The effectiveness of Community Pharmacy Medication (Medicine Use) Reviews

Background

In March 2013 there were 11,495 community pharmacies in England, 60% of which were owned by 'multiples' (5 or more pharmacies) and supermarkets. Since 2005 community pharmacies have had the option to provide a medicine use review (MUR) service for patients as one of four 'advanced' services within the NHS Community Pharmacy Contractual Framework. Pharmacies providing the service must have an appropriate consultation area. The number of MURs provided by pharmacies has increased from around half a million in 2006/7 to 2.8 million in 2012/13.[1]

Summary and key findings

There is good evidence that community pharmacy based medication reviews can reduce the risk of drug related problems and improve the appropriateness of prescribing while reducing the number of drugs prescribed with a consequent reduction in prescribing costs. Although there is evidence that the service generates relative savings in prescribing costs, there is little evidence that the service is cost-effective overall.

The service delivers improved patient satisfaction but this, in itself, does not have a cost benefit and there is mixed evidence whether community pharmacy based medication reviews produce other cost savings through, for example, reduced hospital admissions. It is however argued that hospital admissions are, in any case, too insensitive a measure to demonstrate the effectiveness of the service. There is also no evidence that the service produces any improvement in mortality or other substantial clinical benefits.

Medication reviews by pharmacists may be more effective in the care home setting where polypharmacy is more likely with care home residents each taking, on average, 7-8 medications.[2]

Transitions of care between hospital, GP and care home are points of particular vulnerability to medication error. There is some evidence that a pharmacist review of medication may improve the use of appropriate medication in these circumstances.

The likelihood of a community pharmacy providing a medicine use review service very much depends on the type of pharmacy, with multiples much more likely than independents to provide the service. The quality of written reports provided is variable with room for improvement. The service would benefit from a greater acceptance by GPs and also from the existence of a forum where pharmacists can exchange views and experiences.

[1] NHS England (2013) – Improving health and patient care through community pharmacy – Evidence resource pack

[2] Centre for Policy on Ageing (2011) - Managing and administering medication in care homes for older people

Review of evidence

The reviewed evidence is listed in reverse chronological order with the most recent evidence first.

a) Reviews and overviews

Study	Findings
Geurts M M E, Talsma J, Brouwers J R B J and de Gier J J (2012) Medication review and reconciliation with cooperation between pharmacist and general practitioner and the benefit for the patient: a systematic review, *British Journal of Clinical Pharmacology* 74 (1) : 16-33	Of nine studies reporting outcomes on hospital admissions (HAs), one pre-post study showed a non-significant decrease, six RCTs showed no difference, one RCT showed a significant increase in HAs and one RCT showed a non-significant decrease in HAs which became significant for patients with 5 or more conditions. Other significant results found were decreases in number of drug-related problems, improved prescribing of medication, improved quality of life scores, improved medication appropriateness index scores, increased compliance and patient knowledge, and improved clinical values, e.g. cholesterol levels. Most studies described positive outcomes on satisfaction. Healthcare providers and patients were satisfied when they were involved in projects.

Blenkinsopp A, Bond C and Raynor D K (2012) Medication reviews, *British Journal of Clinical Pharmacology* 74 (4) : 573-580	Provides an overview of the development of Medication Use Reviews (MUR) and summarises factors affecting the quality and effectiveness of MURs: • the quality of the recommendations made by pharmacists improves when pharmacists have more patient information • without a good working relationship between the clinician and pharmacist, the impact of pharmacist medication review is reduced and may be minimal • written recommendations from a pharmacist to a clinician, in the absence of other forms of communication, have limited effect • other pharmacist interventions with similar components have been effective when pharmacists form part of a team • variation in the consultation skills of practitioners conducting medication review. Concludes there is good evidence that medication review improves process outcomes of prescribing including reduced polypharmacy, use of more appropriate medicines formulation and more appropriate choice of medicine but limited hard evidence of outcomes including improved mortality or reduced hospital admissions.
Hinchliffe A (2011) *Medicines use review by community pharmacists*, Public Health Wales : 28pp	Little evidence was found on clinical outcomes post MUR. Studies evaluating directed MUR services, focusing on a particular disease, were most likely to report clinical outcomes. In developing MUR services there are opportunities to learn from experiences of MUR to date. These include: • Developing strategies to encourage uptake/delivery of MURs to patients who need them the most • The need for quality assurance of MURs • The need to evaluate clinical outcomes from MUR services • Improving communication between pharmacists and GPs • Improving GP enthusiasm for community pharmacy MUR services

Hinchliffe A (2010) *Pharmacist-led medication review for older people in the community setting*, Public Health Wales : 37pp	Pharmacist medication review can lead to reduced prescribing of inappropriate medicines, reductions in all prescribed items and consequent reductions in prescribing costs. The evidence suggests that patient outcomes including morbidity and mortality are neither adversely affected nor is there a significant benefit, although there is some evidence that pharmacist medication review can reduce falls and hospital admissions. Pharmacist medication review is more effective where there is a good professional relationship between the pharmacist and the GP, pharmacists communicate with GPs effectively and the pharmacist has access to more patient information on which to base recommendations. There is limited evidence on the cost effectiveness of pharmacist medication review. The majority of studies reviewed provided no indication of the cost of delivering the service.
Zermansky A G and Silcock J (2009) Is medication review by primary-care pharmacists for older people cost effective?: A narrative review of the literature, focusing on costs and benefits, *PharmacoEconomics* 27 (1) : 11-24	Author's synopsis: There is a dearth of economic measurement and often inadequate descriptions of the interventions performed. Those interventions that were described in detail varied in the skills, training and approach of the pharmacists. Therefore, there was no possibility of aggregating results of studies, and the review conclusions are based on trends and impression rather than meta-analysis. There was no suggestion in any reports that patients were harmed by the interventions, and some consistency in suggesting that falls and hospital admissions might be reduced with modest cost savings, at least in terms of drug costs. No studies reported a benefit in terms of mortality, mental capacity or activities of daily living. The authors conclude that clinical medication review is probably of value and may be cost effective, but propose a large-scale, long-term, multicentre, collaborative clinical trial with carefully chosen (and clearly described) interventions and outcome measures to confirm this.
Castelino R L, Bajorek B V and Chen T F (2010) *Retrospective evaluation of home medicines review by pharmacists in older Australian patients using the medication appropriateness index*, 44 : 1922-1929	Author's synopsis: A broad range of tools was used to measure prescribing appropriateness; we found that a consensus on the best approach has not been reached. Most of the studies involving pharmacists showed significant improvement in suboptimal prescribing at one or more time points. However, most of these interventions were directed toward reducing the overuse or misuse of medications. Conclusions: Pharmacy services to reduce suboptimal prescribing have shown promising and noteworthy improvements.

Clyne W, Blenkinsopp A and Seal R (2008) *A guide to medication review 2008*, NHS England - National Prescribing Centre	A useful overview guide providing advice for those providing and commissioning medication reviews in a wide range of care settings, with the needs of vulnerable groups such as the elderly and those with long-term conditions particularly in mind. Describes the characteristics of medication review, how to engage patients in medication review and how to commission a medication review service but with nothing on evaluation of the effectiveness of MURs..
Holland R, Desborough J, Goodyer L, Hall S, Wright D and Loke Y K (2008) Does pharmacist-led medication review help to reduce hospital admissions and deaths in older people? A systematic review and meta-analysis, *British Journal of Clinical Pharmacology* 65 (3) : 303-316	Thirty two studies fitted the inclusion criteria. Meta-analysis of 17 trials revealed no significant effect on all-cause admission, relative risk (RR) of 0.99 [95% confidence interval (CI) 0.87, 1.14, P = 0.92], with moderate heterogeneity (I2 = 49.5, P = 0.01). Meta-analysis of mortality data from 22 trials found no significant benefit, with a RR of mortality of 0.96 (95% CI 0.82, 1.13, P = 0.62), with no heterogeneity (I2 = 0%). Pharmacist-led medication review may slightly decrease numbers of drugs prescribed (weighted mean difference = -0.48, 95% CI -0.89, -0.07), but significant heterogeneity was found (I2 = 85.9%, P < 0.001). Results for additional outcomes could not be pooled, but suggested that interventions could improve knowledge and adherence. Conclusion: Pharmacist-led medication review interventions do not have any effect on reducing mortality or hospital admission in older people, and cannot be assumed to provide substantial clinical benefit. Such interventions may improve drug knowledge and adherence, but there are insufficient data to know whether quality of life is improved.
Fish A, Watson M C and Bond C M (2002) Practice-based pharmaceutical services: a systematic review., *International Journal of Pharmacy Practice* 10 (4) : 225-233	Sixteen randomised, controlled trials (RCTs) met the inclusion criteria. Included studies assessed either the professional interface (educational outreach and general prescribing advice) or the patient interface (medication review and patient-specific prescribing advice). Three trials included all three quality markers. Most studies were effective in achieving one or more of the desired outcomes from pharmaceutical intervention. Two trials showed no statistically significant differences between the study and control groups post intervention. Conclusions: The results of this review suggest that practice-based pharmaceutical services are effective in achieving desired changes; however, more robust evidence is needed to confirm whether they are effective, efficient and sustainable.

b) Effectiveness and cost-effectiveness

Study	Methods	Findings
Desborough J A, Sach T, Bhattacharya D, Holland R C and Wright D J (2012) A cost-consequences analysis of an adherence focused pharmacist-led medication review service, *International Journal of Pharmacy Practice* 20 (1) : 41-49	An economic evaluation of the Norfolk Medicines Support Service (NMSS), a pharmacist-led medication review service for patients identified in primary care as non-adherent. The cost-consequences analysis was based on a before and after evaluation of the NMSS. Participants completed a self-reported adherence and health-related quality of life questionnaire prior to the review, at 6 weeks and 6 months. Service provision, prescribing and secondary care costs were considered and the mean cost before and after the intervention was calculated. One-hundred and seventeen patients were included in the evaluation.	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 (parametric 95% CI: £1269 to £655). The intervention reduced emergency hospital admissions and increased medication adherence but no significant change in health-related quality of life was observed. Study conclusion: The costs of providing this medication review service were offset by the reduction in emergency hospital admissions and savings in medication cost, assuming the findings of the evaluation were real and the regression to the mean phenomenon was not involved.

Bryant L J, Coster G, Gamble G D and McCormick R N (2011) The General Practitioner-Pharmacist Collaboration (GPPC) study: a randomised controlled trial of clinical medication reviews in community pharmacy, *International Journal of Pharmacy Practice* 19 (2) : 94-105	A randomised controlled trial was carried out in people 65 years and older on five or more prescribed medicines. Community pharmacists undertook a clinical medication review (Comprehensive Pharmaceutical Care) and met with the patient's general practitioner to discuss recommendations about possible medicine changes. The patients were followed-up 3-monthly. The control group received usual care. The main outcome measures were Quality of Life (SF-36) and Medication Appropriateness Index. A total of 498 patients were enrolled in the study.	The quality-of-life domains of emotional role and social functioning were significantly reduced in the intervention group compared to the control group. The Medication Appropriateness Index was significantly improved in the intervention group. Only 39% of the 44 pharmacists who agreed to participate in the study provided adequate data, which was a limitation to the study and indicated potential barriers to the generalisability of the study. Conclusion: Clinical medication reviews in collaboration with general practitioners can have a positive effect on the Medication Appropriateness Index. However, pharmacist withdrawal from this study suggests that community pharmacy may not be an appropriate environment from which to expand clinical medication reviews in primary care

Lenaghan E, Holland R and Brooks A (2007) Home-based medication review in a high risk elderly population in primary care – the POLYMED randomised controlled trial, *Age and Ageing* 36 : 292-297	A randomised controlled trial comparing home-based medication review with standard care. Home-based medication review of 136 patients registered with one general practice. Study participants were over 80 years of age, living at home, taking four or more medicines, and had at least one additional medicines-related risk factor. The intervention comprised two home visits by a community pharmacist who educated the patient/carer about their medicines, noted any pharmaceutical care issues, assessed need for an adherence aid, and subsequently met with the lead GP to agree on actions. Main outcome measure: total non-elective hospital admissions within 6 months. Secondary outcomes included number of deaths, care home admissions and quality of life (EQ-5d). Impact on number of medicines prescribed was also assessed.	At 6 months, no difference in hospital admissions (21 intervention versus 20 control P = 0.80), and no difference in care home admissions or deaths were detected between groups. There was a small (non-significant) decrease in quality of life in the intervention group. There was a statistically significant reduction in the mean number of medicines prescribed (-0.87 items in favour of the intervention group, 95% confidence interval -1.66 to -0.08, P = 0.03). Conclusions: no positive impact on clinical outcomes or quality of life was demonstrated, however, this intervention did appear to reduce prescribing. Key points • Home-based medication review by pharmacists does not appear to reduce hospital admissions. • Medication review services in primary care should focus on at-risk populations rather than older people in general.

Krska J, Hansford D, Seymour D G and Farquharson J (2007) Is hospital admission a sufficiently sensitive outcome measure for evaluating medication review services? A descriptive analysis of admissions within a randomised controlled trial, *International Journal of Pharmacy Practice* 15 (2) : 85-91	To describe and assess hospital admissions occurring during a randomised controlled trial (RCT) of a pharmacist-led medication review service; to describe the admissions in terms of emergency status and main cause; to estimate the potential contribution of pharmaceutical care issues (PCIs) to admission; and to assess the proportion of admissions that could be influenced by a pharmacist intervention. Within the context of a RCT of pharmacists providing medication review for 332 elderly patients living at home, taking at least four repeat medicines, carried out in one region of Scotland. Hospital data were obtained for all admissions occurring during the 9-month period studied, summarised and evaluated by two independent medical reviewers for the contribution of PCIs to admission. Two pharmacists assessed the extent to which PCIs were preventable by pharmacist intervention.	Approximately two-thirds of the 77 admissions were unplanned, and two-thirds were to medical wards. Only 17 (22%) of all admissions were considered to be related to PCIs and 10 (13%) possibly preventable by pharmacist intervention. Although the majority of surgical admissions were considered to be unrelated to PCIs (26/29), both unplanned and planned medical admissions were related to PCIs. One of these occurred as a direct result of the pharmacist's recommendation. Conclusion The overall numbers of hospital admissions, medical admissions and unplanned admissions may not be sufficiently sensitive outcome measures for evaluating the impact of pharmacist interventions.

Sorensen L, Stokes J A, Purdie D M, Woodward M, Elliott R and Roberts M S (2004) Medication reviews in the community: results of a randomized, controlled effectiveness trial, *British Journal of Clinical Pharmacology* 58 (6) : 648-664	The study was carried out in Queensland, New South Wales and Western Australia, and conducted as a randomized, controlled effectiveness trial with the general practitioner (GP) as the unit of randomization. Ninety two GPs, 53 pharmacists and 400 patients enrolled in the study. The multidisciplinary service model consisted of GP education, patient home visits, pharmacist medication reviews, primary healthcare team conferences, GP implementation of action plans in consultation with patients, and follow-up surgery visits for monitoring. Effectiveness was assessed using the four clinical value compass domains of (i) functional status, (ii) clinical outcomes, (iii) satisfaction and (iv) costs. The domains of functional status (assessed by the health-related quality of life measure SF-36 subscales) and clinical outcomes (as assessed by adverse drug events (ADEs), number of GP visits, hospital services and severity of illness) were measured at baseline and endpoint. Satisfaction was measured by success in implementation and by participant satisfaction at endpoint, and costs (as assessed using medication and healthcare service costs, less intervention costs) were measured pre-intervention and during the trial. In addition, process evaluation was conducted for intervention patients, in which problems and recommendations from the medication reviews were described.	The model was successfully implemented with 92% of intervention GPs suggesting that the model had improved the care of participating patients, a view shared by 94% of pharmacists. In addition, positive trends in clinical outcomes (ADEs and severity of illness) and costs (an ongoing trend towards reduction in healthcare service costs) were evident, although the trial was limited to a 6-month intervention time. No differences between intervention and control groups were identified for the health-related quality of life domain. The cost–effectiveness ratio for the intervention based on cost savings, reduced adverse events and improved health outcomes was small. The most common problems identified in the medication reviews were potential adverse drug reactions, suboptimal monitoring and adherence/lack of concordance issues. In total, 54.4% of recommendations were enacted, and 23.9% were implemented precisely as recommended in the medication review. Follow-up evaluation showed that 70.9% of actions had a positive outcome, 15.7% no effect and 3.7% had a negative outcome.

Zermansky A G, Petty D R, Raynor D K, Lowe C J, Freemantle N and Vail A (2002) Clinical medication review by a pharmacist of patients on repeat prescriptions in general practice: a randomised controlled trial, *Health Technology Assessment* 6 (20) : 1-86	To determine whether a pharmacist can effectively review repeat prescriptions through consultations with elderly patients in general practice. A randomised controlled trial of clinical medication review by a pharmacist against normal general practice review. Participants: 1188 patients aged 65 or over who were receiving at least one repeat prescription and living in the community. Intervention: Patients were invited to a consultation at which the pharmacist reviewed their medical conditions and current treatment. Main outcome measures: Number of changes to repeat prescriptions over one year, drug costs, and use of healthcare services.	Five hundred and ninety (97%) patients in the intervention group were reviewed compared with 233 (44%) in the control group. Patients seen by the pharmacist were more likely to have changes made to their repeat prescriptions (mean number of changes per patient 2.2 v 1.9; difference=0.31, 95% confidence interval 0.06 to 0.57; P=0.02). Monthly drug costs rose in both groups over the year, but the rise was less in the intervention group (mean difference £4.72 per 28 days, -£7.04 to -£2.41); equivalent to £61 per patient a year. Intervention patients had a smaller rise in the number of drugs prescribed (0.2 v 0.4; mean difference -0.2, -0.4 to -0.1). There was no evidence that review of treatment by the pharmacist affected practice consultation rates, outpatient consultations, hospital admissions, or death rate. Conclusions: A clinical pharmacist can conduct effective consultations with elderly patients in general practice to review their drugs. Such review results in significant changes in patients' drugs and saves more than the cost of the intervention without affecting the workload of general practitioners.

Krska J, Cromarty JA, Arris F, Jamieson D, Hansford D, Duffus P R S, Downie G and Seymour D G (2001) Pharmacist led medication review in patients over 65: a randomized, controlled trial in primary care, *Age and Ageing* 30 : 205-211	A randomised control trial to study the effect of medication review led by a pharmacist on resolution of pharmaceutical care issues, medicine costs, use of health and social services and health-related quality of life in general medical practices in the Grampian region of Scotland. The study looked at patients aged at least 65 years, with at least two chronic disease states who were taking at least four prescribed medicines regularly. Pharmacists reviewed the drug therapy of 332 patients, using information obtained from the practice computer, medical records and patient interviews. In 168 patients, a pharmaceutical care plan was then drawn up and implemented. The 164 control patients continued to receive normal care. All outcome measures were assessed at baseline and after 3 months.	All patients had at least two pharmaceutical care issues at baseline. Half of these were identified from the prescription record, the rest from notes and patient interview. Of all the issues, 21% were resolved by information found in notes and 8.5% by patient interview. General practitioners agreed with 96% of all care issues documented on the care plans in the intervention group. At the time of follow-up, 70% of the remaining care issues had been resolved in the intervention group, while only 14% had been resolved in the control group. There were no changes in medicine costs or health-related quality of life in either group. There were small increases in contacts with health-care professionals and slightly fewer hospital admissions among the intervention group than the control group. Conclusions: Pharmacist-led medication review has the capacity to identify and resolve pharmaceutical care issues and may have some impact on the use of other health services.

Stergachis A, Fors M,Wagner E, Sims D and Penna P (1987) Effect of clinical pharmacists on drug prescribing in a primary care, *American Journal of Health-System Pharmacy* 44 (3) : 525-529	Sudy of the effect of clinical pharmacy services on prescribing patterns and drug costs for nonsteroidal anti-inflammatory drugs (NSAIDs) and salicylates in a primary-care clinic operated by a health-maintenance organization (HMO. Two pharmacists provided clinical services to a randomly selected cluster of family practice physicians in the HMO for six months. A second family practice cluster served as a control group. The pharmacists alerted prescribers to the availability of low-cost alternatives (such as ibuprofen and salicylates) and reviewed the medication profiles of patients receiving high-cost NSAIDs. Data were collected for both physician clusters for nine months before and six months after the pharmacists' intervention.	Changes in the mean numbers of prescriptions for ibuprofen and piroxicam per 1000 enrollees per physician in the baseline and evaluation periods were not significantly different between the two groups. Significantly more prescriptions for salicylates were written by physicians in the intervention group than in the control group during the evaluation period. Annualized mean drug ingredient costs per enrollee and per prescription for NSAIDS and salicylates decreased during the evaluation period in both groups, but these differences were not significant. Conclusion: In relatively unstructured interactions with physicians and nurses, clinical pharmacists were not able to reduce the costs associated with NSAIDs but did have a modest effect on altering salicylate prescribing patterns. This clinical pharmacy program was not economically self-sustaining during the first six months of operation, since operating costs exceeded anticipated savings.

c) Individual clinical conditions – cancer, kidney and heart

Study	Methods	Findings
Salgado T M, Correr C J, Moles R, Benrimoj S I and Fernandez-Llimos F (2013) Assessing the Implementability of Clinical Pharmacist Interventions in Patients With Chronic Kidney Disease: An Analysis of Systematic Reviews, *Annals of Pharamacotherapy* 47 : 1498-1506	To assess the implementability of evidence-based clinical pharmacist interventions in patients with CKD, based on the information contained in the published manuscripts. To describe and characterize pharmacists' interventions, the DEPICT (Descriptive Elements of Pharmacist Intervention Characterization Tool) was applied. Studies were classified as "implementable" or "non-implementable"	Five reviews were retrieved, and 39 original studies were analysed. Of these, 59.0% were classified as non-implementable. Among implementable interventions, 6 evidence-based areas of pharmacist interventions were identified: anemia, renal osteodystrophy, and cardiovascular risk factors management, medication appropriateness evaluation and medication reconciliation, patient education and compliance, and cost containment. Conclusions: Information contained in most articles reporting pharmacist interventions in CKD is not sufficient to ensure the implementation of the service in clinical practice.

Mancini R and Clifford K (2013) *Pharmacist Assessment of Polypharmacy Risks in Patients with Cancer*	To evaluate the polypharmacy risks and the impact that pharmacist assessments can play in a multidisciplinary supportive oncology clinic. In a retrospective review, all patients who were referred to and attended the supportive care clinic from its initiation in June 2010 to May 2012 were assessed by a pharmacist. The risks for polypharmacy were assessed utilizing the AACME (Access, Adherence, Continuity of Care, Medication Reconciliation, and Education) method, which included evaluation for duplicate therapy, drug interactions, lack of efficacy and undertreated conditions, side effect causal relationships, and untreated conditions.	Of 153 patients evaluated during the first year of the clinic, 69 patients (45.1%) were found to have some form of therapeutic duplication within their medication list, 54 patients (35.3%) had documented drug interactions, and 127 patients (83%) reported side effects that were attributable to 1 or more of their medications. Despite this, most patients (88.9%) reported uncontrolled symptoms, and a majority of patients (68.6%) reported symptoms that had not been previously treated. Conclusion: These data suggest that, when evaluated by a pharmacist, the rates of polypharmacy risks may be higher than the rates currently published in the literature.

Roughead E E, Barrat J D, Ramsay E, Pratt N, Ryan P, Peck R, Killer G and Gilbert A L (2009) The effectiveness of collaborative medicine reviews in delaying time to next hospitalisation for heart failure patients in the practice setting: results of a cohort study, *Circulation-Heart Failure* 2 : 424-428	This retrospective cohort study using administrative claims data included veterans 65 years and older receiving bisoprolol, carvedilol, or metoprolol succinate for which prescribing physicians indicated treatment was for heart failure. We compared those exposed to a general practitioner–pharmacist collaborative home medication review with those who did not receive the service. The service includes physician referral, a home visit by an accredited pharmacist to identify medication-related problems, and a pharmacist report with follow-up undertaken by the physician. Kaplan-Meier analyses and Cox proportional hazards models were used to compare time until next hospitalization for heart failure between the exposed and unexposed groups. There were 273 veterans exposed to a home medicines review and 5444 unexposed patients.	The median number of comorbidities was 8 in the exposed group and 7 in the unexposed (P<0.0001). Unadjusted results showed a 37% reduction in rate of hospitalization for heart failure at any time (hazard ratio, 0.63; 95% CI, 0.44 to 0.89). Adjusted results showed a 45% reduction (hazard ratio, 0.55; 95% CI, 0.39 to 0.77) among those who had received a home medicines review compared with the unexposed patients. Conclusion: Medicines review in the practice setting is effective in delaying time to next hospitalization for heart failure in those treated with heart failure medicines.

The Community Pharmacy medicines Management Project Evaluation team (2007) The MEDMAN study: a randomized controlled trial of community pharmacy-led medicines management for patients with coronary heart disease, *Family Practice* 24 (2) : 189-200	A randomized controlled trial was conducted in nine sites in England. Patients with coronary heart disease were identified from general practice computer systems, recruited and randomized (2:1) to intervention or control. The 12-month intervention comprised an initial consultation with a community pharmacist to review appropriateness of therapy, compliance, lifestyle, social and support issues. Control patients received standard care. The primary outcome measures were appropriate treatment [derived from the National Service Framework (NSF)], health status (SF-36, EQ-5D) and an economic evaluation. Secondary outcome measures were patient risk of cardiovascular death and satisfaction. The study involved 1493 patients (980 intervention and 513 control), 62 pharmacists and 164 GPs.	No statistically significant differences between intervention and control groups were shown at follow-up for any of the primary outcome measures such as numbers on aspirin or lifestyle measures. There were few differences in quality of life (SF-36) between the intervention and control groups at baseline or follow-up or with overall EQ-5D score over time. The total National Health Service cost increased between baseline and at 12 months in both groups but to a greater extent in the intervention group. Significant improvements were found in the satisfaction score for patients' most recent pharmacy visit for prescription medicines among the intervention group, compared with control group. Self-reported compliance was good for both groups at baseline and no significant differences were shown at follow-up. Conclusion: There was no change in the proportion of patients receiving appropriate medication as defined by the NSF. The pharmacist-led service was more expensive than standard care.

d) Care homes and transitions between care settings

Study	Methods	Findings
Loganathan M, Singh S, Franklin B D, Bottle A and Majeed A (2011) Interventions to optimise prescribing in care homes: Systematic review, *Age and Ageing* 40 (2) : 150-162	Sixteen studies met the inclusion criteria. Four intervention strategies were identified: staff education, multi-disciplinary team (MDT) meetings, pharmacist medication reviews and computerised clinical decision support systems (CDSSs).	Author's synopsis Mixed results were found for pharmacist interventions.
Nishtala P, Mclachlan A, Bell S and Chen T (2008) Psychotropic prescribing in long term care facilities: impact of medication reviews and educational interventions, *American Journal of Geriatric Psychiatry* 16 (8) : 621-632	The objective of this literature review was to evaluate the evidence pertaining to the impact of medication reviews and/or educational interventions on psychotropic drug use in long-term care facilities. Twenty six studies evaluating the impact of medication reviews and/or educational interventions on psychotropic drug use in long-term care facilities. Eleven studies met the inclusion criteria for this review and the data from six of these studies were included in a meta-analysis.	The pooled odds ratio (OR) from five studies on hypnotic prescribing showed a decrease in use post-intervention (OR = 0.57, 95% confidence intervals [CI] = 0.41–0.79). The pooled OR from five studies on prevalence of antipsychotic prescribing post-intervention was not significant (OR = 0.81, 95% CI = 0.63–1.04). Medication reviews and/or educational interventions are effective in reducing psychotropic drug prescribing. However, research on the benefits of these interventions in reducing psychotropic drug use on total health care costs and resident health outcomes is lacking.

Zermansky A G, Alldred D P, Petty D R, Raynor D K, Freemantle N, Eastaugh J and Bowie P. (2006) Clinical medication review by a pharmacist of elderly people living in care homes – randomised controlled trial, *Age and Ageing* 35 : 586-591	Objective: to measure the impact of pharmacist-conducted clinical medication review with elderly care home residents. Design: randomised controlled trial of clinical medication review by a pharmacist against usual care. Setting: sixty-five care homes for the elderly in Leeds, UK. Participants: a total of 661 residents aged 65+ years on one or more medicines. Intervention: clinical medication review by a pharmacist with patient and clinical records. Recommendations to general practitioner for approval and implementation. Control patients received usual general practitioner care. Main outcome measures: primary: number of changes in medication per participant. Secondary: number and cost of repeat medicines per participant; medication review rate; mortality, falls, hospital admissions, general practitioner consultations, Barthel index, Standardised Mini-Mental State Examination (SMMSE).	The pharmacist reviewed 315/331 (95.2%) patients in 6 months. A total of 62/330 (18.8%) control patients were reviewed by their general practitioner. The mean number of drug changes per patient was 3.1 for intervention and 2.4 for control group ($P < 0.0001$). There were respectively 0.8 and 1.3 falls per patient ($P < 0.0001$). There was no significant difference for GP consultations per patient (means 2.9 and 2.8 in 6 months, $P = 0.5$), hospitalisations (means 0.2 and 0.3, $P = 0.11$), deaths (51/331 and 48/330, $P = 0.81$), Barthel score (9.8 and 9.3, $P = 0.06$), SMMSE score (13.9 and 13.8, $P = 0.62$), number and cost of drugs per patient (6.7 and 6.9, $P = 0.5$) (£42.24 and £42.94 per 28 days). A total of 75.6% (565/747) of pharmacist recommendations were accepted by the general practitioner; and 76.6% (433/565) of accepted recommendations were implemented. Conclusions: general practitioners do not review most care home patients' medication. A clinical pharmacist can review them and make recommendations that are usually accepted. This leads to substantial change in patients' medication regimens without change in drug costs. There is a reduction in the number of falls. There is no significant change in consultations, hospitalisation, mortality, SMMSE or Barthel scores.

Crotty M, Rowett D, Spurling L, Giles L C and Phillips P A (2004) Does the addition of a pharmacist transition coordinator improve evidence-based medication management and health outcomes in older adults moving from the hospital to a long-term care facility? Results of a randomized, controlled trial, *The American Journal of Geriatric Pharmocotherapy* 2 (4) : 257-264	To assess the impact of adding a pharmacist transition coordinator on evidence-based medication management and health outcomes in older adults undergoing first-time transfer from a hospital to a long-term care facility. A randomized, single-blind, controlled trial enrolled hospitalized older adults awaiting transfer to a long-term residential care facility for the first time. Patients were randomized either to receive the services of the pharmacist transition coordinator (intervention group) or to undergo the usual hospital discharge process (control group). The intervention included medication-management transfer summaries from hospitals, timely coordinated medication reviews by accredited community pharmacists, and case conferences with physicians and pharmacists. The primary outcome was the quality of prescribing, measured using the Medication Appropriateness Index (MAI). Secondary outcomes were emergency department visits, hospital readmissions, adverse drug events, falls, worsening mobility, worsening behaviours, increased confusion, and worsening pain. One hundred and ten older adults (67 women, 43 men; mean [SD] age, 82.7 [6.4] years) were recruited from 3 metropolitan hospitals and assigned to 85 metropolitan long-term care facilities. Fifty-six patients were randomized to the intervention group and 54 to the control group; 44 patients in each group were evaluable at 8-week follow-up.	There were no significant differences in baseline characteristics between treatment groups, with the exception of the number of medications discontinued during hospitalization: a mean of 1.1 more drugs was discontinued in the control group compared with the intervention group (P = 0.011). At 8-week follow-up, there was no change in MAI from baseline in the intervention group, whereas it had worsened in the control group (mean [95% CI], 2.5 [1.4-3.7] vs 6.5 [3.9-9.1], respectively; P = 0.007). Patients who received the intervention and were alive at follow-up exhibited a significant protective effect of the intervention against worsening pain (relative risk ratio [95% CI], 0.55 [0.32-0.94]; P = 0.023) and hospital usage (i.e., the combination of emergency department visits and hospital readmissions) (0.38 [0.15-0.99]; P = 0.035), but did not differ from control patients in terms of adverse drug events (1.05 [0.66-1.68]), falls (1.19 [0.71-1.99]), worsening mobility (0.39 [0.13-1.15]), worsening behaviours (0.52 [0.25-1.10]), or increased confusion (0.59 [0.28-1.22]). When data for patients who had died were included, the intervention had no effect on hospital usage in all patients (0.58 [0.28-1.21]). Conclusions: Older people transferring from hospital to a long-term care facility are vulnerable to fragmentation of care and adverse events. In this study, use of a pharmacist transition coordinator improved aspects of inappropriate use of medicines across health sectors.

e) Medicine Use Reviews - uptake, quality of reviews and pharmacists' views

Study	Methods	Findings
Harding G and Wilcock M (2010) Community pharmacists' perceptions of medicines use reviews and quality assurance by peer review, *Pharmacy World & Science* 32 (3) : 381-385	Objectives: To explore existing mechanism to ensure quality assurance of medicine use reviews (MURs), and to identify those parameters of an MUR that community pharmacists consider as indicators of quality. Setting: Community pharmacists undertaking MURs in Cornwall, United Kingdom. Method: A questionnaire was developed to investigate pharmacists' attitudes towards MURs and towards quality assurance of MURs. Questionnaires were distributed during December 2008 to a sample of pharmacists in Cornwall accredited to provide the service. Main outcome measures: Community pharmacists' attitudes towards quality assurance of MURs.	Fifty completed questionnaires were returned, a third of which were from locum pharmacists. The most frequently reported determinant for undertaking an MUR was the pharmacist's judgement. Company policy to deliver MURs was acknowledged as a potential indicator of a sub-optimal MUR. Pharmacists shared a common sense of what constitutes a "poor" MUR but not what defines a quality one. Conclusion For peer review to operate as an effective mechanism to assure quality of MURs, pharmacists need to develop an effective forum to share their practice experiences.

Kaulbach M, Lowe C, Patel N, Pretty D and Rao S (2010) *MUR support and evaluation programme Report*, National Pharmacy Association and Primary Care Pharmacists Association	The aim of the NPA and PCPA support and evaluation programme was to evaluate whether an educational intervention and structured support implemented within a Primary Care Organisation (PCO) can improve the quality of MURs The primary outcome measures were: • Community pharmacist evaluation of programme • Patient satisfaction with MUR • Assessment of quality of referrals to general practitioner	The programme was evaluated well by the community pharmacists. The two main benefits of the programme reported by pharmacists were an improvement in their time management and an increase in confidence. They identified that both of these had been barriers to them implementing MURs before the programme. Pharmacists also reported that their training in consultation skills was helpful in enabling them to understand the patients perspective and structure the consultation accordingly. The patients evaluated the MURs very highly and reported that they had gained an increase in their understanding of both their medicines and their condition. The evaluation of the written recommendations to GPs showed these to be of variable quality. A key learning point was the need to improve written communication. Conclusions: Overall, the project was successful and a number of recommendations can be made. • Firstly, the process of peer review is useful in helping pharmacists to undertake effective MURs. • Secondly, clinical governance mechanisms need to be put in place by PCTs to evaluate the effectiveness of MURs. • Thirdly, community pharmacists need to build good relationships with GPs in order to implement effective MURs.

Laaksonen R, Duggan C and Bates I (2010) Performance of community pharmacists in conducting clinical medication reviews, *Annals of Pharamacotherapy* 44 (7-8) : 1181-1190	To assess trained community pharmacists' performance in writing care plans and referrals when providing clinical medication reviews to elderly patients as part of a patient outcome–focused Medicines Management project. In the south of England, 43 community pharmacists were recruited from 80 local community pharmacies; 37 completed clinical pharmacy training to provide medication reviews for elderly patients who were receiving prescriptions for 4 or more medicines from local general practices. Eleven trained pharmacists withdrew and did not provide any reviews. As part of quality assurance, a clinical pharmacist reviewed all care plans and referrals written by the community pharmacists and, if required, amended referrals before they were sent to the patients' family physicians with recommendations. The referrals written by the community pharmacists were compared with those written by the clinical pharmacist and were deemed to be accurate or incomplete (the community pharmacists could provide verbal information to the physicians) if the observations of drug-related problems (DRPs) and suggestions to solve them were beneficial to patients. Incorrect or missing observations and suggestions were considered non-beneficial to patients. The performance assessment was based on a sample of 244 referrals written by 20 community pharmacists.	The clinical pharmacist identified 908 DRPs and suggested 1489 solutions; the community pharmacists beneficially identified 75% of these DRPs (1% were incorrectly identified and 24% were missed) and suggested 58% of the solutions (6% were incorrectly suggested and 36% were missed). Conclusions: The community pharmacists beneficially identified most DRPs and suggested many solutions. However, the assessment may underestimate the community pharmacists' abilities, as it relied on the records they kept and was based on a gold standard. While the pharmacists were self-selected, this study provides valuable insight into trained community pharmacists' clinical medication review performance.

Lee E, Braund R and Tordoff J (2009) Examining the first year of Medicines Use Review services, *The New Zealand Medical Journal* 122 (1293) : 26-35	Aim To determine where in New Zealand collaborative Medication Use Review and Adherence Support (MUR) services were provided by pharmacists, to identify the processes involved, and pharmacists' perceptions of the service. Methods A questionnaire-based cross-sectional survey was undertaken of 68 of 71 MUR accredited pharmacists that were contactable in May 2008.	Fifty-four (79%) of the 68 accredited pharmacists completed the survey. Services were provided in 5/21 (24%) district health boards (DHBs) by 39 pharmacists from 33/897 (3.7%) pharmacies. The eligibility criteria for patients were highly consistent across the DHBs. The median time for pharmacists conducting their initial MUR consultation was 57 minutes. All pharmacists perceived this service to be highly (93%) or moderately valuable (7%) to patients. The main limitations to providing this service were identified as 'no current contract with funders', 'insufficient time', and 'personal circumstances'. Conclusion By May 2008, collaborative medication review services (MURs) were provided in five DHBs by 39 pharmacists. Limited time since launch and the need for local contract negotiations may have contributed to current participation rates. Studies should be undertaken as the service grows to establish the stakeholders' perceptions of the service, and the impact of MURs on the health outcomes of patients.

Latif A and Boardman H (2008) Community pharmacists' attitudes towards medicines use reviews and factors affecting the numbers performed, *Pharmacy World & Science* 30 (5) : 536-543	The objective of this study was to investigate factors that influence the number of Medicines use reviews (MURs) performed by community pharmacists and to explore community pharmacists' attitudes towards the service. Setting This study was conducted with pharmacists who were employed by one UK community pharmacy chain. Method A questionnaire was developed to investigate factors that influence the number of MURs performed and pharmacists' attitudes towards MURs. It consisted of a series of attitudinal statements together with brief demographic data. Questionnaires were distributed to a sample of 280 pharmacists accredited to provide the service during April and May 2006. Main outcome measure Factors affecting the number of MURs performed and community pharmacists' attitudes towards MURs. Sixty per cent (167/280) of pharmacists returned a completed questionnaire. Twenty-seven per cent of respondents had not performed any MURs, 43% had conducted one to 14 reviews and 31% had conducted 15 or more.	Job title affected the number of reviews performed; respondents categorised as 'Store based' pharmacists performed significantly more MURs than those working as 'Locums' but not significantly more than 'Managing' pharmacists. Pharmacists reporting access to an accredited consultation area performed significantly more MURs than those who did not. Those working more than 20 h per week performed significantly more MURs than those working less. Gender, time since qualification, the pharmacy size and those having or currently undertaking a clinical diploma were not found to be associated with the number of MURs performed. Most respondents reported that MURs were an opportunity for pharmacist to use their professional skills in an extended role and patients would benefit from the service. However they reported concerns about GPs opinion of the service, lack of time and support staff to conduct MURs and were unhappy about consultation areas. Conclusion This study demonstrates that pharmacists perceive MURs to be an opportunity for an extended role and of value to patients. However, this study has identified perceived barriers, including the availability of a consultation area suitable for performing MURs, time to perform MURs and support staff. The number of MURs performed by pharmacists appears to be affected by the pharmacists' job title, their working hours and the presence of a consultation area. Additional support for 'locum' pharmacists was also highlighted and may be needed.

Bradley F, Wagner A C, Elvey R, Noyce P R and Ashcroft D M (2008) Determinants of the uptake of medicines use reviews (MURs) by community pharmacies in England: A multi-method study, *Health Policy* 88 (2–3) : 258-268	To explore and identify the key determinants influencing the uptake of medicines use reviews (MURs). A survey of all primary care organisations (PCOs) in England (n = 303, response rate = 74%) and case study investigations of 10 PCOs, involving interviews with a purposive sample of 43 key stakeholders, including PCO, Local Pharmaceutical Committee and community pharmacy representatives. National data on MUR activity were also analysed and multiple linear regression was used to test determinants of MUR uptake.	The ownership category of the pharmacy was shown to be the most significant determinant of MUR uptake. Rates of MUR provision by multiple pharmacies were almost twice that of independent pharmacies. Interview data corroborated this finding, suggesting that organisational pressure within multiple pharmacies was driving forward MUR activity in some PCOs. Interviewees expressed concern about this quantity driven approach. The PCO survey respondents perceived the greatest barrier to MUR implementation to be a lack of support from general practitioners (GPs). Interviewees reported a lack of communication about MURs between community pharmacists and GPs. Conclusions: The findings suggest that the organisational setting of the pharmacy is an important factor influencing the uptake of MURs. There is also a need for greater communication and collaboration with GPs regarding the MUR service

Krska J, Avery A J and the Community Pharmacy Medicines Management Project Evaluation Team (2008) Evaluation of medication reviews conducted by community pharmacists: a quantitative analysis of documented issues and recommendations, *British Journal of Clinical Pharmacology* 65 (3) : 386-396	To describe issues noted and recommendations made by community pharmacists during reviews of medicines and lifestyle relating to coronary heart disease (CHD), and to identify and quantify missed opportunities for making further recommendations and assess any relationships with demographic characteristics of the pharmacists providing the reviews, all issues and recommendations noted by 60 community pharmacists during patient consultations were classified and quantified. Two independent reviewers studied a subsample of cases from every participating pharmacist and identified and classified potential issues from the available data. The findings of the pharmacists and the reviewers were compared. Relevant pharmacist characteristics were obtained from questionnaire data to determine relationships to the proportion of potential issues noted.	A total of 2228 issues and 2337 recommendations were noted by the pharmacists in the 738 patients seen, a median of three per patient (interquartile range 2–4). The majority of the recommendations made (1719; 74%) related to CHD. 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% confidence interval 30.1, 36.4). No relationship was found between the proportion of issues noted and potentially relevant factors such as pharmacists' characteristics and their experience of doing reviews. Key points: • The 60 community pharmacists taking part in this large randomized controlled trial showed considerable variation in the completeness of the reviews they recorded for intervention patients. • Overall, pharmacists recorded only a minority of the potential issues present in these patients. • The frequency with which pharmacists recorded issues was not related to key characteristics or to the number of reviews completed.

Blenkinsopp A, Bond C, Celino G, Inch G and Gray N (2008) Medicines Use Review: adoption and spread of a service innovation, *International Journal of Pharmacy Practice* 16 (4) : 271-276	Background Research has shown that implementation of community pharmacy Medicines Use Review and Prescription Intervention (MUR) in the first year of the service in England and Wales was less extensive than anticipated. Several barriers to MUR becoming accepted and embedded in the National Health Service (NHS) were identified. Objective To evaluate progress in the provision of the MUR service in England and Wales in its second year (April 1, 2006-March 31, 2007) compared with the first year; and to analyse trends from available national data from the third year of provision in 2007–2008. Methods The analysis drew on the following data sources: routine data on provision of MURs for community pharmacies in a stratified random sample of 31 primary care organisations in England and Wales, and national datasets on MUR provision from the Pharmaceutical Services Negotiating Committee and NHS Information Centre. Outcome measures The percentage of community pharmacies providing the MUR service, the numbers of MURs provided in 2006–2007 at pharmacy and primary care organisation level, and the extent of, and variation in, provision.	Key findings The percentage of community pharmacies providing the MUR service increased from 38 to 67.2%. Overall, 62 559 MURs were provided (a more than four-fold increase on the previous year), representing 13.8% of the possible maximum. The mean number of MURs provided (per provider) increased from 36 to 85. For existing providers the mean number increased from 36 to 111 (median 78, range 0–423). For new providers the mean number was 52 (median 17, range 1–401). More than half (52%) of the pharmacies in the sample claimed for fewer than 50 MURs. Overall, 82% of MURs were provided by multiples and this percentage was lower among new providers (62%) than existing providers (89%). Thirty-three (8.1%) existing MUR providers had no recorded MURs in the second year: almost two-thirds of these (64%) were independents. Eleven pharmacies (1.5%) provided the maximum number of 400 MURs per year: all but one were branches of multiples. Of the pharmacies not yet providing MURs, 78% were independent. Conclusions Both numbers of MURs and numbers of providers of MUR services increased markedly during the service's second year. Those newly providing the service in the second year claimed for more than twice as many MURs as did those who had been 'new providers' the previous year. Overall just over half of all providing pharmacies claimed for the equivalent of one MUR a week or fewer. Therefore the extent of 'successful adoption' of MURs is debatable. Differences in the level of provision continued between independent and multiple pharmacies in terms of both adoption of the service and the number of reviews conducted. As in the previous year, independent pharmacies were less likely to provide the MUR service and when they did the numbers conducted were lower than those provided by multiples.