

Geriatric Polypharmacy

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Overview:

- Working definition of polypharmacy and inappropriate medications
- Epidemiology of polypharmacy and inappropriate prescribing
- Negative health consequences of inappropriate medications

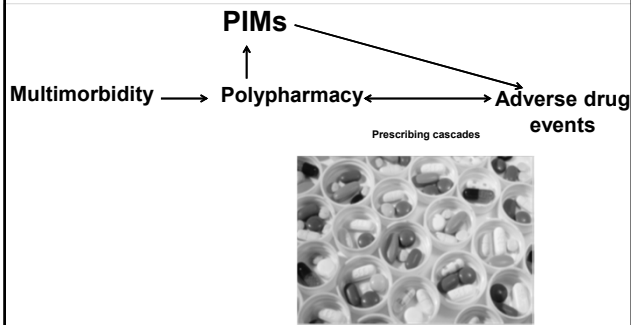
Working definition- Polypharmacy

- Use of multiple medications by patient
- Most common ≥ 6 medications
- Includes prescribed, non-prescribed, and over-the-counter medicines
- A major risk factor for inappropriate prescribing

Working definition- Inappropriate medications

- Medications or medication classes that should be avoided in adults ≥ 65 yrs because
 - Wrong indication
 - They are ineffective
 - Pose unnecessarily high risk and safer alternatives are available
- Also known as Potentially Inappropriate Medications (PIMs)

Polypharmacy is often in response to complex comorbidity



Beers criteria

- Developed by consensus panel first convened in 1991
- Criteria have been revised in 1997, 2003, and 2012
- 53 medications/drug classes
- Goal: Reduce the use of drugs that involve substantial risk of adverse side effects to older patients
- Framework used as one metric for monitoring quality of care in older adults

Beers criteria-3 groupings or recommendations

- I. Potentially inappropriate in all older adults
- II. Potentially inappropriate in all older adults with certain diseases/syndromes
- III. Drugs to be used with caution in older people

STOPP criteria

- Screening Tool of Older Persons' Potentially Inappropriate Prescriptions
 - Derived from Beers criteria
 - Better addresses:
 - Drug-drug interactions
 - Therapeutic class duplication
 - International prescriber
 - Framework more easily utilized as an intervention

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Prevalence of PIMs in US cohort

- Utilized Medicare Part D data
- Retrospective cohort study design; time period 2008
- Participants ≥ 66 yrs, Texas Medicare Part D beneficiaries
- PIM user was identified using 2002 Beers criteria
 - Case definition was defined as ≥ 1 PIM
- Total sample 677,580

Holmes, et. al. Pharmacoepidemiology and Drug Safety 2013; 22: 728-734

Table 1-Sample characteristics; n= 677,580 Texas Medicare Part D beneficiaries

Characteristic	Category	Total number	% getting a PIM [†]	Adjusted odds ratio for PIM use (95%CI) [‡]
Age (years)	66–69	157 530	29.6	Ref.
	70–74	171 984	30.9	1.00 (0.99–1.02)
	75–79	142 225	32.7	1.00 (0.98–1.02)
	80–84	107 999	33.8	0.99 (0.97–1.01)
	85+	97 842	34.4	0.98 (0.96–1.00)
Sex	Male	235 923	26.2	Ref.
	Female	441 657	35.0	1.33 (1.32–1.35)

Holmes, et. al. Pharmacoepidemiology and Drug Safety 2013; 22: 728-734

Table 1-Sample characteristics; n= 677,580 Texas Medicare Part D beneficiaries

Characteristic	Category	Total number	% getting a PIM [†]	Adjusted odds ratio for PIM use (95%CI) [‡]
Race/ethnicity	White	465 680	32.2	Ref.
	Black	52 611	34.2	1.07 (1.05–1.10)
	Hispanic	139 223	31.3	0.87 (0.86–0.89)
	Asian	16 797	22.9	0.60 (0.58–0.63)
	Other	3269	28.3	0.88 (0.81–0.95)
Number of comorbidities [‡]	0	61 477	20.0	Ref.
	1	110 815	23.8	0.99 (0.96–1.01)
	2+	505 288	35.2	0.89 (0.87–0.91)
Hospitalized at least once in 2007	No	533 839	29.4	Ref.
	Yes	143 741	41.5	1.10 (1.08–1.11)

Holmes, et. al. Pharmacoepidemiology and Drug Safety 2013; 22: 728-734

Table 1-Sample characteristics; n= 677,580 Texas Medicare Part D beneficiaries

Characteristic	Category	Total number	% getting a PIM*	Adjusted odds ratio for PIM use (95%CI)±
Total number of different medications in 2008	1-5	209 281	11.4	Ref.
	6-8	158 718	25.7	2.48 (2.43-2.52)
	9-12	154 913	39.3	4.37 (4.29-4.54)
	13+	154 668	58.8	9.11 (8.93-9.29)
Number of different prescribers in 2008	1	182 884	19.2	Ref.
	2	178 487	26.6	1.18 (1.16-1.20)
	3	130 779	34.1	1.29 (1.27-1.32)
	4+	185 430	48.1	

Holmes, et. al. Pharmacoepidemiology and Drug Safety 2013; 22: 728-734

Prevalence of PIMs-UK cohort

- Utilized UK Clinical Practice Research Datalink
- Retrospective cross-sectional study; study period 2007
- Participants ≥ 70 yrs
- Screened for PIM using STOPP criteria
 - Tool that is based on Beers criteria
- Estimated prevalence of PIMs and polypharmacy
 - Use term PIP (potentially inappropriate prescription)

Bradley, et. al. BMC Geriatrics 2014, 14:72

Table 1-Descriptive characteristics of the study population in CPRD

	PIP (n = 295,653)	No PIP (n = 723,838)
Gender		
-Male (%)	122,817 (28.7)	304,622 (71.3)
-Female (%)	172,834 (29.2)	419,211 (70.8)
Age (years)		
-70-74 (%)	82,177 (37.4)	137,366 (62.6)
-75-80 (%)	92,488 (37.6)	153,778 (62.4)
-81-85 (%)	62,407 (33.1)	126,040 (66.9)
- > 85 (%)	58,581 (18)	306,654 (84)
Morbidities (Charlson morbidity index score)		
-1 (%)	189,864 (28.3)	481,983 (71.7)
-2 (%)	52,365 (46.8)	59,519 (53.2)
-3 (%)	53,424 (22.7)	182,336 (77.3)

Bradley, et. al. BMC Geriatrics 2014, 14:72

Table 1-Descriptive characteristics of the study population in CPRD

	PIP (n = 295,653)	No PIP (n = 723,838)
Polypharmacy (≥4 medications)		
-Never (%)	114,816 (14.6)	669,572 (85.3)
-Ever (%)	180,837 (76.9)	54,266 (23.1)
Chronic Obstructive Pulmonary Disease		
-No (%)	277,497 (28.2)	707,447 (71.8)
-Yes (%)	18,156 (52.6)	16,391 (47.5)
Diabetes		
-No (%)	225,280 (27.3)	625,591 (72.7)
-Yes (%)	70,373 (41.7)	98,247 (58.3)
Dementia		
-No (%)	283,983 (28.5)	710,985 (71.5)
-Yes (%)	11,670 (47.6)	12,853 (52.4)

Bradley, et. al. BMC Geriatrics 2014, 14:72

Table 2-Prevalence of potentially inappropriate prescribing by individual STOPP criteria among older people in CPRD

Criteria description	Number of patients (N = 1,019,491)	% of patients (95% CIs)
Cardiovascular system		
Digoxin > 125 mcg/day (<i>increased risk of toxicity</i>) ^a	9327	0.9 (0.8-0.9)
Thiazide diuretics with gout (<i>exacerbates gout</i>)	6094	0.6 (0.6-0.6)
Beta-blocker + verapamil (<i>risk of symptomatic heart block</i>)	503	0.05 (0.05-0.05)
Aspirin + Warfarin without a PPI/ H ₂ RA (<i>high risk of gastrointestinal bleeding</i>)	3616	0.4 (0.3 -0.4)
Aspirin > 150 mg/day (<i>increased bleeding risk</i>)	5128	0.5 (0.5-0.5)
Loop diuretic for dependent ankle edema only i.e. no clinical signs of heart failure (<i>no evidence of efficacy, compression hosiery usually more appropriate</i>)	25843	2.54 (2.5-2.6)
Loop diuretic as first-line monotherapy for hypertension (<i>safer, more effective alternatives available</i>)	7128	0.7 (0.7-0.7)

Bradley, et. al. BMC Geriatrics 2014, 14:72

Table 2-Prevalence of potentially inappropriate prescribing by individual STOPP criteria among older people in CPRD

Criteria description	Number of patients (N = 1,019,491)	% of patients (95% CIs)
Central Nervous System		
TcAs with dementia (<i>worsening cognitive impairment</i>)	354	0.03 (0.03-0.03)
Long-term (>1 month) long-acting benzodiazepines (<i>risk of prolonged sedation, confusion, impaired balance, falls</i>)	15057	1.5 (1.5-1.5)
Long-term (>1 month) neuroleptics (antipsychotics) (<i>risk of confusion, hypotension, extrapyramidal side-effects, falls</i>)	21012	2.1 (2.1-2.1)
Long-term (>1 month) neuroleptics with parkinsonism (<i>worsen extrapyramidal symptoms</i>)	852	0.1 (0.1-0.1)
Two concurrent drugs from the same group- therapeutic duplication (<i>optimization of monotherapy within a single drug class</i>)	121668	11.9 (11.9-12.0)

Bradley, et. al. BMC Geriatrics 2014, 14:72

Prevalence of PIMS-French cohort

- In France, Laroche list=Beers criteria
- Observational study, non-hospital pharmacies
- Jan 1-Mar 31, 2013 in French region
- All reimbursed prescriptions for adults ≥ 75 yrs

Beuscart, et. al. Archives of Geriatrics and Gerontology. 59 (3). 2014

Study Population

	Patients n=207,979
Age (yrs; mean (SD))	81.7 (5.1)
Female n (%)	139, 777 (67.2%)
Nursing home resident	9,284 (4.5%)
# of prescriptions in study period	4 [median IQR: 3-5]
Total # of meds in study period	
< 5	37,911 (18.2%)
5-9	96,997 (46.6%)
10-14	56,388 (27.1%)
15-19	14,058 (6.7%)
≥ 20	2,625 (1.3%)
PIMS	67,863 (32.6%)

Beuscart, et. al. Archives of Geriatrics and Gerontology. 59 (3). 2014

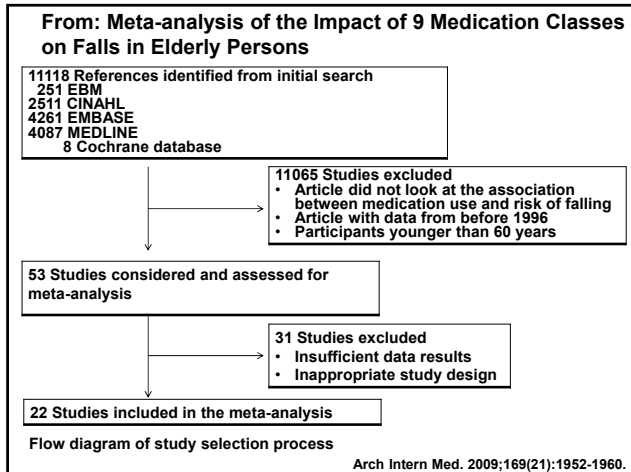
Prevalence of PIMs						
Community-dwelling (n=198,695)			Nursing Home resident (n=928)			
PIM category	n	% of patients with PIM	% of total	n	% of patients with PIM	% of total
Anticholinergic properties	18,439	23	9.3	2,074	57.7	22.3
Hydroxyzine	9,419	14.7	4.7	1,376	38.3	14.8
Oxybutynin	2,310	3.6	1.2	155	4.3	1.7
Amitriptyline	1,704	2.7	0.9	95	2.6	1.0
Long-acting benzodiazepines	17,816	22.2	9.0	821	22.8	8.1
Bromezepam	9,498	14.8	4.8	313	8.7	3.4
Prazepam	2,171	3.4	1.1	167	4.6	1.1
Clonazepam	1,857	2.9	0.9	106	2.9	0.8
Clorazepate dipotassium	1,225	1.9	0.6	77	2.1	0.7

Beuscart, et al. Archives of Geriatrics and Gerontology. 59 (3). 2014

- ## Overview:
- Working definition of polypharmacy and inappropriate medications
 - Epidemiology of polypharmacy and inappropriate prescribing
 - Negative health consequences of inappropriate medications

- ## Health consequences of Polypharmacy
- Adverse drug events
 - Exacerbation of chronic conditions and/or geriatric syndromes
 - Falls
 - Delirium, cognitive impairment
 - Hospitalization
 - Increased associated health care cost

- ## Meta-analysis of the Impact of 9 Medication Classes on Falls in Elderly Persons
- Comprehensive review of literature
 - Articles were selected that determined association between falls and medication use in older adult, ≥ 60 yrs.
 - Meta-analyses performed to determine risk of falling by drug class
 - Pooled estimates were developed for other subgroups



- Meta-analysis of the Impact of 9 Medication Classes on Falls in Elderly Persons**
- Increased risk of ≥ 1 fall, OR (95% CI)
 - Sedatives/hypnotics 1.31 (1.14-1.50)
 - Benzodiazepines 1.60 (1.46-1.75)
 - Antidepressants 1.72 (1.40-2.11)
 - Antihypertensives 1.26 (1.08-1.46)
 - Neuroleptics/antipsychotics 1.71 (1.44-2.04)
 - No change in fall risk, (95% CI)
 - Diuretics 1.03 (0.84-1.26)
 - B-blockers 1.14 (0.97-1.33)
 - NSAIDs 1.65 (0.98-2.77)
 - Narcotics 0.89 (0.50-1.58)
- Woolcot, et. al. Arch Intern Med; 169 (21): 1952-1960

- Conclusions:**
- Polypharmacy often leads to potentially inappropriate medications (PIMs)
 - Frameworks used for evaluating PIM use include Beers and STOPP criteria
 - PIMS are highly prevalent in older adults, ranging from 20-30%, consistent finding in several countries
 - Sedative-hypnotics, antidepressants, and benzodiazepines demonstrate a significant association with falls

Management of Polypharmacy in Older Adults

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Case-History

- 73 y/o woman who has multiple medical conditions, presented to the clinic for a hospital follow-up
- Hospitalized 3 weeks ago with urosepsis, delirium
- Issues after discharge per her daughter
 - Less verbal
 - Worsening depression, memory loss
 - Refusing to take her medications
- ROS: she stated that everything was fine.
- SH: lives with her daughter, wheelchair-bound due to a stroke, dependent in most of ADLs.

Case-Physical Examination

- Vitals stable
- Pleasant, sitting in wheelchair, comfortable
- HEENT/Lungs/Heart/abdomen: unremarkable
- Exts: no edema
- Neuro:
 - Alert and oriented to person and place, disoriented to time
 - Answers a few questions with very short answers
 - MMSE was not performed due to limited visit time
 - Motor strength: 5/5 right arm and leg, 1/5 left arm and leg

Case-Basic Lab Results

WBC	5.3
Hb	12.2
Platelet Count	120
MCV	91.3
ALT	30
AST	45*
Na+	141
K+	4.2
BUN	7
Cr.	0.81
TSH	8.2
HbA1C	5.7 (5.7% one year ago)

Case-Medication List

1. metformin 500 mg bid
2. atorvastatin (LIPITOR) 20 mg daily
3. potassium Chloride 10 Meq daily
4. clopidogrel (PLAVIX) 75 mg daily.
5. furosemide 20 mg daily : on hold since she was discharged from hospital.
6. magnesium oxide 400 mg daily
7. sertraline (ZOLOFT) 100 mg daily
8. atenolol 100 mg daily. on hold since she was discharge from hospital
9. levothyroxine (SYNTHROID) 150 mg daily
- 10.pregabalin (LYRICA) 75 mg daily

Case-Medication List

11. isosorbide mononitrate (IMDUR) 30 mg bid.
on hold since she was discharged from hospital
12. tramadol 50 mg q6 h as needed
13. omega-3 fish oil (LOVAZA) 1 g bid
14. hydrocodone-acetaminophen (VICODIN)
5-500 mg q 8h as needed
15. albuterol 90 MCG/ACT IN AERS q6h as needed
16. alendronate 70 mg weekly since 2001
17. pantoprazole (Protonix) 40 mg daily
18. aspirin 81 mg Daily
19. ferrous sulfate 325 mg tid

Case-Question

- Many medical problems
- Many medications
- Mental status change
- Medication non-compliance

What can/must be done at this visit?

1. MRI brain
2. Add memantine
3. Check B12, RPR
4. Medication assessment

Outline

- How to identify unnecessary and inappropriate medications
- How to manage polypharmacy?
- How to prevent polypharmacy?

How to Identify Unnecessary And Inappropriate Medications in Older Adults

- **Explicit criteria**
 - List of medications/drug classes that are inappropriate in older adults due to adverse effects
 - Beers criteria: North America
 - STOPP/START: Europe
- **Implicit criteria**
 - Patient-specific medication assessment
 - Good Palliative-Geriatric Practice Algorithm

¹ The American Geriatrics Society 2012 Beers Criteria Update Expert Panel. J Am Geriatr Soc 2012;60 (4):616-31.

² Gallagher P, Ryan C, Byrne S, et al. Int J Clin Pharmacol Ther 2008; 46(2): 72-83

³ O.Mahony D, O'sullivan D, Byrne S, et al. Age and Ageing 2014;0:1-6
Age and Ageing advance access published November 18, 2014

⁴ Garfinkel D and Mangin D. Arch intern Med 2010; 170(18): 2010 1648-54

Updated Beers Criteria (2012)

- **Group 1**
-Potentially inappropriate medications used in all older adults
- **Group 2**
-Potentially inappropriate medications used in older adults with certain diseases and syndromes
- **Group 3**
-Medications to be used with caution in older adults

¹ The American Geriatrics Society 2012 Beers Criteria Update Expert Panel.
J Am Geriatr Soc 2012;60 (4):616-31.
<http://www.americangeriatrics.org/files/documents/beers/PrintableBeersPocketCard.pdf>

Potentially Inappropriate Medication in All Older Adults

Example:

Organ system or therapeutic category or drug	Rationale	Recommendation	QE	SR
Antipsychotics first- and second-generation	Increases risk of CVA and mortality in persons with dementia	Avoid use for behavioral problems of dementia unless nonpharmacologic options have failed and the patient is threat to self or others.	Moderate	Strong

QE: Quality of Evidence
SR: Strength of Recommendation

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Potentially Inappropriate Medication in Older Adults with Certain Diseases or Syndromes

Example:

Disease or syndrome	Drug	Rationale	Recommendation	QE	SR
Stress or mixed urinary incontinence	Alpha blockers Doxazosin Prozosin Terazosin	Aggravation of incontinence	Void in women	Moderate	Strong

QE: Quality of Evidence
SR: Strength of Recommendation

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J Am Geriatr Soc 2012;60 (4):616-31.
<http://www.americangeriatrics.org/files/documents/beers/PrintableBeersPocketCard.pdf>

Medications to Be Used with Caution in Older Adults

Example:

Drug	Rationale	Recommendation	QE	SR
Aspirin for primary prevention of cardiac events	Lack of evidence of benefit versus risk in individual aged ≥ 80	Use with caution in adults ≥ 80	Low	weak

QE: Quality of Evidence
SR: Strength of Recommendation

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How to Identify Unnecessary And Inappropriate Medications in Older Adults

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 - *Beers criteria: North America*
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⁴ Garfinkel D and Mangin D. Arch intern Med 2010; 170(18): 2010 1648-54

Screening Tool of Older People's Potential Inappropriate Prescriptions (STOPP)

- First published in 2008
 - STOPP/START version 2 in 2014
 - 80 STOPP criteria
- Examples**
- Section A: indication of medication
 - *Any drug prescribed without an evidence based clinical indication*
 - Section B: Cardiovascular system
 - *Loop diuretics as first line treatment for HTN (safer, more effective alternatives available)*

² Gallagher P, Ryan C, Byrne S, et al. Int J Clin Pharmacol Ther 2008; 46(2):72-83

³ O.Mahony D, O'sullivan D, Byrne S, et al. Age and Ageing 2014;0:1-6

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STOPP/START version 2: <http://ageing.oxfordjournals.org>

Screening Tool to Alert Doctors to Right Treatment (START)

- A list of potential beneficial medications in older adults with a specific condition
- Clinical status is not end-of-life
- 34 START criteria
- **Examples:**
 - Section A : cardiovascular system**
 - Statin therapy with a documented CAD, CVA or PVD, unless the patient's status is end-of-life or >85 years*
 - Beta-blocker with ischemic heart disease*

² Gallagher P, Ryan C, Byrne S, et al. Int J Clin Pharmacol Ther 2008; 46(2):72-83

³ O.Mahony D, O'sullivan D, Byrne S, et al. Age and Ageing 2014;0:1-6

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STOPP/START version 2: <http://ageing.oxfordjournals.org>

Intervention with the Screening Tool of Older Persons Potentially Inappropriate Prescriptions/Screening Tool to Alert Doctors to Right Treatment Criteria in Elderly Residents of a Chronic Geriatric Facility: A Randomized Clinical Trial

Devora Frankenthal, MSc,^a Yaffa Lerman, MD,^{a†} Edward Kalendaryev, MD,[‡] and Yehuda Lerman, MD^{*}

⁵ Frankenthal D. et al J Am Geriatr Soc. 2014 Sep;62(9):1658-65

Effect of a Screening Tool of STOPP/START Medication Intervention on Clinical and Economic Outcomes

- Parallel-group randomized trial
- Location: Chronic care geriatric facility in Israel
- Age 65 and older with at least one prescribed medication
- Total 359 participants
- Screening medications with STOPP/START criteria (*original version*)
- Outcomes assessed at the initiation of the intervention, 6 months and 12 months

⁵ Frankenthal D. et al J Am Geriatr Soc. 2014 Sep;62(9):1658-65

Changes in Outcomes at 12 month Follow-up

Outcome	Intervention group	Control group	P-Value
Average number of drug prescribed	7.3±2.7	8.9±3.2	<.001
The average drug costs (Israeli shekels) monthly	279±171.9	402.3±291.2	<.001
Falls	0.8±1.3	1.3±2.4	<.006

Rates of hospitalization, Functional Independent Measure (FIM) scores, and quality of life measurements similar in both groups

² Frankenthal D. et al J Am Geriatr Soc. 2014 Sep;62(9):1658-65

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⁴ Garfinkel D and Mangin D. Arch intern Med 2010; 170(18): 2010 1648-54

LESS IS MORE

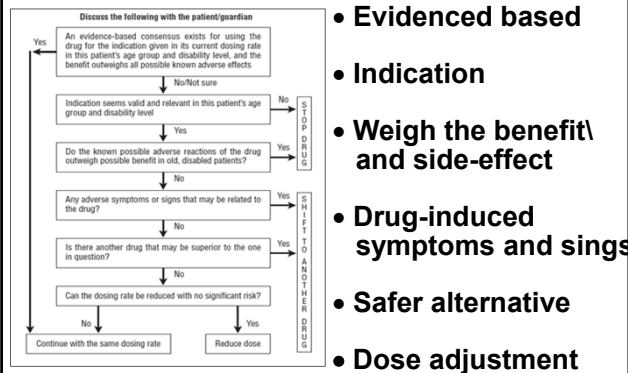
Feasibility Study of a Systematic Approach for Discontinuation of Multiple Medications in Older Adults

Addressing Polypharmacy

Doron Garfinkel, MD; Derelic Mangin, MBChB

⁴ Garfinkel D and Mangin D. Arch Intern Med 2010; 170(18): 2010 1648-54

Good Palliative-Geriatric Practice Algorithm



- Evidenced based
- Indication
- Weigh the benefit and side-effect
- Drug-induced symptoms and signs
- Safer alternative
- Dose adjustment

⁴ Garfinkel D and Mangin D. Arch intern Med 2010; 170(18):2010 1648-54

Good Palliative-Geriatric Practice Algorithm for Drug Discontinuation

- Prospective cohort study done in 2/2005-6/2008 in Israel
- Total patients: 70 in outpatient setting
- Follow-up: 19 months
- Patient referred to geriatrician by family or family physician
- Mean age: 83 years old
- Co-morbidities: 61% ≥ 3 , 26% ≥ 5

⁴ Garfinkel D and Mangin D. Arch intern Med 2010; 170(18): 2010 1648-54

Good Palliative-Geriatric Practice Algorithm for Drug Discontinuation

- Initial drug number: mean 7.7 drugs per patient
- Discontinuation was recommended for 311 meds (58% of all meds)
- 256 of 311 (82%) were discontinued
- Restarted: 2% of discontinued medications
- 88% of patients reported global improvement in health

⁴ Garfinkel D and Mangin D. Arch intern Med 2010; 170(18): 2010 1648-54

Outline

- How to Identify unnecessary and inappropriate Medications
- How to manage polypharmacy?
- How to prevent polypharmacy?

How to Manage Polypharmacy

- Review the medication list or “brown bag” review
- Match the medications to medical conditions/diagnoses
- Medication Assessment
 - Identify and discontinue unnecessary & inappropriate medications

Identify and Discontinue Unnecessary & Inappropriate Medications

- if the medication is not effective or not indicated
 - *Stop the medication*
- if the medication is overprescribed
 - *Stop medication or decrease the dose*
- if the medication causes the current symptoms
 - *Decrease the dose, or switch to safer alternative*
 - *Non-pharmacologic approaches*
- if the medication is potentially inappropriate
 - *Switch to a safer alternative*
- if the potential beneficial drug therapy is under-prescribed
 - *Add the beneficial medication*

⁶ Hanlon JT, Schumder KE, Samsa GP, et al. J Clin Epidemiol. 1992;45:1045-51

⁷ Schumder K, Hanlon JT, Weinberger M et al. J Am Geriatr Soc 1994;42: 1241-7

⁸ Samsa GP, Hanlon JT, Schumder KE, et al. J Clin Epidemiol 1994;47:891-6

⁴ Garfinkel D and Mangin D. Arch Intern Med 2010; 170(18): 2010 1648-54

Case

- Many medical problems
- Many medications
- Mental status change
- Medication non-compliance

What can/must be done at this visit?

1. MRI brain
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Case-Medication Assessment

Condition	Drug	Presentations/ test results	Assessment	
DM	Metformin	A1C 5.7%	Not needed – goal < 7 %	Stop
HTN	Atenolol	Held for low BP with urosepsis	Indicated	Restart
CAD	Atenolol Isosorbide	No chest pain for many years	Indicated Not indicated	Restart Stop
OA	Vicodin Tramadol	No pain	Indicated Adverse effects	Continue, PRN Stop
HLD	Atorvastatin Fish oil	No recent lipid profile	Indicated Pill burden	Continue Stop

Case-Medication Assessment

Condition	Drug	Presentations/ test results	Assessment	
Hypothyroidism	Levothyroxine	TSH is high	Indicated	Continue
GERD	Pantoprazole	Asymptomatic	Not indicated	Stop
Depression	Sertraline	Depressed now	Indicated	Continue
COPD	Albuterol	Occasionally	Indicated	Continue PRN
Osteoporosis	Alendronate	Since 2001	Drug holiday	Stop
History of CVA	Aspirin	Stroke while taking aspirin	Indicated	Continue
	Clopidogrel		Indicated	Continue

Case-Medication Assessment

Condition	Drug	Presentations/ test results	Assessment	
	Furosemide	EF 55% No edema	Not indicated	Stop
	Ferrous sulfate	Normal Hgb Normal MCV	Not indicated	Stop
	Pregabalin	No pain	Not indicated	Stop
	Magnesium		Not indicated	Stop
	Potassium	D/C diuretics	Not indicated	Stop
Dementia		Vascular		
Thrombocytopenia		120's, no bleeding		
Recurrent UTI				

Case-Number of Drugs Before and After Medication Assessment

	Total medications	Scheduled medications	As needed medications
Before	19	16	3
After	8	6	2

Case-3 month Follow-up

- “Doing great” per daughter
- Taking all her medications
- BP ~ 110's/70's, Fasting BG in 100's
- UTI x 2
- No ED visits or clinic visits in the past 3 months

Discontinuation of Medications

- May need more than one clinic visit
- May need to taper the medications
- May need to touch base with the specialists

Outline

- How to identify unnecessary and inappropriate medications
- How to manage polypharmacy?
- How to prevent polypharmacy?

How to Prevent Polypharmacy

- **Appropriate prescribing in older adults**
 - Each medication should have a corresponding clinical indication
 - *Dosing: start low and go slow*
 - Avoid medications inappropriate for older adults
- **Medication assessment**
- **Patient education**
 - All medications have some side-effects
 - Discuss options for non-pharmacologic management
 - Provide a written medication list after every visit