The impact of medication review – does it work?

Structured discussion on the effect of medication review in different settings

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Agenda

- Update of what is published on the impact of medication reviews (MR) in various settings
  - Published intervention studies
  - Economic studies
  - Meta analysis
  - Grey literature
- Reflect issues when investigate pharmacist-led MR
  - Discuss presented data
  - Highlight conclusions and study issues

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Various perspectives to discuss impact of MR

Patient

- Individual therapy management
- Safety, drug related problems
- Understanding of medication treatment

Health care provider

- Responsibility, roles
- Counselling opportunities, acceptance of intervention
- Collaboration with other health care providers

Society / Payer

- Costs (effectiveness, utility, benefits)
- Morbidity, mortality, (re-) hospitalization, …

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PCNE Definition of Medication Review

Malta 2014

Medication review is an evaluation of all the patient‘s medicines with the aim of optimizing medicines use and improving health outcomes.

This entails detecting drug-related problems and recommending interventions.

Comments:

- «Medicines Use», according to the PCNE definition of PhC 2013, which refers to the WHO definition of «responsible use of medicines». This covers effectiveness, quality of life, efficiency and safety (1)
- Medication review is part of the patient`s medication management

(1) www.who.int/medicines/publications/responsible_use/en/index.html

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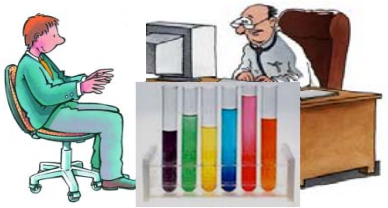
Types of medication review

(PCNE)

	Medi-cation history	Patient	Clinical data	Information source
„Simple“ **Type 1)** Based on the medication history in the pharmacy	+			
„Intermediate“ **Type 2a)** Medication history + patient interview • MUR, Polymedication-Check • „Brown Bag“-Method	+	+		
Type 2b) Medication history + clinical data • In hospital pharmacies • In Dutch communty pharmacies	+		+	
„Advanced“ **Type 3)** Medication history + patient interview + clinical data (clinical medication review)	+	+	+	

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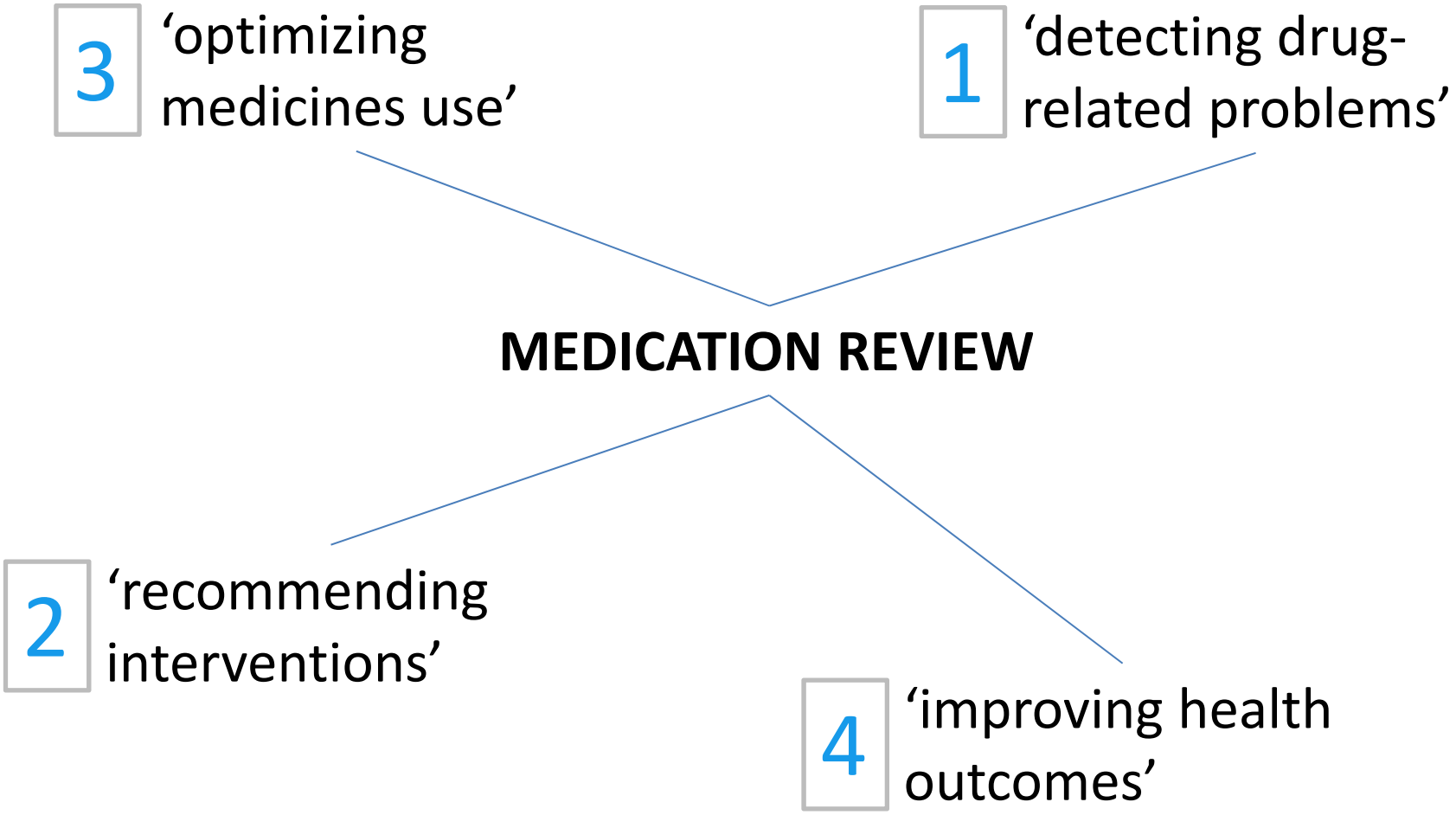
Goal and aims of a medication review

PCNE Malta 2014



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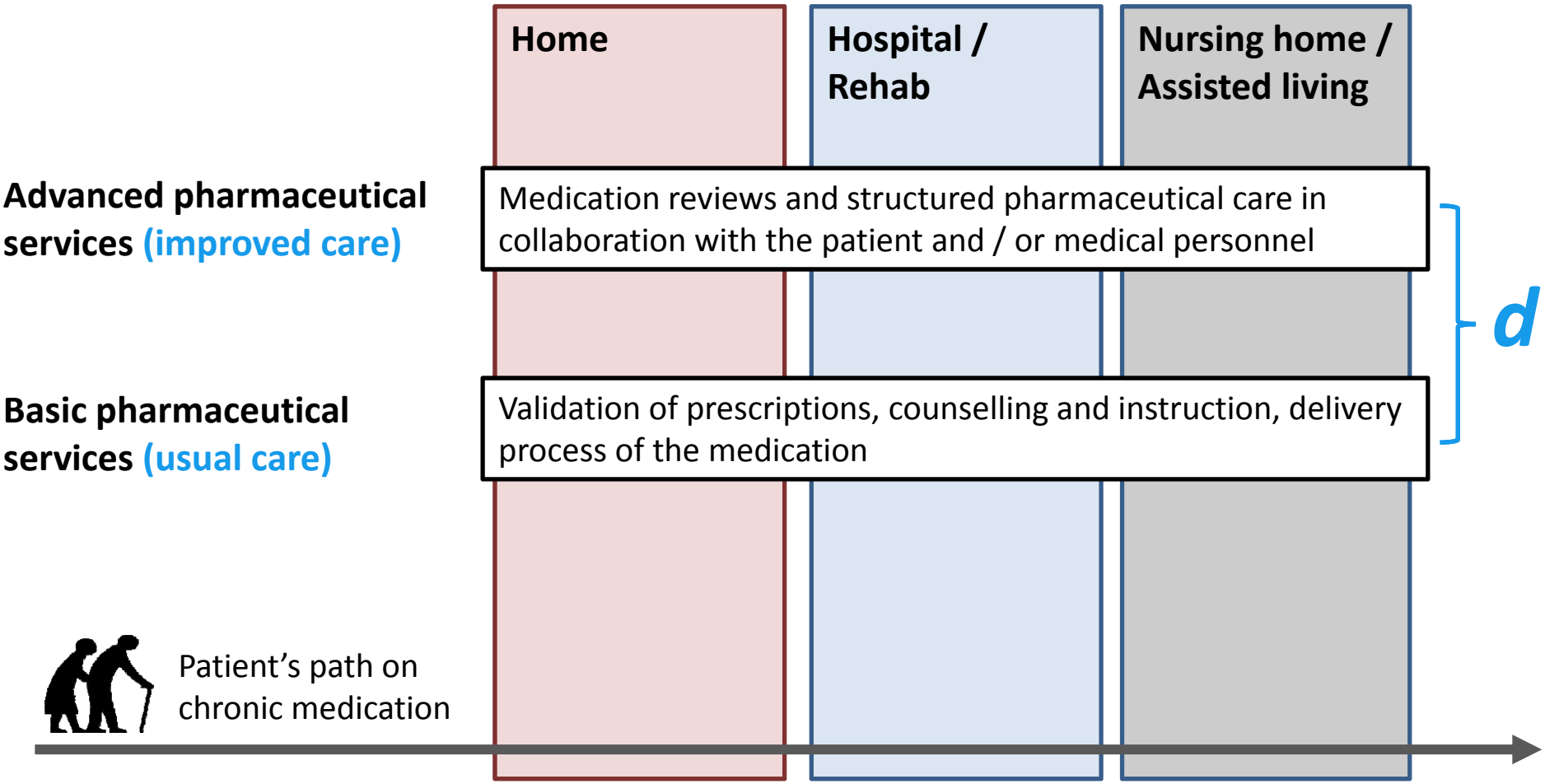
Various possible settings for medication reviews



A practical example 1/2

- ***Mrs. B,*** aged 59, a well-known patient with chronic polypharmacy after a myocardial infarction.

- During a patient oriented medication review she proves to be well informed and organized with her medicines use.

- The pharmacist's last question detects an issue related to almost every medication she takes: swallowing difficulties.

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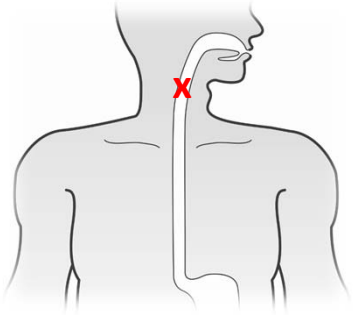
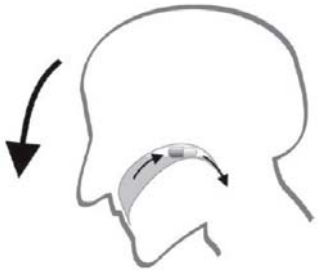
A practical example 2/2



- The disorders are related to every tablet she takes and cause intense complaints and globus sensations.



- The pharmacist asks her to show the swallowing technique and suggests some adaptations. [Schiele J. et al., Ann Fam Med, 2014]

- **Is there a measurable impact as a result of this medication review ?** Is it clinical relevant?

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Is there an impact in this practical example?

- **Patient?**
- **Health care provider?**
- **Society / Payer?**

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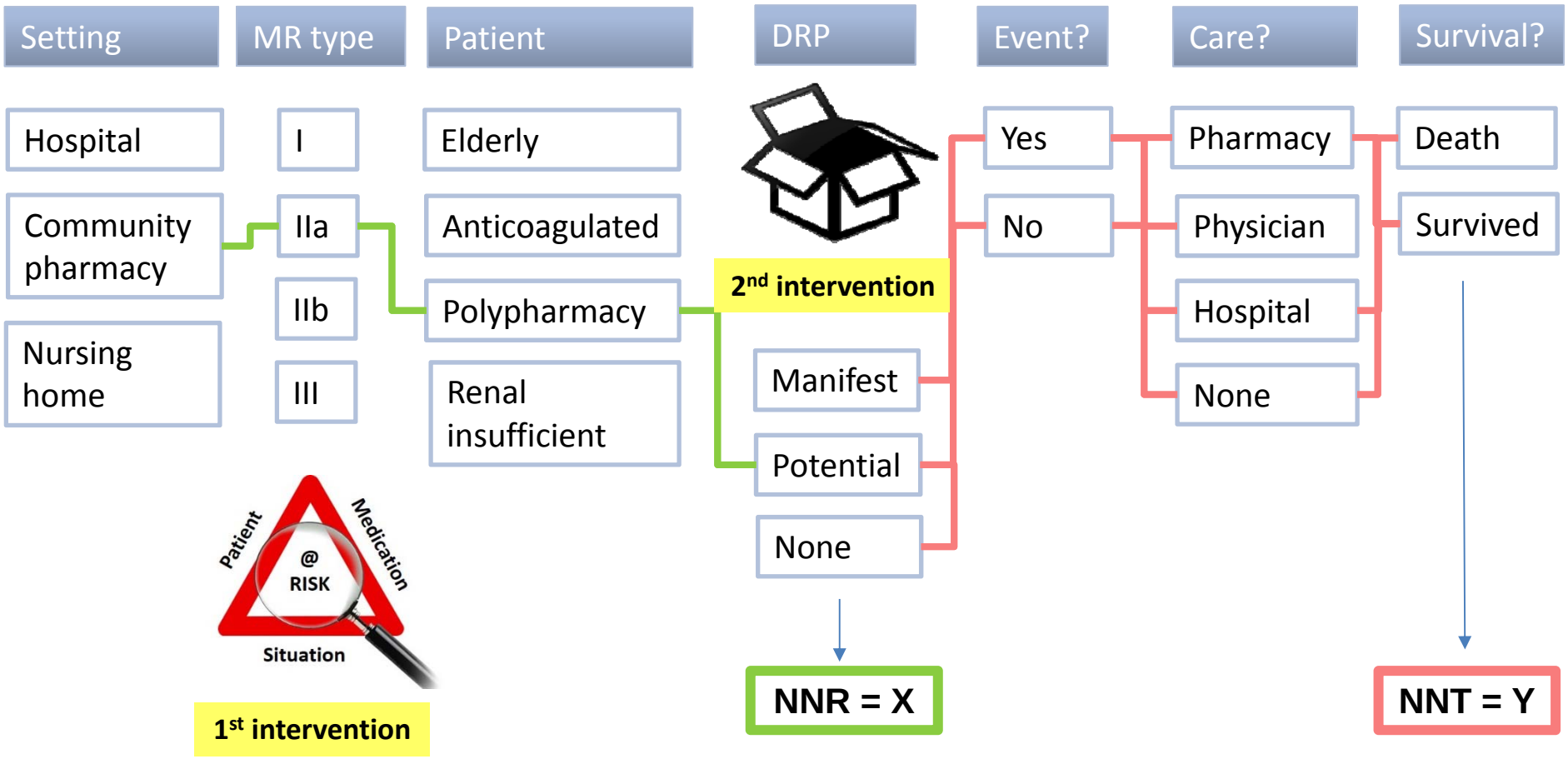
Number Needed to Review (NNR) vs Number Needed to Treat (NNT): 2nd intervention matters!



Published intervention studies

Personal selection 2005 - today

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Holland et al., 2005

Cite this article as: BMJ, doi:10.1136/bmj.38338.674583.AE (published 24 January 2005)

Primary care

Does home based medication review keep older people out of hospital? The HOMER randomised controlled trial

Richard Holland, Elizabeth Lenaghan, Ian Harvey, Richard Smith, Lee Shepstone, Alistair Lipp, Maria Christou, David Evans, Christopher Hand

Table 2 Number of emergency hospital readmissions by group during six month trial follow up

	No of readmissions							
Group	0	1	2	3	4	5	6	Total admissions
Intervention	253	113	34	10	3	1	1	234
Control	281	99	26	5	3	0	0	178

'The intervention was associated with a significantly higher rate of hospital admissions and did not significantly improve quality of life or reduce deaths.'

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Holland et al., 2005

Does home based medication review keep older people out of hospital? The HOMER randomised controlled trial

Richard Holland, Elizabeth Lenaghan, Ian Harvey, Richard Smith, Lee Shepstone, Alistair Lipp, Maria Christou, David Evans, Christopher Hand

Description of the intervention provided by study pharmacists:
'Initial referral to a review pharmacist included a copy of the patient's discharge letter. Pharmacists arranged home visits at times when they could meet patients and carers. Pharmacists assessed patients' ability to self medicate and drug adherence, and they completed a standardised visit form.

Where appropriate, they educated the patient and carer, removed out of date drugs, **reported possible drug reactions or interactions to the general practitioner, and reported the need for a compliance aid to the local pharmacist.**'

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Gheewala et al., 2014

Drugs Aging (2014) 31:825–835
DOI 10.1007/s40266-014-0208-y

ORIGINAL RESEARCH ARTICLE

Impact of the Pharmacist Medication Review Services on Drug-Related Problems and Potentially Inappropriate Prescribing of Renally Cleared Medications in Residents of Aged Care Facilities

Pankti A. Gheewala · Gregory M. Peterson · Colin M. Curtain · Prasad S. Nishtala · Paul J. Hannan · Ronald L. Castelino

Published online: 4 September 2014

'Over 98 % of residents of aged care facilities had at least one DRP. Most (83.8%) recommendations made by accredited pharmacists to resolve DRPs were accepted by general practitioners. Chronic kidney disease (CKD) was prevalent in 48% of residents, and inappropriate prescribing of renally cleared medications was identified in 28 (16 %) residents with CKD.'

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Kempen et al., 2014

Int J Clin Pharm (2014) 36:630–635
DOI 10.1007/s11096-014-9947-4

RESEARCH ARTICLE

Large scale implementation of clinical medication reviews in Dutch community pharmacies: drug-related problems and interventions

Thomas G. H. Kempen · Caroline H. P. A. van de Steeg-van Gompel · Petra Hoogland · Yuqian Liu · Marcel L. Bouvy

'4,579 Clinical medication reviews were analyzed. **On average, 2.9 (SD 2.1) DRPs per review were identified.** 4,123 (31%) of the DRPs led to medication changes. Stopping a drug (16%) was more frequent than starting a drug (8.1%).'

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Kempen et al., 2014

Table 1 Proposed interventions and the degree of implementation of these proposals

Intervention	Proposed n (% of total)	Implemented n (%)
Medication change	8,072 (60)	3,401 (42)
Stop drug	2,604 (20)	1,220 (47)
Change dosage (regimen)	1,994 (15)	889 (45)
Start drug	1,911 (14)	671 (35)
Substitute drug	1,563 (12)	621 (40)
Other	5,299 (40)	2,887 (54)
Perform monitoring	2,345 (18)	1,241 (53)
Provide information/advice	1,483 (11)	1,026 (69)
Other	834 (6.3)	146 (17)
Synchronise medication	404 (3.0)	335 (83)
Change dosage form	210 (1.6)	132 (63)
Unknown	18 (0.1)	7 (39)

Total n = 13,366

Table 2 Drug classes most frequently related to DRPs

Drug class	DRPs n (% of total)	DRPs leading to a medication change n (%)
Lipid modifying agents	1,046 (7.8)	325 (31)
Antithrombotics	934 (7.0)	298 (32)
H2 receptor inhibitors and PPIs	732 (5.5)	314 (43)
Oral antidiabetics	559 (4.2)	183 (33)
Beta blockers	530 (4.0)	178 (34)
ACE inhibitors	397 (3.0)	112 (28)
Vitamin A and/or D	388 (2.9)	148 (38)
Loop diuretics	349 (2.6)	90 (26)
Calcium	341 (2.6)	162 (48)
Inhaled sympathomimetics	333 (2.5)	123 (37)

Total n = 13,366

PPI proton pump inhibitor, *DRP* drug-related problem

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Perera et al., 2011

Evaluation of Prescriber Responses to Pharmacist Recommendations Communicated by Fax in a Medication Therapy Management Program (MTMP)

Prasadini N. Perera, MS; Mignonne C. Guy, PhD; Ashley M. Sweaney, PharmD Candidate; and Kevin P. Boesen, PharmD

J Manag Care Pharm. 2011;17(5):345-54

A medication therapy management program provided to approximately 5'000 high-risk patients yielded 1,548 pharmacist-initiated medication recommendations faxed to 1,163 prescribers for 1,174 patients in a 5-month period. Of the 3 categories of interventions, the majority of the medication recommendations were related to guideline adherence (58.3%), followed by cost savings (33.3%) and safety interventions (8.5%).

The overall prescriber approval rate for recommendations was 47.2%; 255 recommendations were denied (16.5%); and 562 (36.3%) had no response. Approval rates ranged from 41.4% for guideline adherence to 58.2% for cost-saving recommendations.

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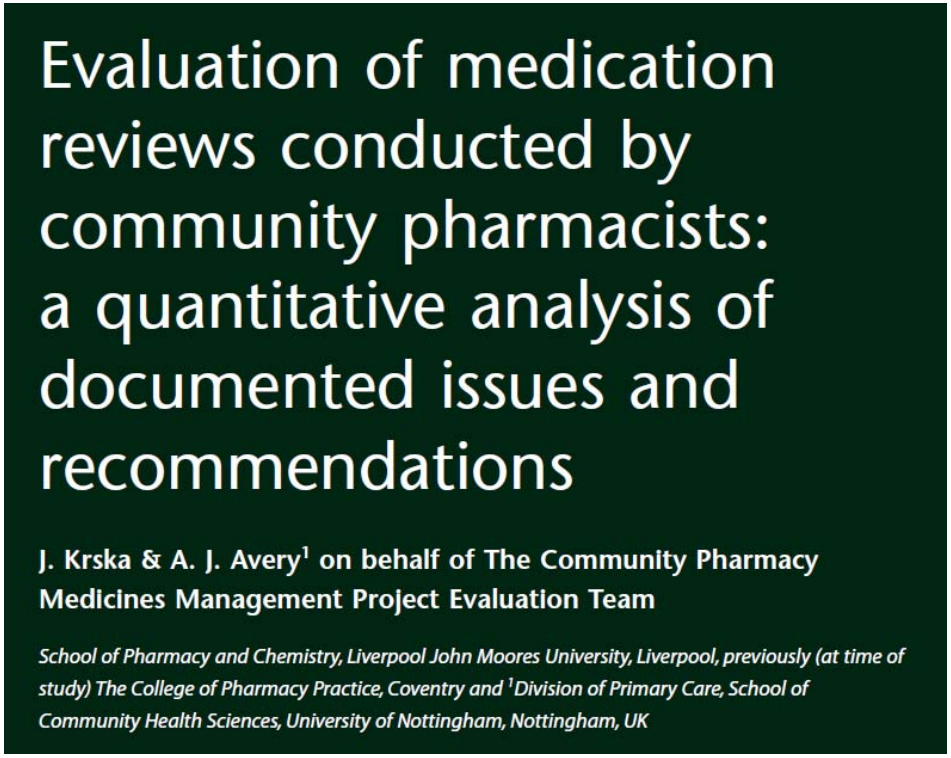
Krska et al., 2007



Evaluation of medication reviews conducted by community pharmacists: a quantitative analysis of documented issues and recommendations

J. Krska & A. J. Avery[1] on behalf of The Community Pharmacy Medicines Management Project Evaluation Team

School of Pharmacy and Chemistry, Liverpool John Moores University, Liverpool, previously (at time of study) The College of Pharmacy Practice, Coventry and [1]Division of Primary Care, School of Community Health Sciences, University of Nottingham, Nottingham, UK

'The majority of issues and recommendations noted by pharmacists related to coronary heart disease, although **pharmacists recorded only a minority of the issues** identified by reviewers.

Variation between pharmacists in the completeness of reviews was not explained by review or other relevant experience.'

Krska et al., 2007

Table 4

Frequency of issues noted and not noted by study pharmacists in 169 cases

Issue type	Number of issues noted: By study pharmacists	Additionally by reviewers	Total	Percent of total noted by study pharmacists
Monitoring	168	385	553	30
Lifestyle	77	141	218	35
Potentially ineffective therapy	67	90	137	49
Indication for therapy	66	83	149	44
Inappropriate use of medicine	41	51	92	45
Potential/suspected ADR	37	62	99	37
Potential/actual compliance	24	45	69	35
Need for education	25	31	56	45
Repeat medicine no longer needed	12	34	46	26
Repeat record not accurate	10	17	27	37
Quantities not aligned	9	55	64	14
No indication for medicine	7	8	15	47
Drug–disease interaction	8	31	39	21
Cost	6	52	58	10

'In the subsample of 169 patients (23% of the total), the reviewers identified **1539 potential issues, of which pharmacists identified an average of 33.8%** (95% CI, 30.1-36.4).'

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Hatah et al., 2013

General practitioners' views of pharmacists' current and potential contributions to medication review and prescribing in New Zealand

Ernieda Hatah MClinPharm;[1,2] **Rhiannon Braund** FNZCP, RegPharmNZ, PhD;[1] **Stephen B Duffull** PhD;[1] **June Tordoff** RegPharmNZ, PhD[1]

Journal of primary health care 2013;5:223-33.

METHODS

Semi-structured interviews were carried out in two localities with GPs whose patients had and had not undergone a pharmacist-led adherence support Medication Use Review (MUR).

GPs were asked their opinions of pharmacists' provision of MUR, clinical medication review and prescribing. Data were analysed thematically using NVivo 8 and grouped by strengths, weaknesses, opportunities and threats (SWOT) category.

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FINDINGS

Eighteen GPs were interviewed. GPs mentioned their own skills, training and knowledge of clinical conditions. These were considered GPs' major strengths. GPs' perceived weaknesses were their time constraints and heavy workloads. **GPs thought pharmacists' strengths were their knowledge of pharmacology and having more time for in-depth medication review than GPs. Nevertheless, GPs felt pharmacist-led medication reviews might confuse patients, and increase GP workloads.** GPs were concerned that pharmacist prescribing might include pharmacists making a diagnosis.

CONCLUSION

GPs perceived their own skills were well suited to reviewing medication and prescribing, but thought pharmacists might also have strengths and skills in these areas. In future, GPs thought that working together with pharmacists in these services might be possible in a collaborative setting.

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Economic studies

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Desborough et al., 2011

IJPP INTERNATIONAL JOURNAL OF Pharmacy Practice

ROYAL PHARMACEUTICAL SOCIETY

IJPP
International Journal of
Pharmacy Practice

Research Paper

A cost-consequences analysis of an adherence focused pharmacist-led medication review service

James A. Desborough[a], Tracey Sach[b], Debi Bhattacharya[a], Richard C. Holland[b] and David J. Wright[a]

[a]School of Pharmacy and [b]Norwich Medical School, University of East Anglia, Norwich, UK

'The mean cost per patient of prescribing and hospital admissions in the 6 months prior to the intervention was £2190 and in the 6 months after intervention £1883. **This equates to a mean cost saving of £307 per patient (95% CI: £1269-£655).** The intervention reduced emergency hospital admissions and increased medication adherence but no significant change in health-related quality of life was observed.'

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Meta analysis

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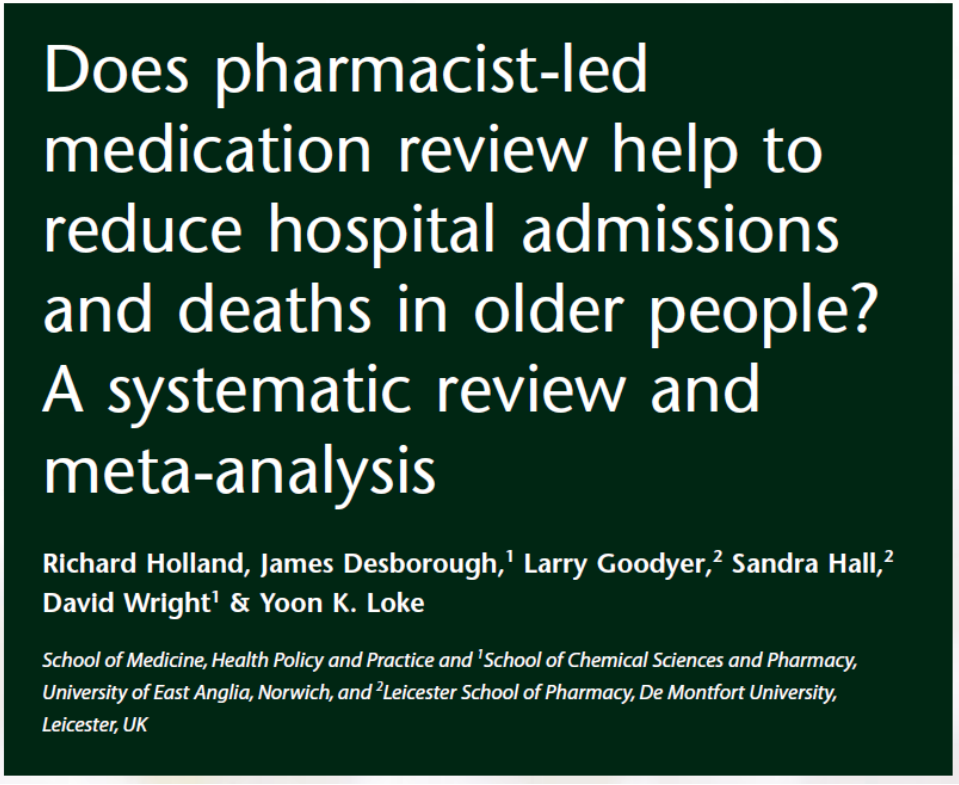
Holland et al., 2008



Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people? A systematic review and meta-analysis

Richard Holland, James Desborough,[1] Larry Goodyer,[2] Sandra Hall,[2] David Wright[1] & Yoon K. Loke

School of Medicine, Health Policy and Practice and [1]School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, and [2]Leicester School of Pharmacy, De Montfort University, Leicester, UK

'Pharmacist-led medication review interventions do not have any effect on reducing mortality or hospital admission in older people, and can not be assumed to provide substantial clinical benefit.'

Holland et al., 2008

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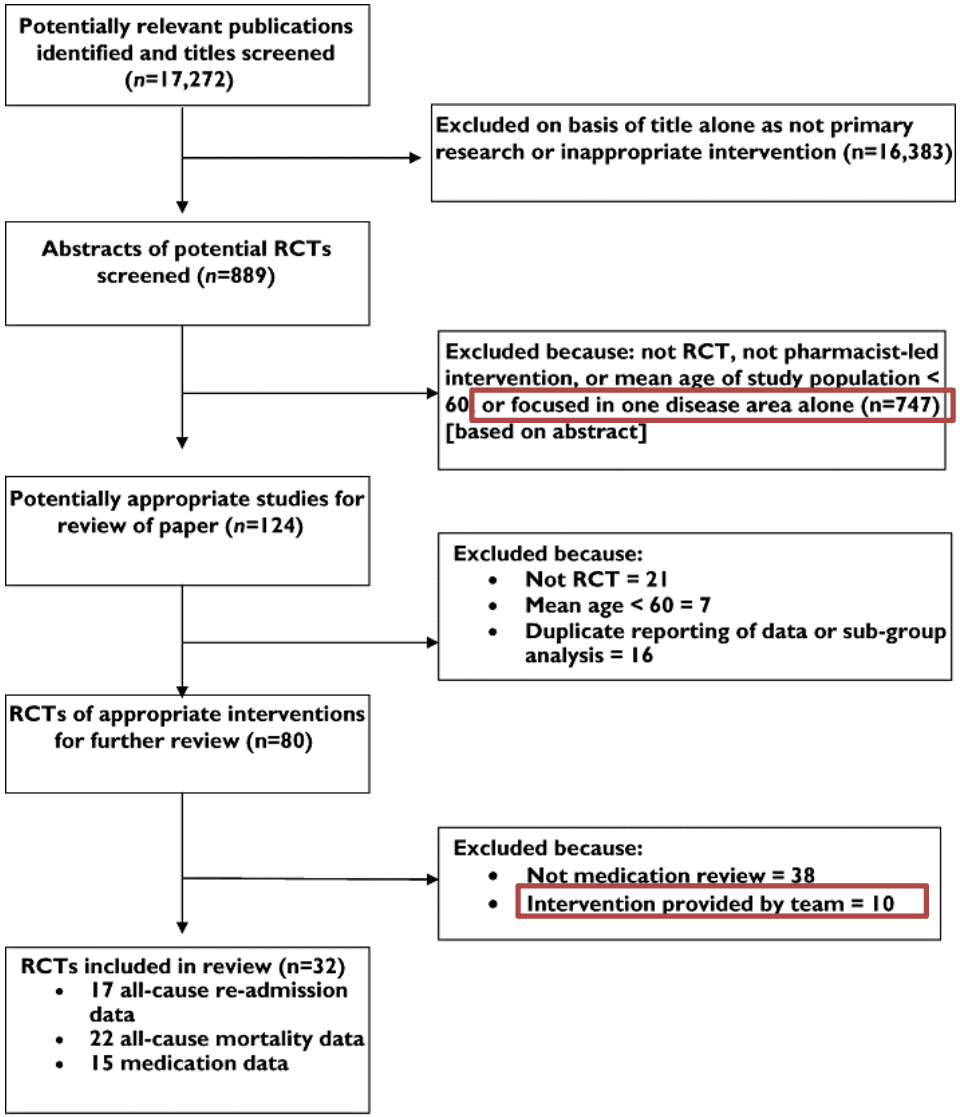

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Holland et al., 2008

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Table 1

Description of studies and interventions

Study author	Date	Country	No. of patients	Mean age, years	% male	Type of pharmacist	No. of pharmacists	Intervention	Patient data	Ability to enact advice	Contact with prescriber	Setting	Extent of patient contact
Begley [1]	1997	UK	222	82	39.4	Research pharmacist	Unclear	Home visits and counselling by a pharmacist after hospital discharge	Discharge letter	Unable to enact	Unclear	Own home	Four detailed visits over a year
Bernsten [18]	2001	Europe	2454	74	42.4	Community pharmacist	104	Community pharmacy assessment of drug-related problems and implementation of a pharmaceutical care plan	Repeat prescribing data	Unable to enact	Unclear	Pharmacy	Unclear
Bolas [34]	2004	Northern Ireland	243	74	39.5	Hospital/ clinical pharmacist	1	Full history, preparation of discharge letter. Medication review (stated in abstract but not method).	Full notes	Unable to enact	Close contact	Hospital	Inpatient ward visit plus discharge plan
Bond [17]	2000	UK	3074	66	41.6	Community pharmacist	62	Pharmacist-controlled repeat prescription system where pharmacist checked if medication needed. Review of side-effects and interactions	Repeat prescribing data	Unable to enact	Contact by letter	Pharmacy	Limited contact, mainly review of repeat scripts
Carter [35, 36]	1998	USA	1054	66.7	96.3	Hospital/ clinical pharmacist	>4	Medication assessment and adherence, change of nonformulary to formulary drugs, and education	Full notes	Partly enact	Close contact	Primary care or clinic	Detailed enquiry, mean 3.5 visits over a year
Furniss [37]	2000	UK	330	81.2	27	Research pharmacist	1	Medication review with patient	Drug chart in nursing home	Unable to enact	Unclear	Nursing home	Detailed review, with second brief visit at 8 months

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Christensen et al., 2013

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

Christensen M, Lundh A

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'We identified 4647 references and included five trials (1186 participants). Follow-up ranged from 30 days to one year.

We found no evidence of effect on all-cause mortality (risk ratio (RR) 0.98; 95% CI 0.78-1.23) and hospital readmissions (RR 1.01; 95% CI 0.88-1.16), but a **36% relative reduction in emergency department contacts (RR 0.64; 95% CI 0.46-0.89).**'

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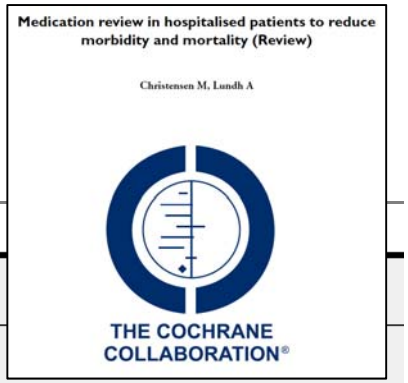
Christensen et al., 2013



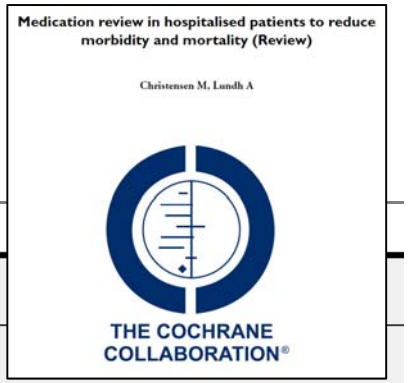
Medication review compared with standard care for hospitalised adult patients

Patient or population: Hospitalised adult patients
Intervention: Medication review
Comparison: Standard care

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No. of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Standard care	Medication review				
Mortality (all-cause) 1 year	Low risk population		RR 0.98 (0.78 to 1.23)	1002 (4 studies)		
	200 per 1000[1]	196 per 1000 (156 to 246)				
	High risk population					
	400 per 1000[1]	392 per 1000 (312 to 492)				
Hospital readmission (all-cause) 1 year	Low risk population		RR 1.01 (0.88 to 1.16)	956 (4 studies)	⊕⊕◯◯ low[4,5]	NA
	300 per 1000[1]	303 per 1000 (264 to 348)				
	High risk population					
	600 per 1000[1]	606 per 1000 (528 to 696)				

No evidence of effect on all-cause mortality and hospital readmission.

Christensen et al., 2013



Medication review compared with standard care for hospitalised adult patients

Patient or population: Hospitalised adult patients
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Comparison: Standard care

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No. of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Standard care	Medication review				
Hospital Emergency Department contacts (all-cause) 1 year	Low risk population		RR 0.64 (0.46 to 0.89)	574 (3 studies)	⊕⊕⊕◯ moderate[6]	
	100 per 1000[1]	64 per 1000 (46 to 89)				
	High risk population					
	300 per 1000[1]	192 per 1000 (138 to 267)				

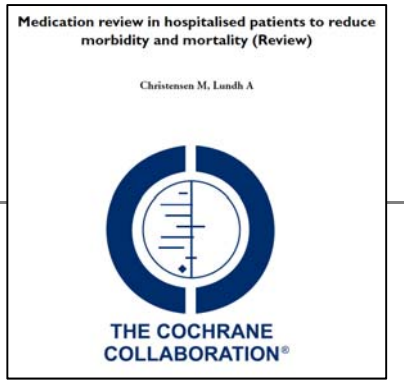
RR 0.64 (0.46 to 0.89)

Equal to a **number needed to treat** of **9 for the high risk population** and **28 for the low risk population.**

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. **...ing risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **NA:** Not applicable; **RR:** Risk Ratio.

'Study inclusion and exclusion criteria defined patient population as a high risk population (e.g. elderly patients, patients with multiple co-medications).'

Christensen et al., 2013



‘It is uncertain whether medication review reduces mortality or hospital readmissions, but medication review seems to reduce emergency department contacts.

However, the cost-effectiveness of this intervention is not known and due to the uncertainty of the estimates of mortality and readmissions and the short follow-up, important treatment effects may have been overlooked.

We recommend that future trials **focus on high risk populations, ensure that the team performing the medication review includes members that are allowed to change patient medications, use well described methods when conducting the medication review, have long-term follow-up and randomize on a cluster level.**’

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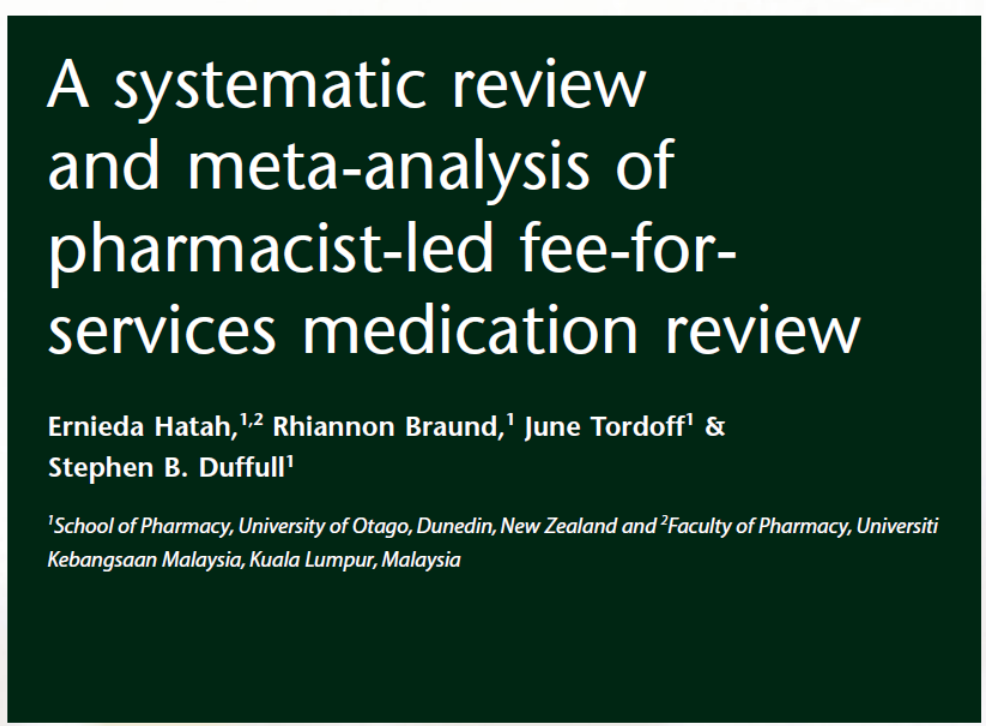
Hatah et al., 2013



A systematic review and meta-analysis of pharmacist-led fee-for-services medication review

Ernieda Hatah,[1,2] Rhiannon Braund,[1] June Tordoff[1] & Stephen B. Duffull[1]

[1]School of Pharmacy, University of Otago, Dunedin, New Zealand and [2]Faculty of Pharmacy, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia

'The majority of the studies (57.9%) showed improvement in medication adherence. Fee-for-service pharmacist-led medication reviews showed positive benefits on patient outcomes.

Interventions that include a clinical review had a significant impact on patient outcomes by attainment of target clinical biomarkers and reduced hospitalization.'

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Hatah et al., 2013

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1

Blood pressure	Medication review		Usual care			Odds ratio	Odds ratio
Study	Success*	Total	Success*	Total	Weight	95% CI	Random, 95% CI
Planas et al. 2009 [48]	12	25	1	15	9.2%	12.92 [1.47, 113.77]	
Chabot et al. 2003 [34]	9	13	13	31	15.8%	3.12 [0.79, 12.35]	
Carter et al. 1997 [23]	17	23	15	24	17.3%	1.70 [0.49, 5.90]	
Park et al. 1996 [20]	12	23	8	26	18.2%	2.45 [0.76, 7.89]	
Taylor et al. 2003 [31]	22	24	8	29	13.0%	28.88 [5.49, 151.99]	
Issets et al. 2008 [15]	91	128	74	126	26.5%	1.73 [1.03, 2.91]	
Total (95% CI)		236		251	100.0%	3.50 [1.58, 7.75]	
Total events	163		119				

Heterogeneity: $Tau^2 = 0.55$; $Chi^2 = 12.88$, df = 5 ($P = 0.02$); $I^2 = 61\%$
Test for overall effect Z = 3.09 ($P = 0.002$)
*Success: achieving target blood pressure

0.01 0.1 1 10 100
Favours usual care | Favours medication review

2

LDL cholesterol	Medication review		Usual care			Odds ratio	Odds ratio
Study	Success*	Total	Success*	Total	Weight	95% CI	Random, 95% CI
Taylor et al. 2003 [31]	14	19	1	19	7.7%	50.40 [5.27, 481.91]	
Shane-McWhorter et al. 2005 [39]	42	79	28	66	29.4%	1.54 [0.80, 2.98]	
Villeneuve et al. 2010 [53]	87	108	86	117	30.1%	1.49 [0.80, 2.80]	
Issets et al. 2008 [15]	67	128	38	126	32.8%	2.45 [1.52, 4.26]	
Total (95% CI)		334		328	100.0%	2.35 [1.17, 4.72]	
Total events	210		153				

Heterogeneity: $Tau^2 = 0.32$; $Chi^2 = 10.10$, df = 3 ($P = 0.02$); $I^2 = 70\%$
Test for overall effect Z = 2.41 ($P = 0.02$)
*Success: achieving target LDL

0.01 0.1 1 10 100
Favours usual care | Favours medication review

3

Hospitalisation	Medication review		Usual care			Odds ratio	Odds ratio
Study	Failure*	Total	Failure*	Total	Weight	95% CI	Random, 95% CI
Taylor et al. 2003 [31]	2	33	11	38	7.2%	0.15 [0.03, 0.72]	
Sturgess et al. 2003 [32]	23	75	13	35	12.3%	0.75 [0.32, 1.74]	
Cordina et al. 2001 [25]	0	64	8	55	3.1%	0.04 [0.00, 0.77]	
Lenaghan et al. 2007 [44]	20	68	21	68	13.2%	0.89 [0.43, 1.86]	
Bouvy et al. 2003 [35]	16	74	15	78	12.7%	1.16 [0.53, 2.55]	
Holland et al. 2007 [16]	134	148	112	143	13.6%	2.65 [1.34, 5.22]	
Herborg et al. 2001 [26]	4	210	11	190	9.8%	0.32 [0.10, 1.01]	
Sellors et al. 2003 [53]	15	379	16	409	13.3%	1.01 [0.49, 2.08]	
Roughead et al. 2009 [51]	15	273	653	5444	14.8%	0.43 [0.25, 0.72]	
Total (95% CI)		1324		6456	100.0%	0.69 [0.39, 1.21]	
Total events	229		860				

Heterogeneity: $Tau^2 = 0.48$; $Chi^2 = 29.51$, df = 8 ($P = 0.0003$); $I^2 = 73\%$
Test for overall effect Z = 1.30 ($P = 0.19$)
*Failure: hospitalization

0.01 0.1 1 10 100
Favours medication review | Favours usual care

4

Mortality	Medication review		Usual care			Odds ratio	Odds ratio
Study	Failure*	Total	Failure*	Total	Weight	95% CI	Random, 95% CI
Lenaghan et al. 2007 [44]	7	61	6	60	17.8%	1.17 [0.37, 3.70]	
Bouvy et al. 2003 [35]	31	71	4	74	18.3%	13.56 [4.46, 41.21]	
Holland et al. 2007 [16]	30	148	24	143	23.8%	1.26 [0.70, 2.28]	
Hugtenberg et al. 2009 [49]	74	262	83	296	25.7%	1.01 [0.70, 1.48]	
Fischer et al. 2002 [30]	2	229	11	433	14.3%	0.34 [0.07, 1.54]	
Total (95% CI)		771		1006	100.0%	1.50 [0.65, 3.46]	
Total events	144		128				

Heterogeneity: $Tau^2 = 0.67$; $Chi^2 = 21.81$, df = 4 ($P = 0.0002$); $I^2 = 82\%$
Test for overall effect Z = 0.96 ($P = 0.34$)
*Failure: mortality

0.01 0.1 1 10 100
Favours medication review | Favours usual care

'**Significant results favouring pharmacists' intervention** were found for blood pressure **(1)** (OR 3.50, 95% CI 1.58-7.75, *P*=0.002) and low density lipoprotein **(2)** (OR 2.35, 95% CI 1.17-4.72, *P*=0.02).

Outcomes on hospitalization **(3)** (OR 0.69, 95% CI 0.39-1.21, *P*=0.19) and mortality **(4)** (OR 1.50, 95% CI 0.65-3.46, *P*=0.34) indicated **no differences between the groups.**'

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Hatah et al., 2013

A systematic review and meta-analysis of pharmacist-led fee-for-services medication review

Ernieda Hatah,[1,2] Rhiannon Braund,[1] June Tordoff[1] & Stephen B. Duffull[1]

[1]School of Pharmacy, University of Otago, Dunedin, New Zealand and [2]Faculty of Pharmacy, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia

Hospitalisation Study	Medication review Failure*	Total	Usual care Failure*	Total	Weight	Odds ratio 95% CI
Taylor *et al.* 2003 [31]	2	33	11	38	7.2%	0.15 [0.03, 0.72]
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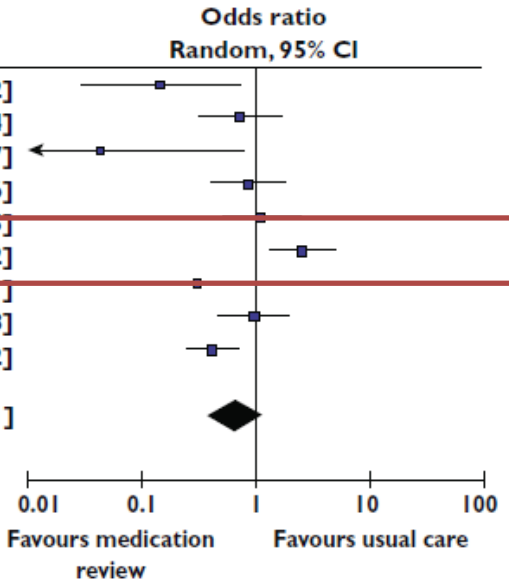
Test for overall effect Z = 1.30 ($P=0.19$)

*Failure: hospitalization



Sensitivity analysis 'hospitalization'

'Significant favouring the intervention group when Holland et al. was removed (OR 0.60, 95% CI 0.37-0.95, *P* = 0.03).'

Hohl et al., 2015

The effect of early in-hospital medication review on health outcomes: a systematic review

Hohl CM[1], Wickham ME, Sobolev B, Perry JJ, Sivilotti ML, Garrison S, Lang E, Brasher P, Doyle-Waters MM, Brar B, Rowe BH, Lexchin J, **Holland R.**

Br J Clin Pharmacol. 2015 Jan 7. doi: 10.1111/bcp.12585. [Epub ahead of print]

[1]Department of Emergency Medicine University of British Columbia / Centre for Clinical Epidemiology & Evaluation, Vancouver Coastal Health 10 Research Institute, Canada

'This systematic review failed to identify an effect of pharmacist-led medication review on health outcomes.

Our review was limited by the quantity and quality of the available evidence. Only few studies have been published on the effect of pharmacist-led medication review in the hospital setting.'

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Hohl et al., 2015

The Effect of Early in-Hospital Medication Review on Health Outcomes: A Systematic Review

Hohl CM[1], Wickham ME, Sobolev B, Perry JJ, Sivilotti ML, Garrison S, Lang E, Brasher P, Doyle-Waters MM, Brar B, Rowe BH, Lexchin J, **Holland R.**

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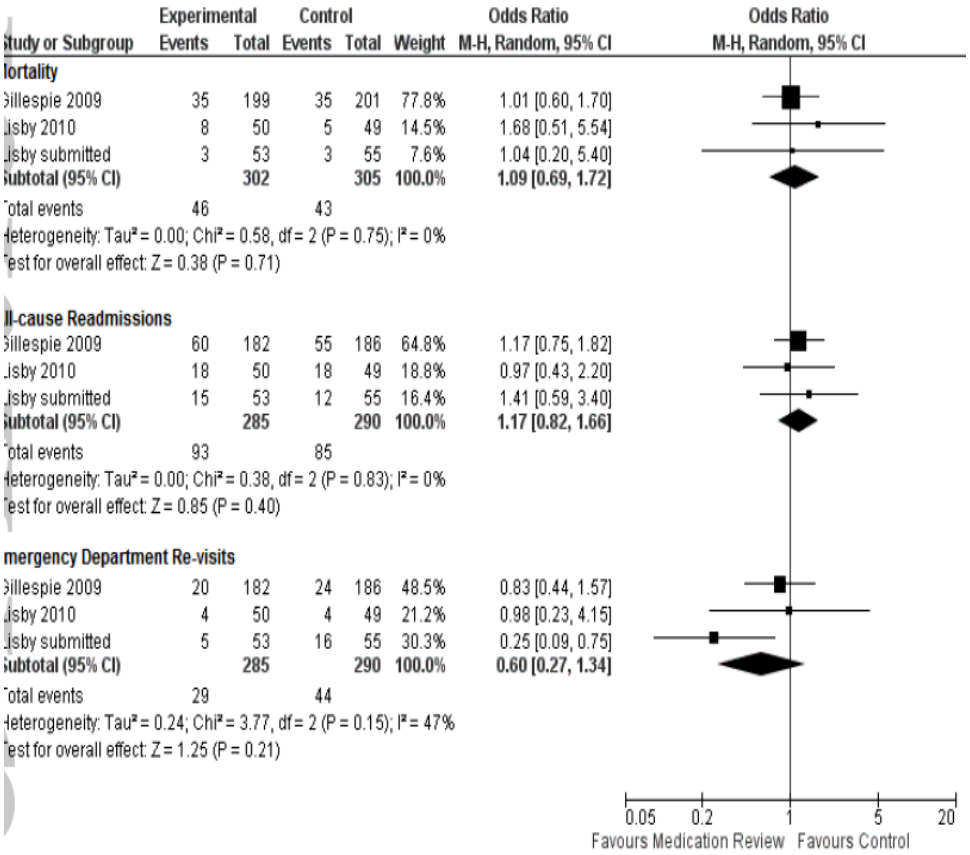
[1]Department of Emergency Medicine University of British Columbia / Centre for Clinical Epidemiology & Evaluation, Vancouver Coastal Health 10 Research Institute, Canada

Figure 3. Forest plot of the effect of medication review on 3-month mortality, 3-month all-cause readmissions, and 3-month emergency department revisits.*



'The results of the meta-analysis indicate a statistically **insignificant 40% reduction in emergency department re-visits** for patients receiving the intervention.'

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Grey literature

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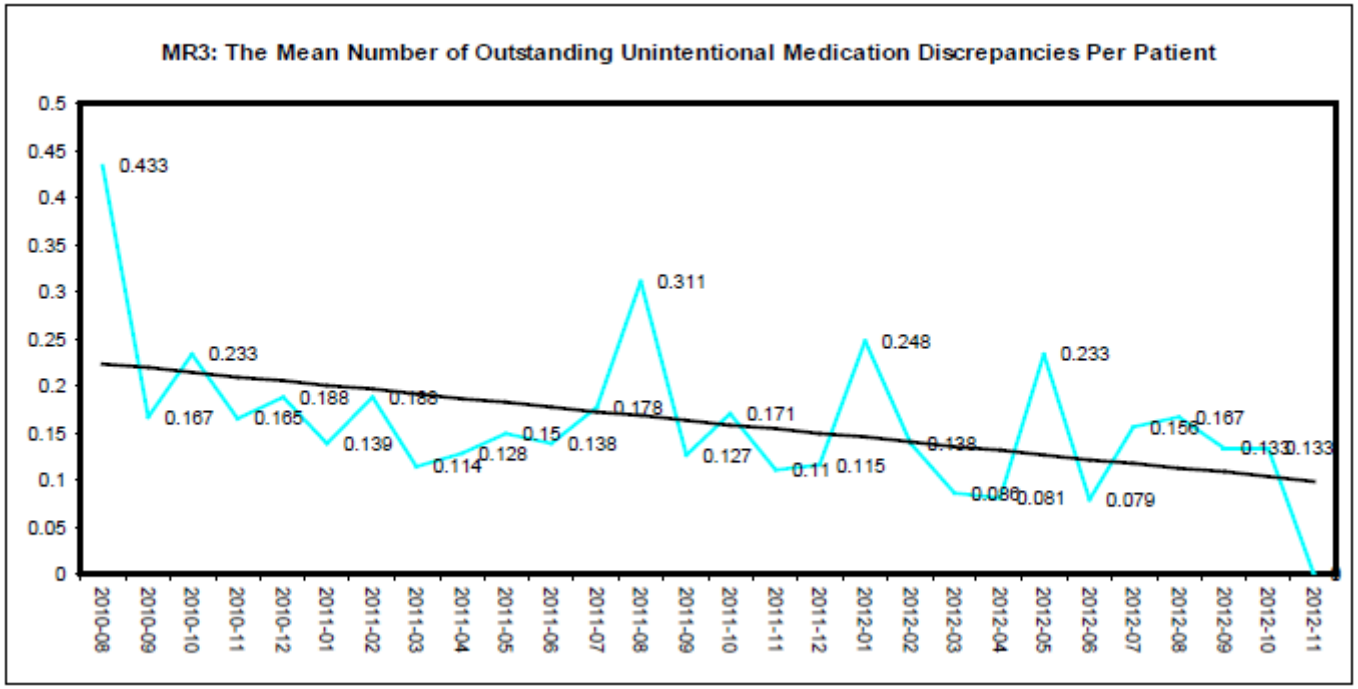
WHO High 5 Project ‘Medication reconciliation’

- Australia: Rates for the percentage of eligible patients with medications reconciled within 24 hours of admission ranged from 16% to 96% across participating hospitals with an average of around 51%. The trend is stable. Hospitals with higher ratios of clinical pharmacists/ beds tended to have higher rates.



WHO High5s-Newsbulletin, March 2013, http://www.who.int/patientsafety/implementation/solutions/high5s/en/

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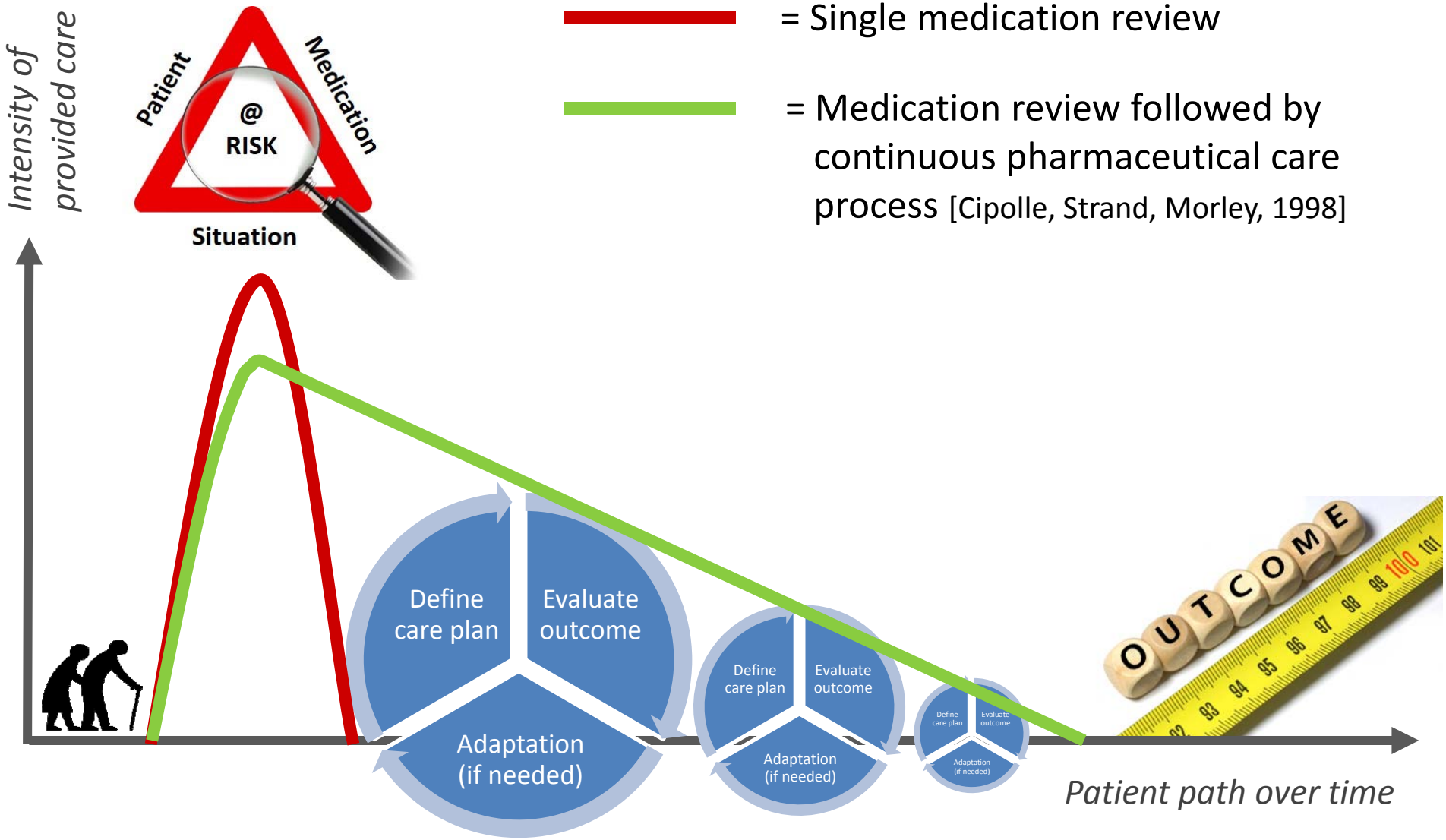
Impact of ‘stand alone interventions’ vs ‘continuous pharmaceutical care process’



Outlook: Study proposal Wouters H., et al.

Discontinuing Inappropriate Medication in Nursing Home Residents (DIM-NHR Study): protocol of a cluster randomised controlled trial

Hans Wouters,[1] Elise H Quik,[1] Froukje Boersma,[2] Peder Nygård,[3] Judith Bosman,[3] Wendelien M Böttger,[3] Hans Mulder,[4] Jan-Gerard Maring,[3] Linda Wijma-Vos,[5] Tim Beerden,[5] Jasperien van Doormaal,[5] Maarten J Postma,[6] Sytse U Zuidema,[2] Katja Taxis[1]

BMJ Open 2014;4: 006082.doi:10.1136

Study objective

To examine the efficacy and cost-effectiveness of the Multidisciplinary Multistep Medication Review (3MR) that is aimed at optimising prescribing and discontinuing inappropriate medication.

Outlook: Study proposal Wouters H., et al.

Discontinuing Inappropriate Medication in Nursing Home Residents (DIM-NHR Study): protocol of a cluster randomised controlled trial

Hans Wouters,[1] Elise H Quik,[1] Froukje Boersma,[2] Peder Nygård,[3] Judith Bosman,[3] Wendelien M Böttger,[3] Hans Mulder,[4] Jan-Gerard Maring,[3] Linda Wijma-Vos,[5] Tim Beerden,[5] Jasperien van Doormaal,[5] Maarten J Postma,[6] Sytse U Zuidema,[2] Katja Taxis[1]

Methods

A cluster randomised controlled trial will be conducted. Elderly care physicians and their wards (clusters) will be randomised. Data will be collected at baseline and 4 months after the 3MR has taken place. Six hundred nursing home residents will be recruited of whom more than half are expected to suffer from dementia. The 3MR will be based on consensus criteria and the relevant literature and will be performed by the patient's elderly care physician in collaboration with a pharmacist.

Analysis

Primary outcomes: the difference in proportion of residents who successfully discontinued inappropriate medication between the intervention and control group at follow-up.

Secondary outcomes: under-treatment, exposure to anti-cholinergic and sedative medicines, neuropsychiatric symptoms, cognitive function, falls, hospital admission, quality of life and cost-effectiveness.

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NICE Guideline for medicines optimisation

NICE National Institute for Health and Care Excellence

NICE Pathways | Guidance | Standards and indicators | Evidence Services | Sign in

NICE Medicines and prescribing centre

Draft for consultation

Medicines optimisation

Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes

Clinical Guideline

Methods, evidence and recommendations

October 2014

Recommendations and research recommendations

Medication review can have many different interpretations and there are also different types which vary in their quality and effectiveness. In this guideline medication review is defined as 'a structured, critical examination of a person's medicines with the objective of reaching an agreement with the person about treatment, optimising the impact of medicines, minimising the number of medication-related problems and reducing waste'.

27. **Consider carrying out a medication review for some patient groups when a clear purpose for the review has been identified. These groups may include:**
    - people taking multiple medicines (polypharmacy)
    - people with chronic or long-term conditions
    - older people.

28. **Determine locally the most appropriate health professional to carry out a medication review, based on their knowledge and skills, including all of the following:**
    - technical knowledge of processes for managing medicines
    - therapeutic knowledge on medicines use
    - effective communication skills.

    The medication review may be led, for example, by a pharmacist (professional-led) or by an appropriate health professional who is part of a multidisciplinary team.

29. **During a medication review, take into account:**
    - the person's (and/or the family members or carers, as appropriate) views and understanding about their medicines
    - the person's (and/or their family members' or carers') concerns, questions or problems with the medicines
    - all prescribed, over-the-counter and complementary medicines that the person is taking or using, and what these are for
    - how safe the medicines are, how well they work, how appropriate they are, and whether their use is in line with national guidance
    - any monitoring tests that are needed.

Do you agree…?

- **Pharmacists-led medication reviews (MR) do have an impact on detecting drug related problems (DRP)** in community and clinical setting.
- Only **addressed issues and solved problems** may have an impact on clinical outcomes.
- To solve detected DRP in daily practice **tailored, standardized and validated interventions are needed**.
- **Complex interventions should be provided to patients at risk only** to ensure effectiveness and efficacy.

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Many thanks for your attention

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BASEL