The impact of HIV clinical pharmacists on HIV treatment outcomes: a systematic review
Saberi P, Dong BJ, Johnson MO, Greenblatt RM, Cocohoba JM

CRD summary
This review concluded that there was a positive association between HIV pharmacist activities and improvements in outcomes such as anti-retroviral adherence and viral load suppression. The conclusions reflect the evidence but limitations of the evidence mean the reliability of the conclusions is uncertain. It is unclear whether the findings are generalisable to developing countries.

Authors' objectives
To assess the impact of HIV clinical pharmacists on HIV treatment outcomes.

Searching
Six electronic databases including PubMed, EMBASE and The Cochrane Library were searched from inception to June 2011 for articles in English. The search strategy was reported. Reference lists of relevant articles were screened manually.

Study selection
Eligible studies were quantitative studies that assessed pharmacists' roles in the clinical care of HIV positive adults. Multifactorial interventions/activities were eligible for inclusion so long as one factor clearly indicated pharmacist involvement. Primary outcomes of interest were antiretroviral treatment adherence, viral load and CD4+ cell count. Secondary outcomes were stated. Abstracts were excluded from the review, as were studies that only assessed pharmacist's ability to provide HIV prevention services or assessed only pharmacy operations (such as medication stock).

More than two-thirds of the included studies were conducted in the United States. Where reported, most studies were set in HIV ambulatory care clinic settings or outpatient community pharmacies. The mean age of participants ranged from 36 to 65 years. Some studies were in men only and some were in women only. Zero to 70% of the participants were men who have sex with men. Where reported, between 15% and 83% of participants were ethnically black and between 12% and 71% were ethnically white.

In the included studies, pharmacists played a central role in the study objectives (clinical care activities) or examined the impact of pharmacist interventions (intervention studies). The pharmacist role was categorised as central or peripheral to the study objectives (as defined in the review). The role of the pharmacist included activities such as the provision of medication and adherence counselling, patient education, anti-retroviral treatment initiation/discontinuation and dose adjustments, and monitoring and prevention of drug interactions or adverse drug reactions. Various methods were used to measure outcomes.

Two authors independently screened studies for inclusion; discrepancies were resolved through referral to a third reviewer.

Assessment of study quality
The Cochrane guide for study assessment checklist was used to assign the study design to each included study. It was unclear how many reviewers undertook this process.

Data extraction
Three reviewers extracted data on primary and secondary measures. Data were then assessed for accuracy by a second reviewer.

Methods of synthesis
Due to variability between studies, data were presented as a narrative synthesis by outcome, type of study and whether the pharmacist's role was central or peripheral.
Results of the review
Thirty-two studies (28 to 7,018 participants) were included in the review: two randomised controlled trials (RCTs), one quasi-RCT, one pilot non-RCT, two controlled before-and-after studies, four historical control studies, five before-and-after studies, six cohort studies, one ecological study and 10 descriptive studies.

Anti-retroviral adherence (18 studies): Ten studies assessed adherence rates where the role of the pharmacist was central. Eight of these studies had a comparison control group; all eight studies showed a significant improvement in the pharmacist group. Nine studies assessed the adherence rates when the pharmacist's role was peripheral. Five of these studies compared the pharmacist role to a control group; four reported significant improvements in the pharmacist group. Where adherence rates were reported as continuous outcomes, rates in the pharmacist arm were 2% to 59% higher compared to the control arm (nine studies).

HIV viral load (10 studies): Six of the nine studies that assessed the central role of the pharmacist showed that pharmacist involvement statistically or clinically reduced viral load significantly or had a greater proportion of maximal viral suppression. Four of five studies that assessed viral load when the pharmacist's role was peripheral showed a favourable association between pharmacist care and virologic response.

CD4+ cell count (10 studies): Two of seven studies that assessed immunologic response when the pharmacist played a central role showed increased CD$_4$+ cell count in association with pharmacist care. Two studies reported immunologic response when the pharmacist played a peripheral role; neither showed any improvements in CD$_4$+ cell count compared to control groups.

The 10 studies that investigated the pharmacist's central role reported favourable outcomes including increased adherence to appointments and reductions in healthcare visits and pill burden (one study each). Nine studies where pharmacists assumed a peripheral role showed no changes in outcomes such as treatment adherence self-efficacy and continued treatment at 12 months (one study each) or frequency of opportunistic infections (two studies). However, two studies each reported a higher likelihood of remaining on anti-retroviral treatment, fewer contraindicated anti-retroviral regimens and a higher cost in groups that involved a pharmacist.

Other findings, including secondary outcomes, were reported in the review.

Authors' conclusions
The evidence supported the positive association between HIV pharmacist activities and improvements in anti-retroviral adherence and viral load suppression, and various other outcomes.

CRD commentary
The review question and supporting inclusion criteria were broadly stated. Several electronic sources were searched and the authors mentioned ongoing studies. Language bias could not be ruled out as language restrictions were imposed. The authors did not perform a full assessment of study quality. Most of the included studies were observational studies (this type of study has its own methodological limitations).

Given the variability between studies, the decision not to pool data was appropriate but it limited the synthesis somewhat. The authors acknowledged additional limitations of the included studies such as small sample sizes, short follow-up duration, incomplete description of the pharmacist's role and the use of unconventional methods to calculate adherence. The reliability of some of the methods used to measure outcome data was unclear.

The authors' conclusions reflect the evidence but the reliability of the conclusions is unclear given the uncertainties of the evidence. Most studies were conducted in developed countries and it is unclear whether the findings are generalisable to developing countries.

Implications of the review for practice and research
Practice: The authors stated that clinical pharmacists trained in HIV pharmacotherapy are invaluable resources and essential members of the HIV multidisciplinary care team.

Research: The authors stated that future research should include both qualitative and quantitative studies (including large RCTs) to determine which pharmacist functions (including those beyond the traditional functions) have the
greatest impact on adherence. The cost-effectiveness of pharmacists should be assessed.

The authors provided details on ongoing studies.

**Funding**
Supported by the National Institute for Health (NIH), USA.

**Bibliographic details**

**PubMedID**
22536064

**DOI**
10.2147/PPA.S30244

**Original Paper URL**
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3333818/

**Indexing Status**
Subject indexing assigned by CRD

**MeSH**
HIV Infections; Humans; Pharmaceutical Services; Pharmacists; Antiretroviral Therapy, Highly Active; Pharmacy Service, Hospital

**AccessionNumber**
12013006189

**Date bibliographic record published**
05/03/2013

**Date abstract record published**
20/12/2013

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.