The impact of medication reviews on process measures and patient outcomes

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Disclosure Statement

"Conflict of interest: nothing to disclose"

Questions

1. What type of measure is Incidence of Adverse Drug Events (ADEs)?

A. Structure Measure
B. Process Measure
C. Outcome Measure

2. What is true about hospital re-admissions?

A. They are always drug-related
B. They are often multi-factorial and hard to impact using single target interventions (such as medication reviews)
C. They are never drug-related

3. Which of these tools, used for identifying inappropriate prescribing, came first?

A. The Beer's criteria
B. MAI
C. STOPP/START

Learning objectives

At the end of this session, participants should be able to:

- summarise the current evidence base for effects of medication reviews on process measures and patient outcomes
- list factors associated with a positive or negative outcome from a medication review

References - Pharmacy practice research

Application of the STOPP/START criteria: a systematic review of the prevalence of potentially inappropriate prescribing in older adults, and evidence of clinical, humanistic and economic impact Hill-Taylor B, Sketris I, Hayden J et al.J Clin Pharm Ther 2013; 38: 360–72.

Prevention of potentially inappropriate prescribing for elderly patients: a randomized controlled trial using STOPP/START criteria Gallagher PF, O'Connor MN, O'Mahony D.. Clin Pharmacol Ther 2011; 89: 845–54.

Reduction of potentially inappropriate medications using the STOPP criteria in frail older inpatients: a randomised controlled study. Dalleur O, Boland B, Losseau C, Henrard S, Wouters D, Speybroeck N, Degryse JM, Spinewine A. Drugs Aging. 2014 Apr;31(4):291-8.

Inappropriate prescribing and related hospital admissions in frail older persons according to the STOPP and START criteria. Dalleur O1, Spinewine A, Henrard S, Losseau C, Speybroeck N, Boland B J Clin Pharm Ther. 2016 Apr;41(2):158-69.

Effects of a clinical pharmacist service on health-related quality of life and prescribing of drugs: a randomised controlled trial. Bladh L, Ottosson E, Karlsson J, Klintberg L, Wallerstedt SM. BMJ Qual Saf

Why is there a demand for pharmacy practice research?

Although the value of medication reviews is generally accepted among clinicians, there is a lack of robust evidence demonstrating (cost-) effectiveness.

This lack of evidence constitutes a barrier to more widespread implementation.

Why is the demand for pharmacy practice research also a good thing?

Evidence-based care:

→ Scientific basis for treatment recommendations

→ Scientific basis for working

The profession's development:

→ New roles, new working methods require evaluation

Types of measures*

(in this example used to evaluate the effects of medication reviews by pharm.)

Structure measures e.g.

- Number of clinical pharmacists at a ward

Process measures e.g.

- % of patients receiving a medication review at a ward
- % of patients prescribed inappropriate drugs (Beer's, MAI, STOPP/START) – *also used as outcome measures*
- Number of DRP identified

Outcome measures e.g.

- Readmissions,
- Mortality
- ADEs
- Health care costs, cost/QALY

*Donabedian's model for types of quality measures. Pronovost et al 2001

Steering with process measures - Swedish examples

The National Board of Health and Welfare

New legislation 2012: All persons over 75 years of age with at least 5 prescriptions shall be offered a medication review.

Swedish Association of Local Authorities and Regions

Counties that reduce prescribing of certain, ”inappropriate” drugs receive performance based remuneration

Types of measures*

(in this example used to evaluate the effects of medication reviews by pharm.)

Structure measures e.g.

- Number of clinical pharmacists at a ward

Process measures e.g.

- % of patients receiving a medication review at a ward
- **% of patients prescribed inappropriate drugs (Beer's, MAI, STOPP/START**)
- Number of DRP identified

Outcome measures e.g.

- **Readmissions**
- Mortality
- **ADEs**
- **Health care costs, cost/QALY**

*Donabedian's model for types of quality measures. Pronovost et al 2001

Readmissions as outcome measure in studies

Challenging…

- Very multifactorial – we target only one factor
- We can only impact on drug-related readmissions hence large studies required
- Not necessarily negative with extra admission, depends a lot on how care is organized
- Team work – how can you measure the effects of one member, the pharmacists?

What about drug-related readmissions as outcome measure in studies?

Subjective measure…

- Panel of experts (consensus) – documented in case notes – blinded? – Unlikely/possible/probable/certain
- Drug contributed a little or as only reason for admission?
- If not impact on total readmissions – does it really matter?

But:

- Probably the most important/relevant outcome measure for us!

Quality of life or mortality as outcome measures in studies?

Challenging!!

- *Very* multifactorial – we target only one factor (and probably not the most important one)
- We can only impact on drug-related issues - hence *huge* studies required
- Team work – how can you measure the effects of one member, the pharmacists?

Improvements in Beer's, MAI or STOPP/START, reduction in DRP etc as outcome measures in studies

The easy way out?

- "Easy" to show effects of quality improvement efforts, adherence to guidelines
- Measures/evaluates the pharmacist's contribution

But:

- "Proxy", "Surrogate endpoints" – correlation to clinical outcome measures?
- Interesting mostly for pharmacists..?

The Northern Irish example (IMM)

Study aim:

- To determine whether an *increased* input by clinical pharmacists at each stage of the patient's hospital journey resulted in an enhanced level of patient care

The Northern Irish example

- RCT, hospital setting
- 760 patients included, 12 months follow-up
- Intervention group: Integrated medicines management (IMM)
- Control group: Standard care (including regular pharmaceutical care)

The Northern Irish example

Primary outcome measure:

- Length of hospital stay

Secondary outcome measures:

- Time to and number of readmissions
- Assessment of health care practitioner satisfaction

The Northern Irish example

Results:

- Reduced length of hospital stay by 2 days (p=0.003)
- Decreased rate of readmission during 12 months follow-up (40.8% vs 49.3%, p=0.027)
- Increased time to readmission

IMM now implemented all over NI

Scullin C, Scott MG, Hogg A, McElnay JC. J Eval Clin Pract 2007; 13: 781–8.

The “80+ study” – Uppsala University Hospital

RCT, hospital setting, 12 months follow-up

Study population:

- Patients 80 years or older admitted to two internal medicine wards: 400 patients

Study aim:

- To investigate the effectiveness of interventions performed by ward-based pharmacists

The 80+ study

Primary outcome measure:

- Frequency of hospital visits (emergency department and readmissions [total and drug-related]) during the 12-month follow-up period

Secondary outcome measure

- Cost of hospital care

The 80+ study

Results:

- Reductions in hospital visits (16%), drug related readmissions (80%) and visits to ED (46%)

- Clinical pharmacy services implemented within the county of Uppsala

Gillespie U, Alassaad A, et al, Arch Intern Med 2009; 169: 894–900.

Tools to identify inappropriate prescribing

- Overprescribing
- Underprescribing
- Misprescribing

Tools used to assess appropriateness of prescribing

Explicit tools - Beers' criteria

\+
- Easy and rapid to use
- May be applied to large data-sets and allows comparison.

\-
- Some drugs controversial
- Many drugs not available in Europe

Ref. Beers et al., Arch Int Med 1991;151:1825-32 and 1997;157:1531 and 2003;163:2716-24

Tools used to assess appropriateness of prescribing

Explicit tools – STOPP and START

- Criteria that identify PIMs (potentially inappropriate medications) and PPOs (Potential Prescription Omissions).

- The criteria are arranged according to relevant physiological systems

Ref. Gallagher et al. Int J Clin Pharmacol Ther 2008;46:72-83

Tools used to assess appropriateness of prescribing

Implicit tools - MAI

(Medication Appropriateness Index)

- 10 general questions asked for each drug

Ref. Hanlon et al. Am J Med 1996;100:428-37

Tools used to assess appropriateness of prescribing

Implicit tools - MAI

\+
- Comprehensive and systematic with good operational instructions and examples
- Good educational tool for students

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- Knowledge-dependent
- Timeconsuming!
- Untreated indications not covered

The MAI, STOPP and START study
(80+ study)

Study aims

1. To further analyse data from RCT (80+) with respect to the *effects* of the pharmacist intervention *on the appropriateness of prescribing*, as measured by the three instruments MAI, STOPP and START

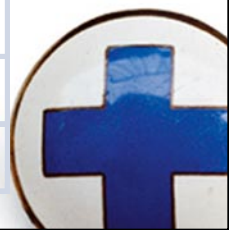
2. To evaluate the instruments in terms of *ability to predict hospitalisation*

Example

- 87 year old woman
- Lives in nursing home
- Clkrea: 25ml/min
- Diagnoses and symptoms: Alzheimers disease, heartfailure (NYHA 2-3), chronic atrial fibrilation, Megaloblastic anemia, depression and chronic back pain
- Prone to falls and anxiety

	MAI	STOPP	START
Digoxin 0.13mg 1x1			
kalcipos-d 1x2			
folacin 5mg 1x1			
furix 40mg 1x1			
atacand 8mg 1x1			
tradolan 50mg 1x2			
alvedon 500mg 2x3			
cipralex 15mg 1x1			
aricept 10mg 1x1			
solvezink 1x3			
asmanex twisthaler 200mg vb			
behepan inj var 3e mån			
Atarax 25mg vb			
Spironolakton 50mg 1x1			
Weighted score MAI:			
Score STOPP:			
Score START:			

	MAI	STOPP	START	
Digoxin 0.13mg 1x1	3	PIM		
kalcipos-d 1x2	1,8,10			
folacin 5mg 1x1				
furix 40mg 1x1				
atacand 8mg 1x1	8			
tradolan 50mg 1x2	7	PIM		
alvedon 500mg 2x3				
cipralex 15mg 1x1	8			
aricept 10mg 1x1				
solvezink 1x3	1,8,10			
asmanex twisthaler 200mg vb	1,8,10			
behepan inj var 3e mån				
Atarax 25mg vb	7	PIM		
Spironolakton 50mg 1x1	3,6			
			PPO (Aspirin)	
Weighted score MAI:	27			
Score STOPP:	3			
Score START:	1			



Results –study aim 1

Instrument		Intervention group (n=182)			Control group (n=186)			p-valuee
		Admission	Discharge	Change from admission[d]	Admission	Discharge	Change from admission[d]	
MAI[a]	Mean (SD)	8.5 (6.8)	5.0 (4.2)	-3.5 (5.1)	8.7 (7.3)	10.0 (7.3)	1.3 (3.1)	p<0.001
	Median (Min, Max)	8 (0-35)	5 (0-20)	-2 (-26-8)	7 (0-34)	8.5 (0-32)	0 (-7-13)	
STOPP[b]	Mean (SD)	1.4 (1.5)	0.9 (1.0)	-0.5 (1.0)	1.5 (1.5)	1.7 (1.5)	0.2 (0.7)	p<0.001
	Median (Min, Max)	1 (0-7)	1 (0-5)	0 (-4-2)	1 (0-7)	1 (0-8)	0 (-3-3)	
START[c]	Mean (SD)	0.4 (0.7)	0.1 (0.3)	-0.3 (0.6)	0.4 (0.7)	0.5 (0.7)	0 (0.4)	p<0.001
	Median (Min, Max)	0 (0-4)	0 (0-2)	0 (-4-0)	0 (0-3)	0 (0-3)	0 (-1-2)	

SD, Standard deviation.[a] Summated MAI score per patient.[b] Number of PIMs per patient.[c] Number of PPOs per patient.[d] Change from admission calculated as Score at discharge-Score on admission.[e] p-values from rank analysis of covariance for the effect of group status (Intervention or Control) on change from admission, adjusted for the score on admission.

Results –study aim 2

Effect of MAI, START, STOPP on number of total visits to hospital, number of readmissions and number of drug-related readmissions (N=368)

	Number of total visits to hospital	Number of readmissions	Number of drug-related readmissions
Model[a]	RR (95% CI)[b]	RR (95% CI)[b]	RR (95% CI)[b]
MAI			
Unadjusted	1.02 (1.00-1.03), p=0.053	1.02 (1.00-1.04), p<0.05	1.08 (1.03-1.13), p<0.001
Adjusted	1.02 (1.00-1.03), p=0.058	1.02 (1.00-1.04), p=0.060	1.09 (1.04-1.14), p<0.001
STOPP			
Unadjusted	1.05 (0.97-1.14), p=0.24	1.09 (0.99-1.19), p=0.07	1.30 (1.03-1.63), p<0.05
Adjusted	1.05 (0.97-1.15), p=0.23	1.06 (0.97-1.16), p=0.20	1.34 (1.05-1.70), p<0.05
START			
Unadjusted	1.05 (0.87-1.28), p=0.60	1.17 (0.95-1.44), p=0.14	1.49 (0.92-2.39), p=0.10
Adjusted	1.09 (0.90-1.32), p=0.39	1.16 (0.95-1.42), p=0.14	1.49 (0.91-2.45), p=0.11

[a] Negative binomial regressions. Adjusted models include age, gender, weight, social support and medical history.
[b] RR, Rate ratio; CI, Confidence interval.

Why is there a demand for pharmacy practice research?

- There is a lack of robust evidence demonstrating (cost-) effectiveness.
- This lack of evidence constitutes a barrier to more widespread implementation.
- And can even mean discontinuation of existing services!

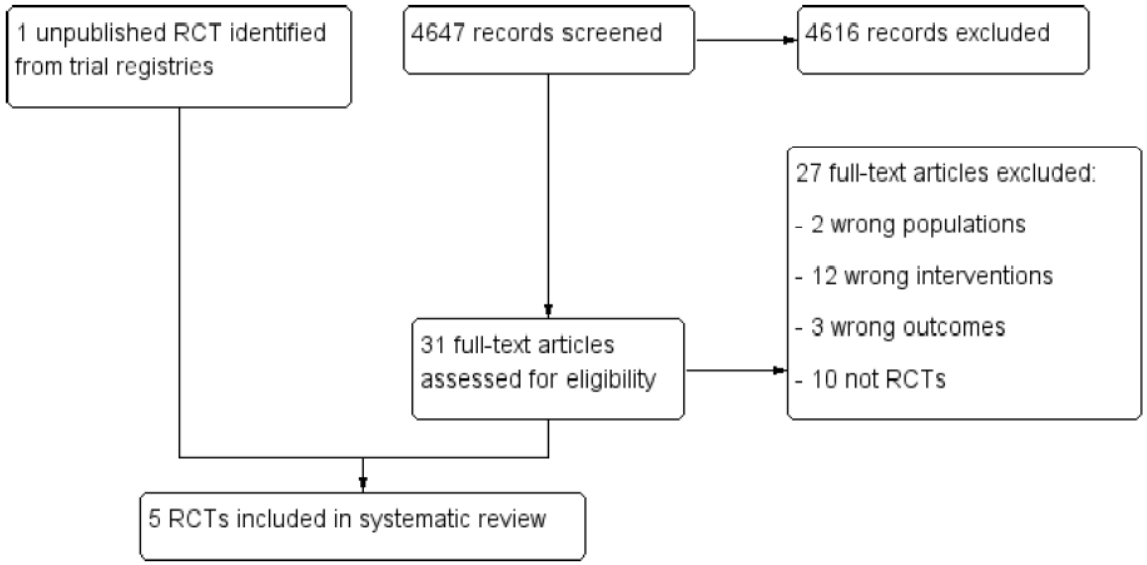
Systematic review

Cochrane: 2013 and 2016

Medication review in hospitalised patients to reduce morbidity and mortality (Review)

Christensen M, Lundh A

Figure 1. Study flow diagram.



Systematic review

Cochrane: 2013 and 2016

Medication review in hospitalized patients to reduce morbidity and mortality

"It is uncertain whether medication reviews reduce mortality or hospital readmissions, but medication review seems to reduce the number of emergency department contacts"

"…Therefore, medication review should preferably be undertaken in the context of clinical trials. High quality trials with long follow up are needed before medication review should be implemented."

BUT:

1. the authors were not cognisant of the definition of medication reviews

2. None of the studies were powered to have mortality as an outcome.

3. The extent to which the physicians, responsible for patient care, followed the suggestions generated from the medication review ranged from 18% (Lisby et. al) to 94 % (Gallagher et. al).

4. The IMM study from NI was not included in the review.

New study!

MedBridge 2017

Medication Reviews Bridging Healthcare:

- to study the effects of a new extended medication review service on elderly patients' health-care consumption

Study design

- 4 hospitals (Uppsala, Västerås, Gävle and Enköping) – 8 medicine or geriatric wards
- 2250 patients to be included
- Cluster-randomised crossover (ward level)
- 8-week periods (7 weeks active treatment)
- Each intervention twice per cluster

Participants

Inclusion criteria:

- Patients ≥65 or older

Exclusion criteria:

- Residing in other than the three regions
- Medication review 30 days before admission or during same admission period within the hospital

Interventions

- **Intervention 1**: ”current medication review”

- **Intervention 2**: ”extended and bridging medication review” (2 phone calls and referals)

- **Control**: usual care

Outcomes

Primary outcome:

- Incidence of unplanned hospital visits (admissions and ER visits) within 12 months

Secondary outcomes:

- Incidence of unplanned hospital readmissions
- Incidence of unplanned drug-related readmissions
- Incidence of unplanned contacts with primary care
- Costs of hospital based care
- All-cause mortality rates

Pharmacy practice research

There is a vast number of studies that show that pharmacists' interventions improve the *quality of prescribing, reduce errors and DRPs and are perceived as valuable…*

…especially in specific *settings, disease states, and patient populations.*

…but "general" evidence showing the impact of pharmacists' interventions on *hard clinical outcomes, quality of life and costs* are equivocal.

Factors associated with a positive result (showing effectiveness of medication reviews)

- Well functioning team before study!
- Oral communication as far as possible!

And

- Choosing the right outcomes!

Thank you for listening!

Uppsala 2003

Uppsala 2016

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