

HUB-AND-SPOKE DISPENSING MODELS FOR COMMUNITY PHARMACIES IN EUROPE

By: Bernd Rechel

Summary: This article explores experiences in Europe with models of “hub-and-spoke” dispensing for community pharmacies. It finds that one of the most common forms of this type of model is automated “multi-dose dispensing” for older people who take multiple medicines, either in nursing homes or at home. Although now firmly established in the Nordic countries and the Netherlands, evidence on outcomes and costs is limited and does not allow firm conclusions. There is some indication that multi-dose dispensing might reduce overall drug use and improve treatment adherence, but would increase inappropriate drug use and result in fewer changes in drug treatment. Evidence on cost implications is missing so far.

Keywords: Pharmacies, Dispensing, Hub-and-Spoke Dispensing, Multiple Chronic Conditions

Bernd Rechel is Research Officer, European Observatory on Health Systems and Policies, London School of Hygiene & Tropical Medicine, UK. Email: Bernd.Rechel@lshtm.ac.uk

Acknowledgement: This article draws on a rapid response report undertaken by the European Observatory on Health Systems and Policies for the United Kingdom Department of Health and Social Care. The author would like to express his gratitude to Lieven Zwanepoel (Belgian Pharmaceutical Association), Frans Moss (Royal Dutch Pharmacists Association), Johan Waller (Swedish Pharmacy Association), Charlotta Sandler (Association of Finnish Pharmacies) and Michael Jung (Federal Union of German Associations of Pharmacists) for providing detailed information on their countries.

Introduction

The United Kingdom is currently considering the introduction of a “hub and spoke” dispensing model for community pharmacies (see **Figure 1**). In this model, dispensing, which is currently only allowed between pharmacies belonging to the same retail business, would take place across legal entities. Both entities would need to be registered pharmacies, but only the “spoke” pharmacy would be required to have a contract with the National Health Service (NHS). The Department of Health issued a consultation document with the proposed amendments in March 2016.¹

What is “hub-and-spoke dispensing”?

While the term “hub and spoke dispensing” is not widely used outside

the United Kingdom, it is possible to identify relevant experience from other European and non-European countries, in which prescriptions are collected from a “spoke” pharmacy, medication is prepared centrally in a “hub” and then delivered back to the “spoke” pharmacy which dispenses it to the patient. This is sometimes called “centralised dispensing” and is often related to processes of automation (“automated dispensing”) and to attempts to prepare centrally various medications for the same patient (“multi-dose dispensing”).

A 2017 publication on the impact of automation on the pharmacist workforce² identified the following centralised dispensing models:

- Automated multi-dose drug dispensing for older patients in Australia, Denmark, Finland, Norway, Sweden and the Netherlands.
- Selective centralised dispensing for patients with stable chronic conditions in South Africa.

Both of these models follow a “hub-and-spoke” design but are limited to particular groups of patients.

In the first model, these are mainly older people, either in nursing homes or living at home, who take multiple medicines. The medicines are re-packaged automatically into unit-dose bags for each administration. These single dose disposable sachets are labelled with patient data, medicine contents and the date and time for intake.¹ Repackaging is increasingly consolidated at central locations and distributed to the consumer or the local pharmacy for collection.

“Repackaging is increasingly consolidated at central locations”

In the second model, dispensing takes place through a “chronic dispensing unit” within the public health sector in South Africa. This unit was established to maintain medicine supply to people with chronic conditions, including HIV/AIDS. Once patients are stable, the health facility pharmacy sends their prescriptions to the central dispensing unit which makes use of a semi-automated dispensing process. Dispensed medications are sent to the health facility for collection by the patient.

Multi-dose dispensing – experience in Europe

Within Europe, the use of “hub-and-spoke” models thus relates in the first place to multi-dose dispensing to older patients in the Nordic countries and

the Netherlands. This was confirmed by a survey undertaken in 2016 by the Pharmaceutical Group of the European Union in which it asked its country contacts about the existence of inter-company hub-and-spoke models in other EU Member States; 17 responses were received.² Of those, only four countries reported the existence of a “hub-and-spoke” model: Belgium, Denmark, Finland and Germany. However, multi-dose dispensing is also being used in Sweden, Norway and the Netherlands. Some country examples from across Europe are given below.

Belgium

In 2012, a Royal Decree was published describing the conditions for “individual preparation of medication” (IPM) as it is called in Belgium. Since then, community pharmacies exclusively are allowed to de-blister solid oral medicines and to dispense them in weekly dispensers. In the case of automated “individual preparation”, the activity may be outsourced to another community pharmacy. Several pharmacies have developed services for outsourced IPM that are often used for the provision of medication in homes for older people, but rarely in ambulatory care.

Since the providers of automated dispensing are always community pharmacies, there are no real “hubs”. There are about a dozen community pharmacies that provide this service to homes for older people or to other community pharmacies. The provision of automated dose dispensing (ADD) to homes for older people has been driven by economic incentives and the desire to achieve a large scale of medications, with a decrease in price, but also a decrease in quality of care and individual follow-up of patients. While in theory patients are entitled to choose their pharmacy, in reality contracts are negotiated between providers and institutions for older people. Outside of homes for older people, there is no real demand for ADD. Some pilot projects have been initiated, involving home nurses, but these have not been rolled out. The service is not covered by health insurance benefits, but needs to be paid for out-of-pocket.

Germany

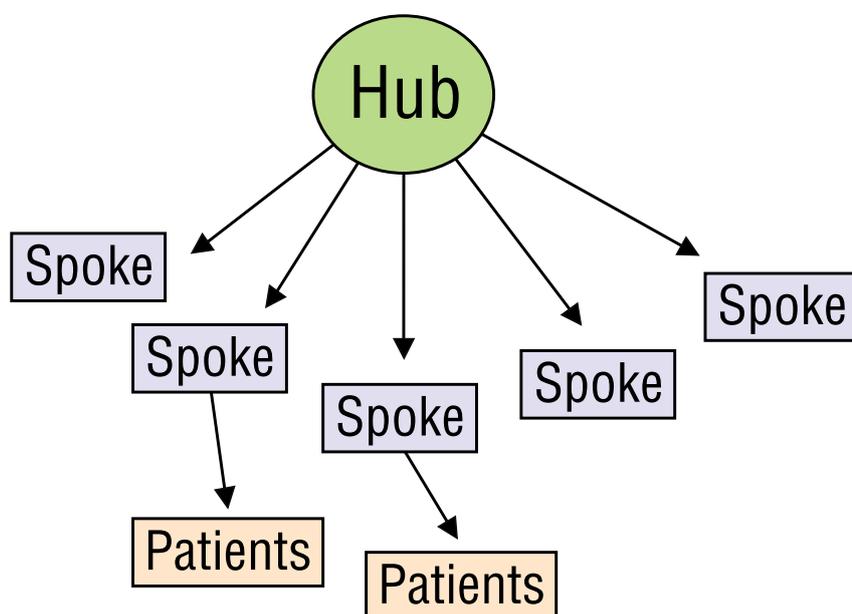
Hub-and-spoke models of dispensing, such as in multidose dispensing for patients receiving multiple medications, are the exception rather than the rule in Germany. There are generally no pharmacy chains, but there are some “hubs” (*Blisterzentren*) which operate industrially, on the basis of contracts with pharmacies which order medicines for their patients according to prescriptions. In general, however, the German legal framework, especially the rules on reimbursement by the Statutory Health Insurance Funds, determines that only complete packages in the officially authorised sizes shall be dispensed to patients. Since 2005, individually prepared dispensing (*patientenindividuelle Verblisterung*) can take place if prescribed by a doctor explicitly and by special exception. It is mainly used in the context of the supply of medicines to nursing homes, with older patients as the main target group, but remains the exception.

Sweden

Already in the 1980s Sweden successively replaced manual repackaging of multi-dose medications from pharmacies with automated multi-dose drug dispensing. The Swedish medicines agency published guidelines on dose dispensing in 2010.³ In fact, Sweden has, per capita, the largest number of patients receiving multi-dose dispensing worldwide.⁴ In 2009, there were 185,000 patients using ADD,⁵ with between 180,000⁶ and 190,000⁷ users in 2011. There are now approximately 200,000 patients receiving multi-dose dispensing (2018). About 35% of them change annually, as many of them are older people who die. About 80% of users in 2011 were 65 years and older; about 40% of users lived in ordinary housing, while about 60% lived in nursing homes.⁸ In 2018 about 50% of recipients of multi-dose dispensing were living at home and 50% were living in nursing homes.

Finland

In Finland, ADD was launched in 2002 and implemented through legislation in 2011. At the end of 2016, there were 49,500 patients using the ADD service.⁹ In Finland, ADD takes predominantly the form of multi-dose dispensing (called “dose dispensing”

Figure 1: Hub-and-spoke dispensing

Source: Author's compilation

in the Finnish context). The Ministry of Social Affairs and Health recommends the ADD service for older patients using primary health care services either at home or in nursing homes to ensure safe medication. Most customers (about 95%) of dose-dispensing, who are either living in nursing homes or at home (approximately equally split between the two locations), are entitled to publicly funded multi-dose dispensing. The remaining 5% of customers must request to have their medications provided in the form of multi-dose dispensing. For them, the service is only reimbursed by the public insurance system for patients aged 75 years and over and using six or more reimbursable prescription medicines that are suitable for ADD. There are plans to change the legislation, so that whoever has a physician prescription for multi-dose dispensing can be reimbursed.

Netherlands

In the Netherlands, both centralised dispensing (such as for repeat prescriptions) and multi-dose dispensing (for patients taking multiple medications) are widely used.⁸ ADD robots can be located in community pharmacies, but more often community pharmacies tend

to purchase this service from a pharmacy that is specialised in ADD.⁹ Responsibility for clinical and accuracy checks lies with the spoke pharmacy, as the hub is not a registered pharmacy, but rather a supply unit.¹⁰ There were 360,000 ADD users in 2011.⁸ The largest provider of automated customised packaging of medications in the Netherlands, including multi-dose drug dispensing (MDD), is the Pharmacy Voorzorg in Limburg, serving approximately 145,000 customers through 540 pharmacies.¹¹

Limited evidence on outcomes and costs

Almost all of the studies on what is termed in the United Kingdom “hub-and-spoke dispensing” relate to ADD services in primary health care in the Nordic countries and the Netherlands. ADD has been introduced to improve medication safety and treatment adherence, particularly in older patients with multiple medications. Additional anticipated benefits are a reduced workload for dispensing staff in pharmacies and nurses administering the medication, and the avoidance of stockpiles of medication at home.⁸

While ADD services in primary health care are widely promoted and used in the Nordic countries and the Netherlands, evidence on outcomes is so far very limited.⁸ A study pointed out in 2014 that there was no conclusive evidence with regard to patient safety and adherence using ADD automated multi-drug use dispensing.⁷ A systematic review of the influence of ADD on the appropriateness of medication use, medication safety, and costs in primary health care published in 2013,⁸ only identified seven relevant studies. None were randomised controlled studies, but four studies used controls. The review concluded that evidence on appropriateness and safety is so far limited, but that overall the few identified studies suggested that patients using ADD have more inappropriate drugs (see below), although ADD may improve medication safety in terms of reducing discrepancies in medication records between GPs and home care services. The review did not identify any studies related to costs.⁸

Overall and inappropriate drug use

A nationwide cohort study of all primary care patients in Finland aged 65 years and older who were enrolled in the ADD service in 2007 (n=2073), with a control group matched by gender, age, area of residence and number of prescription drugs reimbursed, found that overall drug use was decreased after the initiation of the ADD service compared to the controls.⁶

However, ADD may introduce new types of medication errors. A pragmatic randomised controlled study of patients using six community pharmacies in the Netherlands, with 63 patients in the intervention group and 55 patients in the waiting-list group, found a high number of drug-related problems among patients using multi-dose dispensing, as identified by a medication review.¹² Several studies from Sweden have found that patients using ADD are at an increased risk of receiving inappropriate medicines such as long-acting benzodiazepines, anticholinergic medicines, and three or more psychotropic medicines and that there are fewer changes in their

pharmaceutical treatment.^{5, 13–17} This may occur because prescriptions are less likely to be checked and changed.

“ provide services to older people who take multiple medicines ”

Treatment adherence

A study examined self-reported medication adherence and knowledge of older patients (at least 65 years old and taking at least five oral drugs) receiving their drugs via multi-dose drug dispensing (MDD users) with patients receiving manually dispensed drugs (non-MDD users). The study was based on the random selection of 112 MDD users from eight community pharmacies in the Netherlands, with 96 non-MDD users matched on age and gender.¹⁸ The study found that older patients receiving their drugs via MDD reported a higher self-reported medication adherence (81% versus 58%) compared with patients receiving manually dispensed drugs, despite a lower knowledge and lower cognitive function among patients receiving MDD.^{12, 18}

Conclusions

Several countries in Europe have embraced models of “hub-and-spoke” dispensing that are somewhat similar to those anticipated in the United Kingdom. These are in particular the Nordic countries and the Netherlands. However, “hub-and-spoke” dispensing seems to be predominantly used to provide services to older people who take multiple medicines, either at home or, more commonly, in nursing homes. It is known as “multi-dose dispensing” in which medicines are re-packaged automatically into unit-dose bags for each time of administration. Multi-dose dispensing most often takes place for clearly defined groups of patients, often with a minimum age

and a minimum number of prescribed medications; it tends to be reimbursed by the statutory health system.

Although now firmly established in these countries, evidence on outcomes and costs is limited and does not allow for firm conclusions. There is evidence from Finland that found that multi-dose dispensing might reduce overall drug use, but studies in Sweden found an increase in inappropriate drug use and fewer changes in drug treatment. There is also some indication of improved treatment adherence, but so far evidence on cost implications is missing.

References

- ¹ Department of Health. Amendments to the Human Medicines Regulations 2012: ‘Hub and spoke’ dispensing, prices of medicines on dispensing labels, labelling requirements and pharmacists’ exemption. Consultation document. London: Department of Health, 2016.
- ² Spinks J, Jackson J, Kirkpatrick CM, Wheeler AJ. Disruptive innovation in community pharmacy – Impact of automation on the pharmacist workforce. *Res Social Adm Pharm.* 2017;13(2):394–7.
- ³ Cheung KC, van den Bemt PM, Bouvy ML, Wensing M, De Smet PA. Medication incidents related to automated dose dispensing in community pharmacies and hospitals – a reporting system study. *PLoS One.* 2014;9(7):e101686.
- ⁴ Pharmaceutical Group of the European Union. *PGEU Fact Sheet: Hub and spoke.* Brussels: Pharmaceutical Group of the European Union; 2016.
- ⁵ Sinnemaki J, Sihvo S, Isojarvi J, Blom M, Airaksinen M, Mantyla A. Automated dose dispensing service for primary healthcare patients: a systematic review. *Syst Rev.* 2013;2:1.
- ⁶ Waller J. Personal communication, 14 February 2018.
- ⁷ Bardage C, Ekedahl A, Ring L. Health care professionals’ perspectives on automated multi-dose drug dispensing. *Pharm Pract (Granada).* 2014;12(4):470.
- ⁸ Sinnemaki J, Airaksinen M, Valaste M, Saastamoinen LK. Impact of the automated dose dispensing with medication review on geriatric primary care patients drug use in Finland: a nationwide cohort study with matched controls. *Scand J Prim Health Care.* 2017;35(4):379–86.
- ⁹ Moss F. Personal communication, 20 February 2018.
- ¹⁰ National Pharmaceutical Association. *Background paper on automation and Hub and Spoke.* London: National Pharmaceutical Association, 2016.
- ¹¹ Pharmacy Voorzorg. Website Pharmacy Voorzorg. Available at: <https://www.apotheekvoorzorg.nl>

¹² Kwint H-F. *Improving appropriate medication use for older people in primary care, PhD thesis.* Utrecht: Utrecht University; 2013.

¹³ Johnell K, Fastbom J. Multi-dose drug dispensing and inappropriate drug use: A nationwide register-based study of over 700,000 elderly. *Scand J Prim Health Care.* 2008;26(2):86–91.

¹⁴ Sjoberg C, Edward C, Fastbom J, et al. Association between multi-dose drug dispensing and quality of drug treatment – a register-based study. *PLoS One.* 2011;6(10):e26574.

¹⁵ Wallerstedt SM, Fastbom J, Johnell K, Sjoberg C, Landahl S, Sundstrom A. Drug treatment in older people before and after the transition to a multi-dose drug dispensing system – a longitudinal analysis. *PLoS One.* 2013;8(6):e67088.

¹⁶ Sjoberg C, Ohlsson H, Wallerstedt SM. Association between multi-dose drug dispensing and drug treatment changes. *Eur J Clin Pharmacol.* 2012;68(7):1095–101.

¹⁷ Belfrage B, Koldestam A, Sjoberg C, Wallerstedt SM. Prevalence of suboptimal drug treatment in patients with and without multidose drug dispensing – a cross-sectional study. *Eur J Clin Pharmacol.* 2014;70(7):867–72.

¹⁸ Kwint HF, Stolk G, Faber A, Gussekloo J, Bouvy ML. Medication adherence and knowledge of older patients with and without multidose drug dispensing. *Age Ageing.* 2013;42(5):620–6.