

The basics of the STOPP/START criteria

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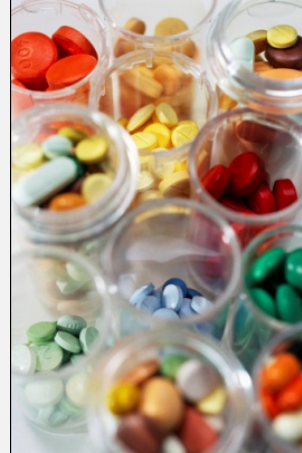
Overview

- Why & how STOPP/START was developed
- Aims of STOPP/START
- Contents of STOPP/START
- STOPP/START in prevalence studies
- Inter-rater reliability of STOPP/START amongst pharmacists
- STOPP/START in clinical practice

The importance of regular medication review in older people



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• **Increase in co-morbidities with age**

• **Physiological changes**

- pharmacokinetics
- pharmacodynamics



• **Increased susceptibility to:**

- Polypharmacy
- Drug interactions
- Adverse drug reactions
- Prescribing cascade
- Poor compliance
- Potentially inappropriate prescribing

Potentially inappropriate prescribing defined

- Risk > Benefit
- Over-prescribing
 - Excessive doses/duration of medicines
 - Polypharmacy
- Mis-prescribing
 - Unfavourable choice of medicine, dose, or duration
- Under-prescribing
 - Not prescribing a clinically indicated medicine, despite the patient not having any contra-indication to that medicine

Explicit screening tools

Screening Tool	Content	Method	Prevalence of PIP Globally	Prevalence of PIP in Ireland
McLeod (1997)	38 Indicators	Delphi Validation	3.0%-31.78%	-
IPET (2000)	14 Indicators	Based of McLeod criteria	18.3%	Primary Care: 10% Secondary Care: 22% Nursing Homes: -
Beers' Criteria ('03)	48 Indicators	Delphi Validation	Primary Care: 9.8-38.5% Secondary Care: 34% Nursing Home: 40.3%	Primary Care: 11-13% Secondary Care: 34% Nursing Homes: 56.8%

Key: PIP: Potentially Inappropriate Prescribing

Need for new criteria

- Limitations of IPET
- Limitations of Beers' } STOPP/ START
- Combined Limitations

Aims of STOPP/START

- Provide explicit, evidence based rules of avoidance of commonly encountered instances of potentially inappropriate prescribing and potential prescribing omissions
 - Improve medication appropriateness
 - Prevent adverse drug events
 - Reduce drug costs



STOPP/START

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STOPP (Screening Tool of Older Person's Prescriptions) and START (Screening Tool to Alert doctors to Right Treatment). Consensus validation

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- Consensus panel of 18 experts
- Delphi process (2 rounds)
- Final agreed list of STOPP criteria (n=65) and START (n=22)
- Good inter-rater reliability (STOPP k=0.75; START k= 0.68)



Contents of STOPP

Physiological System	Number of criteria
Cardiovascular system	17
Central nervous system	13
Gastro-intestinal system	5
Musculoskeletal system	8
Respiratory system	3
Urogenital system	6
Endocrine system	4
Drugs that adversely affect fallers	5
Analgesics	3
Duplicate drug classes	1

STOPP: Screening Tool of Older People's Potentially Inappropriate Prescriptions

The following drug prescriptions are potentially inappropriate in persons aged ≥ 65 years of age

Cardiovascular System

1. Digoxin at a long-term dose $> 125\mu\text{g}/\text{day}$ with impaired renal function
2. Loop diuretic for dependent ankle oedema only i.e. no clinical signs of heart failure
3. Loop diuretic as first-line monotherapy for hypertension
4. Thiazide diuretic with a history of gout
5. Non cardioselective Beta-blocker with Chronic Obstructive Pulmonary Disease
6. Beta-blocker in combination with verapamil
7. Use of diltiazem or verapamil with NYHA Class III or IV heart failure
8. Calcium channel blockers with chronic constipation
9. Use of aspirin and warfarin in combination without histamine H_2 receptor antagonist
10. Dipyridamole as monotherapy for cardiovascular secondary prevention
11. Aspirin with a past history of peptic ulcer disease without histamine H_2 receptor antagonist or Proton Pump Inhibitor
12. Aspirin at dose $> 150\text{mg}$ day
13. Aspirin with no history of coronary, cerebral or peripheral vascular symptoms or occlusive event
14. Aspirin to treat dizziness not clearly attributable to cerebrovascular disease
15. Warfarin for first, uncomplicated deep venous thrombosis for longer than 6 months duration
16. Warfarin for first uncomplicated pulmonary embolus for longer than 12 months duration
17. Aspirin, clopidogrel, dipyridamole or warfarin with concurrent bleeding disorder

STOPP: Screening Tool of Older People's Potentially Inappropriate Prescriptions

The following drug prescriptions are potentially inappropriate in persons aged ≥ 65 years of age

Central Nervous System and Psychotropic Drugs.

1. Tricyclic antidepressants (TCAs) with dementia
2. TCAs with glaucoma
3. TCAs with cardiac conductive abnormalities
4. TCAs with constipation
5. TCAs with an opiate or calcium channel blocker
6. TCAs with prostatism or prior history of urinary retention
7. Long-term (i.e. > 1 month), long-acting benzodiazepines and benzodiazepines with long-acting metabolites
8. Long-term (i.e. > 1 month) neuroleptics as long-term hypnotics
9. Long-term neuroleptics (> 1 month) in those with parkinsonism
10. Phenothiazines in patients with epilepsy
11. Anticholinergics to treat extra-pyramidal side-effects of neuroleptic medications
12. Selective serotonin re-uptake inhibitors (SSRIs) with a history of clinically significant hyponatraemia
13. Prolonged use (> 1 week) of first generation antihistamines i.e. diphenhydramine, chlorpheniramine, cyclizine, promethazine

STOPP: Screening Tool of Older People's Potentially Inappropriate Prescriptions

Gastrointestinal System

1. Diphenoxylate, loperamide or codeine phosphate for treatment of diarrhoea of unknown cause
2. Diphenoxylate, loperamide or codeine phosphate for treatment of severe infective gastroenteritis
3. Prochlorperazine (Stemetil) or metoclopramide with Parkinsonism
4. PPI for peptic ulcer disease at full therapeutic dosage for > 8 weeks
5. Anticholinergic antispasmodic drugs with chronic constipation

Respiratory System

1. Theophylline as monotherapy for COPD
2. Systemic corticosteroids instead of inhaled corticosteroids for maintenance therapy in moderate-severe COPD
3. Nebulised ipratropium with glaucoma

Musculoskeletal System

1. NSAID with history of peptic ulcer disease or gastrointestinal bleeding, unless with concurrent histamine H₂ receptor antagonist, PPI or misoprostol
2. NSAID with moderate-severe hypertension
3. NSAID with heart failure
4. Long-term use of NSAID (>3 months) for symptom relief of mild osteoarthritis
5. Warfarin and NSAID together
6. NSAID with chronic renal failure
7. Long-term corticosteroids (>3 months) as monotherapy for rheumatoid arthritis or osterarthritis
8. Long-term NSAID or colchicine for chronic treatment of gout where there is no contraindication to allopurinol

STOPP: Screening Tool of Older People's Potentially Inappropriate Prescriptions

The following drug prescriptions are potentially inappropriate in persons aged ≥ 65 years of age

Urogenital System

1. Bladder antimuscarinic drugs with dementia
2. Antimuscarinic drugs with chronic glaucoma
3. Antimuscarinic drugs with chronic constipation
4. Antimuscarinic drugs with chronic prostatism
5. Alpha-blockers in males with frequent incontinence i.e. one or more episodes of incontinence daily
6. Alpha-blockers with long-term urinary catheter *in situ* i.e. more than 2 months

Endocrine System

1. Glibenclamide or chlorpropamide with type 2 diabetes mellitus
2. Oestrogens with a history of breast cancer or venous thromboembolism
3. Beta-blockers in those with diabetes mellitus and frequent hypoglycaemic episodes i.e. ≥ 1 episode per month
4. Oestrogens without progestogen in patients with intact uterus

STOPP: Screening Tool of Older People's Potentially Inappropriate Prescriptions

The following drug prescriptions are potentially inappropriate in persons aged ≥ 65 years of age

Drugs that adversely affect fallers.

1. Benzodiazepines
2. Neuroleptic drugs
3. First generation antihistamines
4. Vasodilator drugs with persistent postural hypotension i.e. recurrent $> 20\text{mmHg}$ drop in systolic blood pressure
5. Long-term opiates in those with recurrent falls

Analgesic Drugs

1. Use of long-term powerful opiates e.g. morphine or fentanyl as first line therapy for mild-moderate pain
2. Regular opiates for more than 2 weeks in those with chronic constipation without concurrent use of laxatives
3. Long-term opiates in those with dementia unless indicated for palliative care or management of moderate/severe chronic pain syndrome

Duplicate Drug Classes

Any duplicate drug class prescription e.g. two concurrent opiates, NSAID's, SSRI's, loop diuretics, ACE inhibitors

Contents of START



Physiological System	Number of criteria
Cardiovascular system	8
Respiratory system	3
Central nervous system	2
Gastro-intestinal system	2
Musculoskeletal system	3
Endocrine system	4

START: Screening Tool to Alert doctors to Right Treatments

These medications should be considered for people ≥ 65 years of age with the following conditions, where no contraindication to prescription exists.

Cardiovascular System

1. Warfarin in the presence of chronic atrial fibrillation.
2. Aspirin in the presence of chronic atrial fibrillation, where warfarin is contraindicated, but not aspirin
3. Aspirin or clopidogrel with a documented history of atherosclerotic coronary, cerebral or peripheral vascular disease in patients with sinus rhythm.
4. Antihypertensive therapy where systolic blood pressure consistently >160 mmHg
5. Statin therapy with a documented history of coronary, cerebral or peripheral vascular disease, where the patient's functional status remains independent for activities of daily living and life expectancy is greater than 5 years
6. Angiotensin Converting Enzyme (ACE) inhibitor with chronic heart failure
7. ACE inhibitor following acute myocardial infarction
8. Beta-blocker with chronic stable angina

Respiratory System

1. Regular inhaled β_2 agonist or anticholinergic agent for mild to moderate asthma or COPD
2. Regular inhaled corticosteroid for moderate-severe asthma or COPD, where predicted FEV1 $<50\%$.
3. Home continuous oxygen with documented chronic type 1 respiratory failure or type 2 respiratory failure.

Central Nervous System

1. L-DOPA in idiopathic Parkinson's disease with definite functional impairment and resultant disability
2. Antidepressant drug in the presence of moderate-severe depressive symptoms lasting at least three months.

START: Screening Tool to Alert doctors to Right Treatments

These medications should be considered for people ≥ 65 years of age with the following conditions, where no contraindication to prescription exists.

Gastrointestinal System

1. Proton Pump Inhibitor with severe gastro-oesophageal acid reflux disease or peptic stricture requiring dilatation
2. Fibre supplement for chronic, symptomatic diverticular disease with constipation

Musculoskeletal System

1. Disease-modifying anti-rheumatic drug (DMARD) with active moderate-severe rheumatoid disease lasting > 12 weeks
2. Bisphosphonates in patients taking maintenance corticosteroid therapy
3. Calcium and Vitamin D supplement in patients with known osteoporosis

Endocrine System

1. Metformin with type 2 diabetes +/- metabolic syndrome
2. ACE inhibitor or Angiotensin Receptor Blocker in diabetes with nephropathy
3. Antiplatelet therapy in diabetes mellitus with co-existing major cardiovascular risk factors
4. Statin therapy in diabetes mellitus if co-existing major cardiovascular risk factors present

Prevalence of Potentially Inappropriate Prescribing using STOPP/START

- Primary Care

- Potentially inappropriate prescribing (STOPP): 21.4%
- Potential prescribing omissions (START): 22.7%

Ryan C *et al.* Br J Clin Pharmacol 2009

- Secondary Care

- Potentially inappropriate prescribing (STOPP): 34.5%
- Potential prescribing omissions (START): 57.9%

Gallagher *et al.* Age Ageing 2008

Barry PJ *et al.* Age Ageing 2007

- Nursing Home

- Potentially inappropriate prescribing (STOPP): 55-49.8%

Ryan C *et al.* Ir J Med Sci 2009

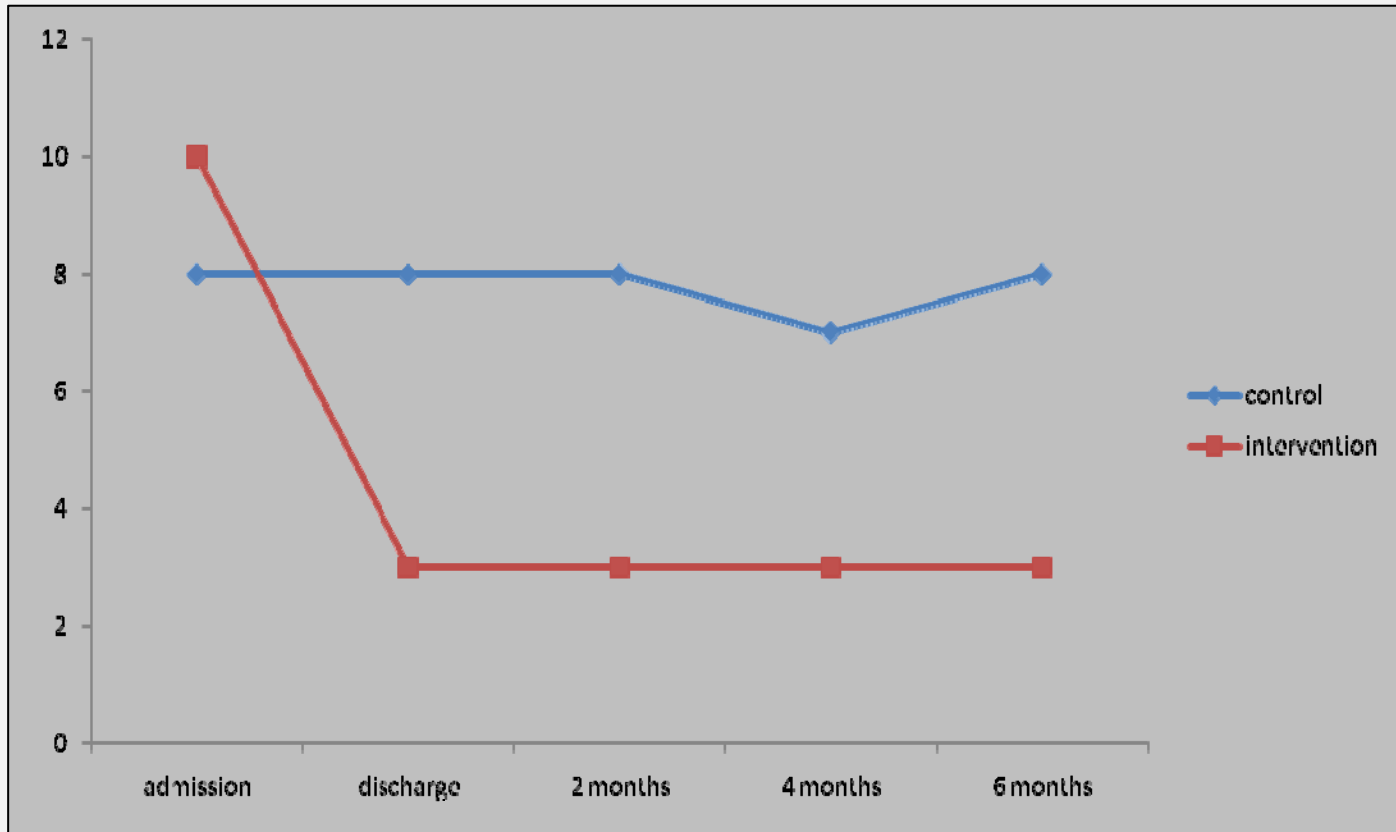
O'Sullivan D *et al.* Eur Ger Med 2010

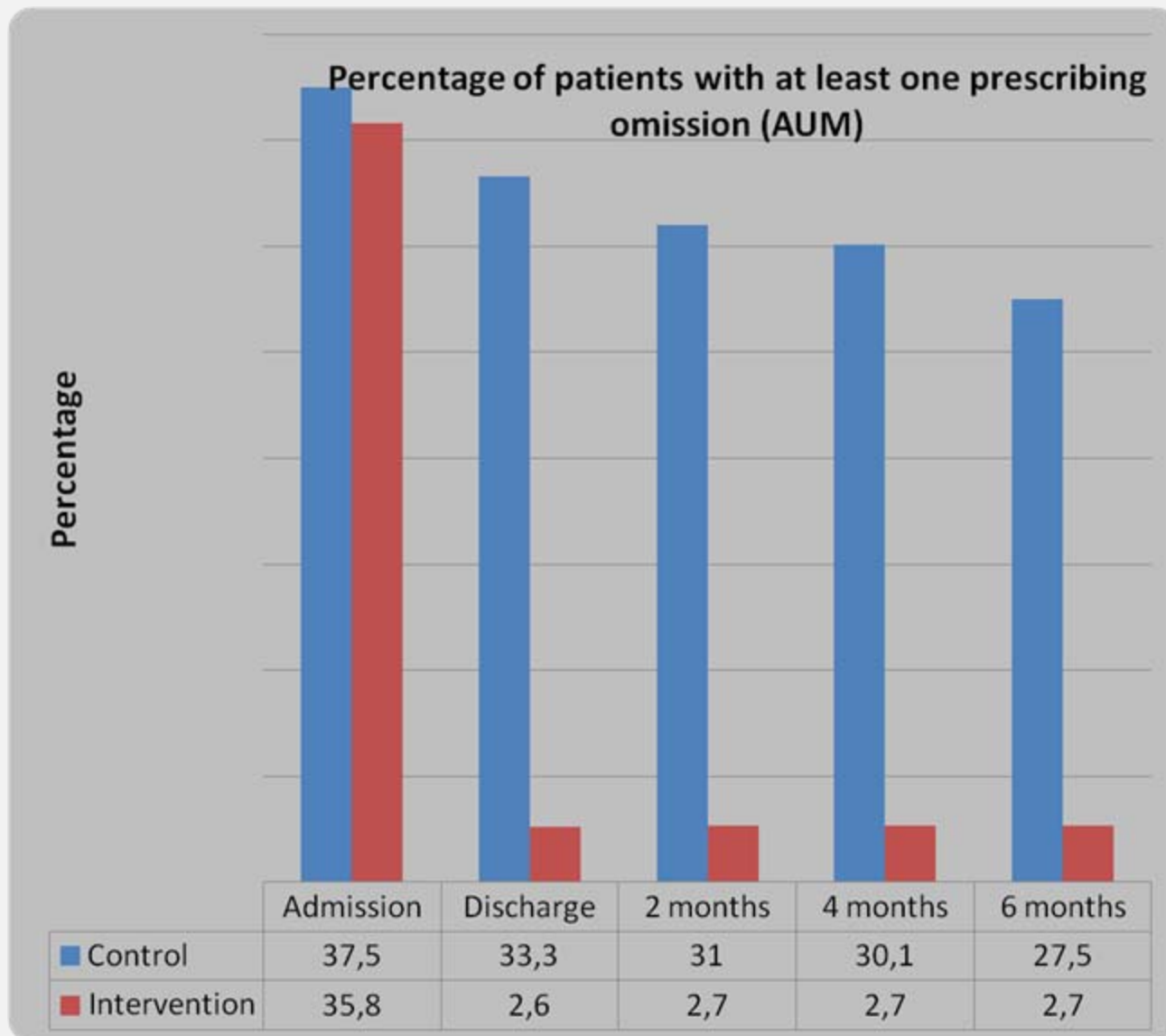
Aims of STOPP/START

- Provide explicit, evidence based rules of avoidance of commonly encountered instances of potentially inappropriate prescribing and potential prescribing omissions
 - Improve medication appropriateness
 - Prevent adverse drug events
 - Reduce drug costs

Medication Appropriateness

MAI
Score





Aims of STOPP/START

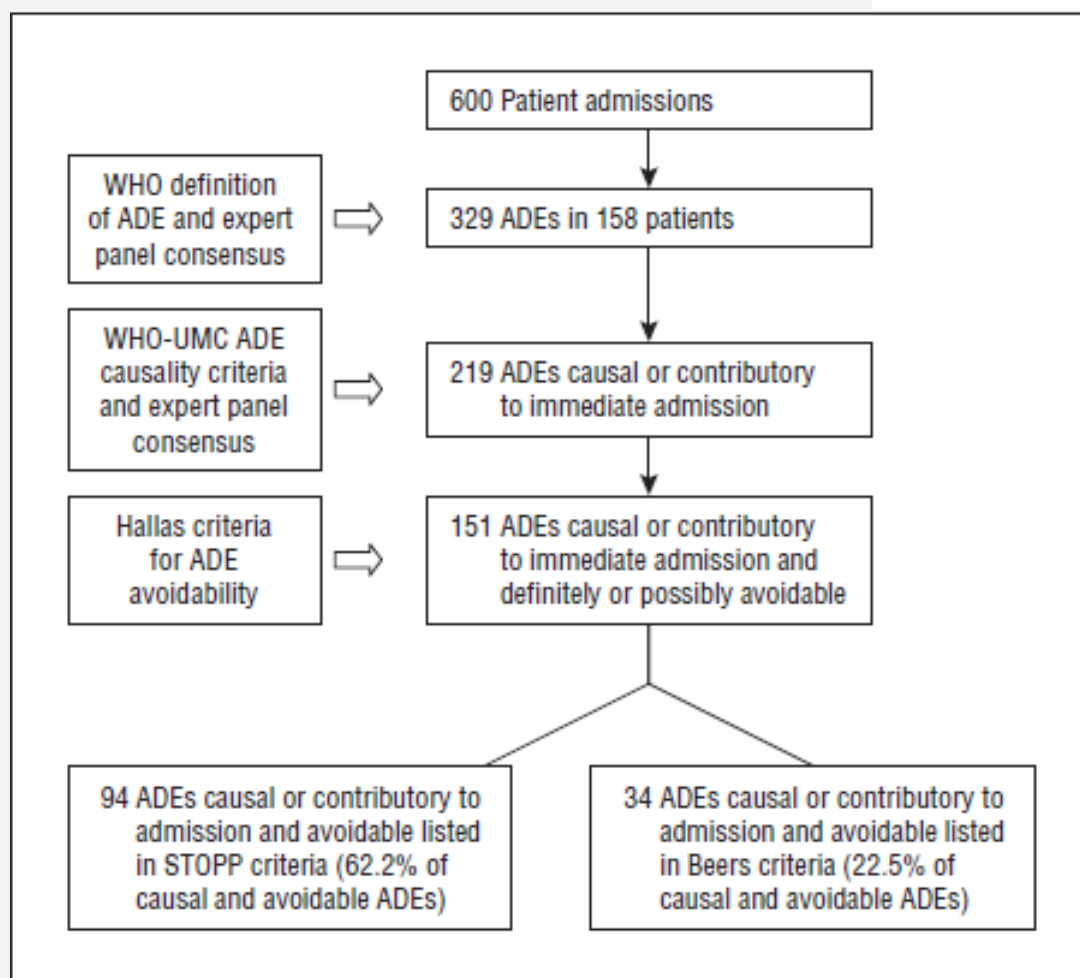
- Provide explicit, evidence based rules of avoidance of commonly encountered instances of potentially inappropriate prescribing and potential prescribing omissions
 - Improve medication appropriateness
 - **Prevent adverse drug events**
 - Reduce drug costs

Potentially Inappropriate Medications Defined by STOPP Criteria and the Risk of Adverse Drug Events in Older Hospitalized Patients

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Stephen Byrne, PhD, MPSI; Denis O'Mahony, MD, FRCPI

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Aims of STOPP/START

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Economic implications of potentially inappropriate prescribing

- Irish population based study using (n=338,801)
- Potentially inappropriate prescribing rate using 30 STOPP indicators: 36%
- NIC: €45 631 319
 - 9% of the overall expenditure on pharmaceutical in those ≥ 70 years

Inter-rater reliability amongst pharmacists when provided with clinical information

Participants

- 5 hospital pharmacists
- 5 community pharmacists

Method

- 20 patient cases randomly selected from primary care study
- STOPP/START applied
- Compared with consensus agreement of academic pharmacists

Interpretation of Results

- Cohen's kappa (k) statistics calculated
- 0.81-1.0= good, 0.61-0.80= substantial, 0.41-0.6= moderate, 0.21-0.40= fair, $k \leq 0.2$ = poor

Inter-rater reliability amongst pharmacists when provided with clinical information

Comparators	Median kappa (p<0.01 95% CI)
STOPP	
APs*HPs	0.89 (0.69-1.0)
APs*CPs	0.88 (0.67-1.0)
Inter HPs	0.82 (0.55-1.0)
Inter CPs	0.78 (0.46-0.99)
START	
APs*HPs	0.91 (0.75-1.0)
APs*CPs	0.90 (0.76-1.0)
Inter HPs	0.90 (0.70-1.0)
Inter CPs	0.82 (0.57-0.99)
KEY AP: Academic Pharmacists, HP: Hospital Pharmacists, CP: Community Pharmacists	

Inter-rater reliability amongst pharmacists without access to clinical information

Participants

- 3 community pharmacists

Method

- Random selection of cases from primary care study (n=250)
- STOPP/START applied to medication lists alone
- Responses compared to consensus agreement of two academic with clinical information

Interpretation of Results

- Cochran's Q test and McNemar's test
- Cohen's kappa statistics (k) were calculated for the three most commonly occurring instances of potentially prescribing

Inter-rater reliability amongst pharmacists without access to clinical information

Pharmacist	K (95% CI, p<0.01)
Bisphosphonate in patients taking maintenance corticosteroid therapy	
CP1	1
CP2	0.89 (0.67-1.0)
CP3	1
PPI for peptic ulcer disease at full therapeutic dosage for > 8 weeks	
CP1	0.50 (0.10-1.0)
CP2	0.50 (0.10-1.0)
CP3	0.80 (0.41-1.0)
Antiplatelet therapy in diabetes mellitus with coexisting major CV risk factors	
CP1	0.50 (0.10-1.0)
CP2	0.80 (0.41-1.0)
CP3	1

Inter-rater reliability amongst pharmacists without access to clinical information

Pharmacist	K (95% CI, p<0.01)
Long-term (i.e. > 1 month), long-acting benzodiazepines with long-acting metabolites	
CP1	0.94 (0.85-1.0)
CP2	0.87 (0.75-1.0)
CP3	0.97 (0.90-1.0)
PPI for peptic ulcer disease at full therapeutic dosage for > 8 weeks	
CP1	0.60 (0.45-0.76)
CP2	0.68 (0.51-0.81)
CP3	0.68 (0.51-0.81)
Duplicate Drug Classes	
CP1	0.77 (0.60-0.95)
CP2	0.39 (0.70-1.0)
CP3	0.85 (0.67-1.0)

STOPP/START in practice

- Growing momentum in the research literature
 - Translated to various European languages
- Integrated into some geriatric units in secondary care
- Use as a guide to assist clinical medication review in some primary care and secondary care settings
- Used as an educational tool for pharmacists and prescribers

Future for STOPP/START

- Limitation:
 - Clinical guideline- not to replace expert knowledge
 - In need of regular updating
- More RCTs:
 - Pharmaco-economic model
 - Comparison between screening tool facilitated MUR and full clinical review
 - Long term patient outcomes

Example: 70 Year old male

- Current Medicines
 - Digoxin 250micrograms od
 - Bendroflumethiazide 2.5mg od
 - Flurazepam 30mg od (past 3 years)
- Application of STOPP
 - Long term flurazepam

Example: 70 Year old male

- Current Medicines

- Digoxin 250micrograms od
- Bendroflumethiazide 2.5mg od
- Flurazepam 30mg od (past 3 years)

- Current Diagnoses

- Hypercholesterolaemia
- Chronic Atrial Fibrillation
- Ischaemic Heart Disease

- Medical History

- Cataracts, Gout, Insomnia

- Biochemical Data

Chol: 8.8mmol/L
eGFR 30ml/min/1.73m²
LFTs within range

- Application of STOPP

Digoxin > 125mcg with impaired renal function
Thiazide diuretic and history of gout
Long term flurazepam

- Application of START

Warfarin and atrial fibrillation
Statin with elevated cholesterol