Evidence Report 1

Drug distribution and prescription handling

English version 1.1 – 2006

Translated summary based on Danish version 2.1 and 2.2
March 2006

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Introduction

The evidence report on the effect of pharmacy activities related to drug distribution and intervention in connection with prescription handling has been prepared within the framework of The Danish Community Pharmacy Evidence Database. The aim of the database is to ensure that the pharmacy sector has continuous access to updated knowledge about the impact of pharmacy practice.

The Danish Community Pharmacy Evidence Database consists of, on one hand, thematic summaries of studies (an evidence report) and, one the other hand, a database that offers a possibility of searching across the literature contained in all the thematic evidence reports.

The evidence report describes professionally analysed studies to assess the effect of pharmacy practice (datasheets), and also describes total documentation in the area. Ten evidence reports have been prepared in the following areas:

1. Drug distribution and prescription handling
2. Patient information on prescribed drugs
3. Follow-up on outcomes of drug therapy (pharmaceutical care)
4. Self-care activities
5. Health promotion and ill-health prevention
6. Promoting rational pharmacotherapy to other health professionals
7. Incidence of drug-related problems and adverse drug events in primary care
8. Patient safety and medication errors
9. Compliance and concordance
10. Opportunistic screenings in primary health sector

The evidence reports cover pharmacy practice studies containing an evaluation of the effect of an intervention. The effects have been divided into the following final and intermediate performance measures: economic outcome; effect on health and well-being (including clinical outcomes); effect on satisfaction; effect on knowledge, attitudes and behaviour with regard to drugs, illness and health; effect on drug-related problems; effect on drug use; and effect on process measures.

The evidence reports cover studies published in internationally peer-reviewed journals and relevant Danish journals since 1990. Danish and Nordic reports of studies in pharmacy practice have also been included. In 2003, the geographic scope of the evidence reports was extended to include non-European studies.

The primary users of the database are the Danish Pharmaceutical Association, pharmacies and Pharmakon a/s, Danish College of Pharmacy Practice. Pharmakon and the Danish Pharmaceutical Association jointly developed and financed the database, which Pharmakon continues to develop and maintain. All datasheets are included in the searchable, electronic version of the database on www.pharmakon.dk/dokumentationsdatabasen. The evidence reports can be downloaded from the same website as well as from the Danish Pharmaceutical Association's site www.apotekerforeningen.dk

A summarised translation of all evidence reports will be prepared and made available on www.pharmakon.com under the heading “College”. The present translation is the third to be made available.

Specialist editor: Pia Knudsen

Delimitation

One of the key tasks that pharmacies perform for society is to distribute drugs and undertake pharmaceutical control of the wording and content of prescriptions before they are dispensed.

GPP describes the following drug distribution steps:
(a) The pharmacy receives the prescription and checks that it has been received in full.
(b) The pharmacist assesses the prescription based on:
    1. a therapeutic point of view (pharmaceutical and pharmacological)
    2. its suitability for the individual patient
    3. social, legal and economic aspects
(c) The prescription medication is prepared.

The role of the pharmacy is defined in *Apotekets Kvalitetshåndbog*[1], the pharmacy quality assurance handbook, as follows: 'The pharmacy sells drugs and thus has a co-responsibility for ensuring the supply of drugs to society. The pharmacy's distribution service includes drugs in general and non-drugs (products sold exclusively by pharmacies plus products in free trade) sold direct to customers without a written order or sold/distributed in accordance with written documentation (prescription or request form). The pharmacy also has a duty to provide consumers, health professionals and authorities with information about drugs, drug use and storage'.

In chapter 2.3.2 of the handbook[1], the distribution service is defined as all activities relating to product handling, prescription handling, supplies, dispatch and statutory administration.

In the present evidence report, the following are categorized as distribution-related tasks: distribution of drugs to individuals, institutions and health professionals, and activities in connection with the pharmaceutical control of prescription drugs.

The report covers studies describing pharmaceutical interventions in connection with prescription distribution and handling. No studies dealing specifically with logistics were identified. The report describes the following activities:

- Dose dispensing to individual patients and nursing homes
- Pharmaceutical interventions in connection with prescription handling
- Returned medication
- Unclaimed prescriptions

The quality of the studies included, and thus the strength of the evidence for the results, is assessed on the basis of the study design. The following four quality categories were used:

A. Meta-analyses and randomized, controlled trials using large patient sample
B. Non-randomized, controlled trials
C. Studies without control group comparison (e.g., before-and-after studies)
D. Descriptive, observational and qualitative studies.

1. Apotekets kvalitetshåndbog [in Danish only]. Version according to DS/EN/ISO 9001:2000. Pre-evaluated by Dansk Standard. The Danish Pharmaceutical Association. Version 6 2005.

Studies dealing with information in connection with distribution (for example, to dose dispensing customers and customers who pick up their prescriptions from non-pharmacy outlets) and prescription delivery to individual customers are described in *Evidence Report 2, Patient information on prescribed drugs*. Clinical pharmaceutical interventions in connection with assessing the medication for individual patients at the pharmacy and in the home are described in *Evidence Report 3, Follow-up on outcomes of drug therapy (pharmaceutical care),* while clinical pharmaceutical interventions in general practice and in nursing homes are described in *Evidence Report 6, Promoting rational pharmacotherapy to other health professionals*.

Results of literature search

Literature search
The studies covered by the former evidence report 1.1 were selected on the basis of a search carried out in International Pharmaceutical Abstract (IPA) and Medline for the period 1990-2002.

Two new combined electronic searches were conducted for all the evidence reports in 2003, the first in April and the second in October. A full literature search was conducted in International Pharmaceutical Abstract (IPA) and Medline for the period 2001- 2003. The search strategy has been revised to only include a general combined search for evidence reports 1 to 6.

A manual search of the Spanish journal *Pharmaceutical Care* was conducted for the period 2001 – up to and including October 2003.

Two new combined searches were conducted in April and October 2004 in International Pharmaceutical Abstracts and Medline for the period September 2003 – September 2004. The search was conducted exclusively on English-language journals. Conference abstracts were excluded from the search.

Updates
The update of *Evidence Report 1, Distribution and prescription handling*, Version 2.1, up to and including October 2003, resulted in 11 new datasheets. Most of these derive from the two new searches, while some were generated by the geographic expansion of the documentation reports to include American, Australian and Canadian studies. A few datasheets were produced for articles collected previously but not described.

The second update, Version 2.2, to and including September 2004 resulted in two new datasheets.

The electronic version of the evidence database contains a list of references to articles that have been assessed but not found suitable for mention in the evidence reports.

Geographic spread
The evidence report on the effect of distribution and prescription handling comprises 40 studies, of which 33 are European. Nine of the studies come from Denmark, eight from Sweden, five from the UK, five from Norway, three from the Netherlands and one each from Belgium, France and Germany. The report also includes three studies from the USA and four from Australia dealing with returned drugs and interventions in connection with prescription handling.

Study design and activities

The evidence report covers 36 studies described in 40 datasheets. The table shows the study design, activity carried out and number of studies involved.

Design	Activity	Number
A: Randomized controlled trials	Intervention in connection with prescription handling	3
	Unclaimed prescriptions	1
		4
B: Non-randomized controlled trials, occasionally using historic control groups	Intervention in connection with prescription handling	1
	Dose dispensing following discharge from hospital	1
		2
C: Studies without control group and before-and-after studies	Dose dispensing for nursing homes	1
	Dose dispensing for people living at home	2
		3
D: Descriptive, observational and qualitative studies	Interaction study	1
	Identification of errors on hospital prescriptions	1
	Intervention in connection with prescription handling	12
	Identification of drug-related problems	1
	Intervention in connection with prescription handling / Identification of drug-related problems	2
	Unclaimed prescriptions	1
	Dose dispensing for nursing homes	2
	Returned medication	10
	Medication orders and dose dispensing at nursing homes	1
		31

Study design
Four randomized, controlled trials were found (including three articles about the same study) and two controlled trials. Of these four articles deal with interventions in connection with prescription handling, one with interventions against unclaimed prescriptions and one with the use of dose dispensing following discharge from hospital.

Three studies were found based on a before-and-after design without a control group. They all deal with dose dispensing for nursing homes and home care services.

A total of 31 descriptive studies were found.

Activities

Prescription handling
There is evidence that interventions in connection with prescription handling can generate savings for the health service and that pharmacists can, in connection with prescription handling, identify and solve technical and drug-related problems of clinical significance.

Dose dispensing
There is ample evidence that savings can be made by introducing dose dispensing.

Returned medication
Studies of returned medication show that community pharmacies receive considerable amounts of unused or expired medication.

Unclaimed prescriptions
There is no evidence that community pharmacies can influence the number of unclaimed prescriptions by introducing various reminder systems for patients or doctors.

Main conclusions

- There is evidence that interventions in connection with prescription handling can save medication costs and costs incurred from contacting health services
- There is ample evidence that savings can be made by introducing dose dispensing
- Considerable quantities of unused and expired medication, which also have a significant financial value, are returned to community pharmacies
- There is evidence that user compliance is increasing and that users and carers are satisfied with dose dispensing
- There is ample evidence that pharmacists can, in connection with prescription handling, identify and solve technical and drug-related problems of clinical significance
- There is no evidence that community pharmacies can influence the number of unclaimed prescriptions by introducing various reminder systems for patients or doctors
- No studies were found on the effect of interventions on patient health and well-being, drug consumption and drug-related problems.
- There is evidence of frequent errors in hospital prescriptions handled by Danish community pharmacies
- There is evidence that pharmacists spend a significant portion of their working hours responding to electronic drug interaction alerts, most of which can be disregarded.

Evidence for individual performance measures

The results of the 40 datasheets have been divided into the following areas: economy, health and well-being, satisfaction, attitudes, knowledge and behaviour, drug consumption, drug-related problems and process measures.

Performance measure	Design	Number of datasheets
Effect on health and well-being	A: Randomized controlled trials	No studies
	B: Controlled trials	
	C: Studies without control groups	
	D: Descriptive studies	
Economic analysis	A: Randomized controlled trials	2
	B: Controlled trials	0
	C: Studies without control groups	1
	D: Descriptive studies	14
Effect on satisfaction	A: Randomized controlled trials	0
	B: Controlled trials	1
	C: Studies without control groups	2
	D: Descriptive studies	2
Effect on knowledge, attitudes and behaviour	A: Randomized controlled trials	0
	B: Controlled trials	1
	C: Studies without control groups	1
	D: Descriptive studies	0
Effect on drug-related problems	A: Randomized controlled trials	No studies
	B: Controlled trials	
	C: Studies without control groups	
	D: Descriptive studies	
Effect on drug consumption	A: Randomized controlled trials	No studies
	B: Controlled trials	
	C: Studies without control groups	
	D: Descriptive studies	
Process measures		33 of the 40 studies reported process measures. 16 reported process measures exclusively.

Economic analysis
The controlled trials of the effect of community pharmacy interventions in connection with prescription handling show that medication costs and expenses incurred from contacting the health services can be reduced. Four descriptive studies show the same trend. There is ample evidence that saving can be made by introducing dose dispensing. Considerable quantities of unused and expired medication, which also have a significant financial value, are returned to community pharmacies.

Effect on satisfaction
There is evidence that users of dose dispensing and caregivers may find the system satisfactory but also that a small proportion experience some form of dissatisfaction or uncertainty.

Effect on knowledge, attitudes and behaviour
Two studies on the effect of dose dispensing on patient compliance show that compliance can be increased.

Effect on process measures
There is ample evidence that pharmacists identify and solve technical and drug-related problems in connection with prescription handling. There is considerable variation in the intervention rates found by the studies and among the community pharmacies in the individual studies. The interventions are assessed as having significant clinical relevance. There is ample evidence that community pharmacies perform an important task for society by accepting returned medication, often in unopened packaging. The randomized controlled trial on unclaimed medication did not show any effect.

List of datasheets

Datasheet	Study ref. no
Andersson ÅC, Brodin H, Nilsson JLG. Pharmacists' Interventions in Relation to Patient Drug-related Problems. J Soc Adm Pharm 2003;20:82-91 (Sweden).	1.34
Benrimoj SI, Langford JH, Berry G, Collins D, Lauchlan R, Stewart K, Ward PR. Clinical intervention rates in community pharmacy: a randomised trial of the effect of education and a professional allowance. International Journal of Pharmacy Practice 2003;11:71-80 (Australia).	1.37
Benrimoj SI, Langford JH, Berry G, Collins D, Lauchlan R, Stewart K, Ward PR. Clinical significance of clinical interventions in community pharmacy: a randomised trial of the effect of education and a professional allowance. International Journal of Pharmacy Practice 2003;11:81-87 (Australia).	1.32
Benrimoj SI, Langford JH, Berry G, Collins D, Lauchlan R, Stewart K, Aristides M, Dobson M. Economic impact of increased clinical intervention rates in community pharmacy. Pharmacoeconomics 2000;18:459-468 (Australia).	1.27
Bjelland E. Maskinelt fylte doseringsesker – bidrag fra apotekerne til kvalitetssikring i hjemmepleien [Automated filling of pill dispensers – the pharmacies contribute to quality assurance of home care. In Norwegian]. Norsk Farmaceutisk Tidsskrift 1993;(13):15-1 (Norway).	1.11
Bronder E, Kimpel A. Unused drugs returned to the pharmacy – new data. Int J Clin Pharmacol Ther 2001;11:480-483 (Germany).	1.36
Buurma H, de Smet PAGM, van den Hoff OP, Egberts ACG. Nature, frequency and determinants of prescription modifications in Dutch community pharmacies. Br J Clin Pharmacol 2001;52:85-91 (The Netherlands).	1.14
Bøgh L i samarbejde med Forskningskonsulentfunktionen. Dosisdispensering på Øresunds Apotek. Intern evaluering og kvalitetsstyringssystem [Dose dispensing at Øresund Pharmacy. Internal evaluation and quality management system. In Danish]. Report 1996, Danmarks Apotekerforenings Kursusejendom (Denmark).	1.23
Claesson CB, Burma K, Nilsson JLG, Vinge E. Prescription errors detected by Swedish pharmacists. Int J Pharm Pract 1995;3:151-6 (Sweden).	1.4
Edward C. Läkemedelsförsörjning til sjukhem [Drug distribution to nursing homes. In Swedish]. Svensk Farmacevtisk Tidsskrift 1993;97(4):28-30 (Sweden).	1.9
Edward C. Läkemedelshantering – en del af ADL-träningen [Medicine handling – part of ADL training. In Swedish]. Svensk Farmaceutisk Tidsskrift 1992;96(6):38-41 (Sweden).	1.20
Ekedahl A, Wergeman L, Rydberg T. Unused drugs in Sweden measured by returns to pharmacies. J Soc Adm Pharm. 2003;1:26-3 (Sweden).	1.28
Green R. Survey of prescription anomalies in community pharmacies: (1) Prescription monitoring. The Pharmaceutical Journal 1995;254:476-481 (UK).	1.7

Green R. Survey of prescription anomalies in community pharmacies: (2) Interventions and outcomes. The Pharmaceutical Journal 1995;254:873-875 (UK).	1.8
Guignard AP, Couray-Targe S, Colin C, Chamba G. Economic Impact of Pharmacists' Interventions with Nonsteroidal Antiinflammatory Drugs. Ann Pharmacother 2003;37:332-338 (France).	1.33
Hawksworth GM, Corlett AJ, Wrigth DJ, Chrystin H. Clinical pharmacy interventions by community pharmacists during the dispensing process. Br J Clin Pharmacol 1999;47:695-700 (UK).	1.6
Hernæs L. Apotek på medicinrom [The pharmacy helping in the dispensary. In Norwegian]. Sykepleien 2002;11:14 (Norway).	1.24
Isacson D, Olofsson C. Drugs up in smoke: a study of caseated drugs in Sweden. Pharmacy World & Science 1999;21(2):96-99 (Sweden).	1.13
Larsen UH, Larsen MS. Undersøgelse af omfang og type af fejl på recepter fra sygehuse modtaget på Helsingør Axeltorvs Apotek. Rapport ifm. studieophold på apotek [Survey of the extent and type of prescription errors from hospitals received by Axeltorv Pharmacy in Helsingør. Report from study project at the pharmacy. In Danish]. 2004 (Denmark).	1.39
Larsson A, Block G, Stargård Y. Läkemedelskassation vid Ekerö kommuns särskilda boendeformer [Destroying drugs in nursing homes under Ekerö local authority. In Swedish]. Läkemedelsvärlden 1998;102(6):39-40 (Sweden).	1.12
Leach RH, Hipkiss S, Hesslewood J, Mcgraghan P, Parkinson M. Investigation into the effectiveness of the Dudley prescribing efficiency scheme. The Pharmaceutical Journal 2003; 270: 276-77 (UK).	1.38
Leemans L, Veroeveren L, Bulens J, Hendrickx C, Keyenberg W, Niesten F, Vandeberg J, Van Hoof J, Laekeman G. Frequency and trends of interventions in Flemish community pharmacies. Pharm World Sci 2003;25:65-69 (Belgium).	1.35
Longmore RB, Sunderland VB, Sansom LN. Analysis of a "Medidump" campaign in Australia. Int J Pharm Pract 1995;3:186-91 (Australia).	1.31
Lægemiddelstyrelsen, Danmarks Apotekerforening. Returmedicin på Apotekerne [Medicine returned to pharmacies. In Danish]. Report, November 2001 (Denmark).	1.17
Mellbye KS. Kvalitetssikring i reseptekspeditionen – registrering af reseptfejl [Quality assurance of prescription handing – registration of prescription errors. In Norwegian]. Norges Apotekerforenings Tidsskrift 1993;15:536-537 (Norway).	1.10
Munk Hansen B. Dosisdispensering – et forsøg i Vejle Amt. Del II. Vurdering af de økonomiske konsekvenser for lægemiddelbrugere, Fredericia kommune og Vejle Amt [Dose dispensing – pilot project in Vejle County. Part II. Evaluation of the economic consequences for medicine users, Fredericia local community and Vejle County. In Danish]. Report 1999, Sygesikringen i Vejle Amt (Denmark).	1.25
Murphy JE, Forrey RA, Desiraju U. Community pharmacists' responses to drug-drug interaction alerts. Am J Health-Syst Pharm. 2004;61:1484-7 (USA).	1.40

Pedersen BL, Dengsø V, Winther L. Farmaceutisk interventionsregistrering på apotek [Pharmaceutical intervention registration at the pharmacy. In Danish]. Report 1997. Danmarks Apotekerforenings Kursusejendom (Denmark).	1.16
Petursson S. Returmedicinkampagnen – Horsens Sund By [Return medicine campaign – Horsens Healthy City. In Danish]. Farmaceuten 1990;4:135-139 (Denmark).	1.22
Rogers PJ, Fletcher G, Rees JE. Clinical interventions by community pharmacists using patient medication records. Int J Pharm Pract 1994;3:6-13 (UK).	1.19
Rupp MT. Value of community pharmacists' interventions to correct prescribing errors. Pharmacoeconomics 1992;26:1580-1584 (USA).	1.26
Secnik K, Pathak DS, Cohen JM. Postcard and telephone reminders for unclaimed prescriptions: a comparative evaluation using survival analysis. JAm Pharm Assoc. 2000;40:243-51 (USA).	1.29
Sørensen C. Fra destruktion til information – en undersøgelse af omfanget af Returmedicin [From destruction to information – a survey of the extent of returned medicine. In Danish]. Report 2001, Jerne Apotek Esbjerg. Jensby AB. Spild for mange millioner [Many millions wasted. In Danish]. Farmakonomen 2001;6:4-7 (Denmark).	1.18
Teisberg A, Berg G. Gamle medisiner blir aldrig som nye [Old medicines will never be new. In Norwegian]. Norges Apotekerforenings Tidsskrift 1993;4:120-121(Norway).	1.21
Thormodsen M, Fonneløp H, Rytter E, Tørisen HM. Medisinretur som kvalitetsindikator for farmakoterapien – hva bliver til overs? [Returned medicine as a quality indicator for pharmacotherapy – what is left? In Norwegian] Tidsskr Nor Lægeforen 1997;117:3517-20(Norway).	1.30
Tomsen DV, Søndergaard B, Damsgaard TM, Herborg H. Dosisdispensering – et forsøg i Vejle Amt. Del I. Evaluering af resultater og konsekvenser for lægemiddelbrugere og deres behandling samt apotekets indsats ved dosisdispensering af medicin [Dose dispensing – pilot project in Vejle County. Part I. Evaluating the results and consequences for medicine users and their treatment as well as the pharmacy's role. In Danish]. Report 1999, Pharmakon (Denmark).	1.15
van Mil FJW, Dudok van Heel MC, Boersma M, Tromp TDFJ. Interventions and documentation for drug-related problems in Dutch community pharmacies. Am J Health-Syst Pharm 2001;58:1428-31 (Holland).	1.3
Westein MPD, Herings RMC, Leufkens HGM. Determinants of pharmacists' interventions linked to prescription processing. Pharm World Sci 2001;23(3):98-101 (The Netherlands).	1.1
Westerlund T, Almarsdottir AB, Melander A. Drug-related problems and pharmacy interventions in community pharmacies. Int J Pharm Pract 1999;7:40-50 (Sweden).	1.2
Ørkild AM, Møller M, Sobhani S, Mønsted T. Uafhentet medicin [Unclaimed prescriptions. In Danish]. Medicus 1994;7:26-27 (Denmark).	1.5