number	Issue Date	Fill Date	Days Supply	QTY Per Day	Recommendation	Quality of Evidence	Alternative Therapies
CYCLOBENZAPRINE HCL 10MG TAB	SKELETAL MUSCLE RELAXANTS				5	3.00	Avoid	Moderate: Risk of adverse events identified, but study consistency needs improvement	For acute mild or moderate pain—acetaminophen, nonacetylated salicylate (e.g., salsalate), propionic acid derivatives if no heart failure or eGFR >30 mL/min and given with PPI for gastroprotection if used for > 7 days
MECLIZINE HCL 12.5MG TAB	ANTIVERTIGO AGENTS				4	8.00	Avoid	Moderate: Risk of adverse events identified, but study consistency needs improvement	Intranasal normal saline; Second-generation antihistamine (e.g., cetirizine, loratadine); Intranasal steroid (e.g., fluticasone, over the counter)

VA | U.S. Department of Veterans Affairs
Problems? Feedback is Welcome! [Click here to contact us.](#)

Baseline Characteristics of 8 Implementation Sites

Academic Detailing

n=4



Group baseline PIM%

8.01%

	Academic Detailing			
	Site A	Site B	Site C	Site D
Total number of Encounters FY '21	12,149	21,278	17,387	11,914
% FY21 Encounters Veterans >=65 yrs old	7,223 (59%)	10,321 (48%)	10,064 (58%)	6,845 (57%)
% of admissions FY21 Veterans >=65 yrs old	45.82%	21.55%	26.43%	41.22%
Six-month baseline PIM prescribing %	5.50%	8.90%	9.65%	7.49%
Site Champion Title	Associate Director for Clinical Affairs GRECC	Section Chief Emergency Medicine	ED Clinician	Director of Geriatric Emergency Medicine

Dashboard

n=4



Group baseline PIM%

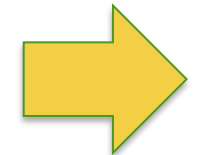
8.04%

	Dashboard			
	Site E	Site F	Site G	Site H
Total number of Encounters FY '21	39,162	25,505	20,220	18,445
% FY21 Encounters Veterans >=65 yrs old	16,841 (43%)	11,007 (43%)	11,937 (59%)	9,750 (54%)
% of admissions FY21 Veterans >=65 yrs old	34.77%	18.13%	42.95%	29.49%
Six-month baseline PIM prescribing %	7.83%	8.42%	6.63%	10.49%
Site Champion Title	Section Chief of Quality, Training and Education	Director of the Geriatric ED	Associate Director Clinical GRECC	Chief Emergency Medicine Service

Prescribing Outcomes 12 months after Implementation



OVERALL RESULTS	Total Discharge Prescriptions for Veterans 65 years and older	Total PIM Prescriptions for Veterans 65 years and older	% PIMs	Within group ^α and Between group ^β p-value
ACADEMIC DETAILING				
Baseline	17,744	1,421	8.01	
Implementation	16,909	1,220	7.22	
Post-implementation	23,648	1,672	7.07	0.0006 ^α
DASHBOARD				
Baseline	26,936	2,166	8.04	
Implementation	16,503	1,280	7.76	
Post-implementation	36,795	2,979	8.10	0.81 ^α
				<0.0001 ^β



Dashboard sites had 14% higher odds of prescribing PIMs 12 months after implementation of EQUIPPED audit and feedback OR=1.14 (95% CI 1.08-1.22)

Limitations

- Only able to evaluate 12 months of prescribing data based on funding timeline
- Not feasible to continually update audit and feedback based on staffing fluctuations
 - Providers receiving audit and feedback determined by site Champion at baseline
- Implementation during COVID pandemic was disruptive; however, reflects real-world realities

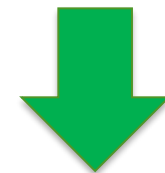
Exploratory Analysis

- Providers to receive audit and feedback determine by site Champion at baseline
 - More likely to be staff providers than moonlighters or resident trainees
- Academic Detailing sites: 79/638 (12.4%) received audit and feedback
- Dashboard sites: 86/548 (15.7%) received audit and feedback
- Prescribers receiving feedback accounted for ~60% of prescriptions in both groups
- *Did prescribing results differ based on receipt of audit and feedback?*

Analysis Limited to Prescribers Receiving Feedback



OVERALL RESULTS	Total Discharge Prescriptions for Veterans 65 years and older	Total PIM Prescriptions for Veterans 65 years and older	% PIMs	Within group ^α and Between group ^β p-value
ACADEMIC DETAILING				
Baseline	10,280	824	8.02	
Implementation	9,991	772	7.22	
Post-implementation	14,576	981	6.73	0.0002 ^α
DASHBOARD				
Baseline	15,958	1,317	8.25	
Implementation	9,105	617	6.78	
Post-implementation	21,639	1,383	6.39	<0.0001 ^α
				0.22 ^β



Additional Implementation Considerations (preliminary findings)

Factors Facilitating Implementation

- All sites have large populations of geriatric patients in the ED
- Initial leadership engagement/endorsement
- All sites reported training providers before EQUIPPED started
- EQUIPPED supported ACEP Geriatric ED accreditation(6 of 8 sites)
- 4 of 8 sites received VA Office of Geriatrics and Extended Care supplemental funding
- Centralized facilitation team and tools that were reviewed by national and local experts
- Order sets could be adapted based on local needs and provider preferences

Bottom Line

- Generally high degree of reported organizational readiness for change (change viewed as important and feasible)
- Generally reported that EQUIPPED is in line with organizational goals
- Facilitation and tools are available

Additional Implementation Considerations (preliminary findings)

Barriers to Implementation and Impact of COVID-19 Pandemic

- *All sites implemented EQUIPPED during the COVID-19 pandemic*
- Sites were identified and planning started at most prior to the pandemic
- 1 initially identified site dropped out of the project – Experienced change in leadership
- Lower patient volumes during the early part of COVID allowed more time to start new projects
- Patients in the ED were higher acuity and fewer were discharged
- Individuals pulled to different duties (e.g., informatics team need to make changes to the electronic health record)
- Engaging frontline staff during COVID was challenging (e.g. low response rates for surveys of providers)
 - Learning new ways of caring for patients across the board
 - Life challenges faced as a result of COVID
 - Important both in relation to delivery of feedback and discussions related to the balance between guideline concordant care and clinical judgement

Conclusions

- Academic detailing approach more effective at group level
- Dashboard approach may be reasonable w/limited resources
 - Consider automatic prescriber enrollment during onboarding
- Results suggest EQUIPPED well-suited for ED setting of care
 - Implementation evaluation of facilitators and barriers pending



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