

The Utrecht Pharmacy Practice network for Education and Research: a network of community and hospital pharmacies in the Netherlands

Ellen S. Koster · Lyda Blom · Daphne Philbert ·
Willem Rump · Marcel L. Bouvy

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Abstract Practice-based networks can serve as effective mechanisms for the development of the profession of pharmacists, on the one hand by supporting student internships and on the other hand by collection of research data and implementation of research outcomes among public health practice settings. This paper presents the characteristics and benefits of the Utrecht Pharmacy Practice network for Education and Research, a practice based research network affiliated with the Department of Pharmaceutical Sciences of Utrecht University. Yearly, this network is used to realize approximately 600 student internships (in hospital and community pharmacies) and 20 research projects. To date, most research has been performed in community pharmacy and research questions frequently concerned prescribing behavior or adherence and subjects related to uptake of regulations in the pharmacy setting. Researchers gain access to different types of data from daily practice, pharmacists receive feedback on the functioning of their own pharmacy and students get in depth insight into pharmacy practice.

Keywords Pharmacy practice · Research network · The Netherlands · UPPER

Impact of findings on practice

- Practice based research networks (PBRNs) can be useful in pharmacy practice research, to collect data en generate evidence.
- The Utrecht Pharmacy Practice network for Education and Research (UPPER), realizes approximately 600 student internships and 20 research projects each year.

Background

Pharmacy practice is moving away from its focus on compounding and dispensing towards a more patient-focused role [1]. As a consequence of this professional change, pharmacy education at Utrecht University has changed thorough since 2001. At the same time pharmacy practice research became an accepted research area. Pharmacy practice research is necessary to generate evidence for further development of pharmacy services. Pharmacy practice research can be divided in two main themes: (1) research related to the pharmacy as *data source* (e.g. studies regarding prescribing behavior or medication use) or (2) research related to the pharmacy as *object* of research (e.g. studies regarding internal pharmacy procedures, guideline adherence or quality of patient counselling).

Practice based research networks are commonly used within the primary care setting. Next to collecting data for research these PBRNs can also help to implement research outcomes [2]. PBRNs have been described in the US, UK and Canada [3–5]. Most of these networks are linked to universities and facilitate research activities. Differences between networks have been described regarding size and management of the network. In the Netherlands, there are

E. S. Koster (✉) · L. Blom · D. Philbert · W. Rump ·
M. L. Bouvy
UPPER, Division of Pharmacoepidemiology and Clinical
Pharmacology, Faculty of Science, Utrecht Institute of Sciences,
Utrecht University, PO Box 80082, 3508 TB Utrecht, The
Netherlands
e-mail: e.koster@uu.nl

several PBRNs within the primary care setting, however these networks mainly consist of primary care physicians.

Because of the increased emphasis on practice research and to facilitate the students' practical education during internships a network of pharmacists, practicing in community or hospital pharmacies was needed. Two universities in the Netherlands, universities of Utrecht and Groningen, offer education for pharmacists (PharmD degree). In this paper, we describe the network of Utrecht University. In 2004, the department of Pharmaceutical Sciences at Utrecht University founded the UPPER. The network started with community and hospital pharmacists that were involved in student internships (PharmD degree at Utrecht University). Research activities are an obligatory part of these internships. The activities of students include collecting pharmacoepidemiological data and other observational data such as interviewing patients, pharmacy personnel or physicians. Over the years the network was expanded with pharmacies that do not facilitate internships. This paper describes the characteristics, function and output of the UPPER network, a PBRN in pharmacy settings in the Netherlands.

The network

Network participants

In 2004, the network consisted of 1,090 members (437 pharmacy master students and 653 pharmacists working in 604 pharmacies). There are three ways of expanding the network. The first and most important way is that pharmacists request to be added to the network (e.g. because they want to offer internships or want to participate in a specific research project). Each year about 20–30 pharmacists join UPPER for above-mentioned reasons. The second way of expanding the network is natural growth, i.e. when students of Utrecht University (PharmD degree) graduate and those who start working in a pharmacy which is not included in the network yet (about five pharmacies every year). The third way of expansion is when researchers request to subscribe new pharmacies, in order to require information (e.g. medication data for included patients in a study). These pharmacies are then contacted and, when they agree, added to the network. UPPER registers contact information about the participants in a relational database management system (upstage). This database contains additional information on pharmacies participating in student internships. The objective of these data is to facilitate students in selecting a preferred pharmacy for their internship. Pharmacy data are collected both through direct questionnaires and through students that follow internships.

Working procedure UPPER: education (internships)

Pharmacists who offer internships in their pharmacy (a portion of network participants), have to meet our selection criteria. Thereby we distinguish professional selection criteria (concerning the quality and contents of pharmacy services/activities) and selection criteria that represent the educational climate in the pharmacy. Pharmacies that no longer meet either of these criteria are excluded from future educational activities.

Pharmacy students at Utrecht University follow internships in both community and hospital pharmacies affiliated with the UPPER-network. In total, students have 26 weeks of internships, which are distributed over at least two community pharmacies and one hospital pharmacy. During their internships students work on predetermined educational goals and receive feedback from the supervising pharmacist. At the end of the internship, this pharmacist evaluates the student's achieved level. Finally, a lecturer of the department decides whether the student has achieved the predetermined educational goals of this specific internship. In addition, students evaluate their internships by an online survey, in order to provide feedback about their pharmacy experiences to the university, to other students and to the pharmacist involved. This monitor system provides the university feedback about the quality of the educational climate of the pharmacies where student have their internships. Questions concern the feedback they receive from the pharmacy team, the work atmosphere in the pharmacy and are they allowed to spend the time needed for their learning objectives.

Working procedure UPPER: research projects

Because all pharmacies provide potentially important information for research purposes, no pharmacies are excluded from these invitations. Therefore, all pharmacies in the network, including pharmacies that are not involved in internships, can be invited to participate in research. Research projects are generally supervised by researchers from the Department of Pharmaceutical Sciences of Utrecht University. Other parties can make use of the network provided that a researcher from the department is involved in the project.

Before start of a project, a research protocol has to be reviewed by the UPPER Institutional Review Board (IRB). For all projects carried out within the UPPER network involving persons (patients or healthcare providers) at least IRB approval is necessary. For research projects that fall under the scope of the Dutch Medical Research Involving Human Subjects Act (WMO) medical ethical review by an accredited medical ethical research committees is also necessary. The IRB evaluates projects for their importance

Table 1 Overview of network participants: development of the UPPER-network over the years

Network participant	Year 2005		Year 2014		The Netherlands— general
	All participants (N = 608)	Internship providing participants (N = 487)	All participants (N = 1,708)	Internship providing participants (N = 523)	
Community pharmacies	390 (64.1)	338 (69.4)	1,295 (75.8)	228 (43.6)	1,981 ^a
Hospital pharmacies	62 (10.2)	55 (11.3)	79 (4.6)	58 (11.1)	131 ^b
Outpatient pharmacies (in network since 2010)	0 (0)	0 (0)	23 (1.3)	10 (1.9)	68 ^c
Administration-related, governmental, and commercial organizations	107 (17.6)	58 (11.9)	186 (10.9)	118 (22.6)	–
Pharmacies abroad	49 (8.1)	36 (7.4)	125 (7.3)	109 (20.8)	–

^a Website of the Dutch national atlas of public healthcare (Nationale Atlas Volksgezondheid; <http://www.zorgatlas.nl/zorg/eerstelijnszorg/farmaceutische-zorg/aantal-openbare-apotheken-per-gemeente-2011/>, consulted March 3, 2014

^b Website of the Dutch national atlas of public healthcare (Nationale Atlas Volksgezondheid, <http://www.zorgatlas.nl/zorg/ziekenhuiszorg/algemene-en-academische-ziekenhuizen/aanbod/locaties-algemene-en-academische-ziekenhuizen/>, consulted February 28, 2014

^c Website of the Dutch Association of outpatient pharmacies (Nederlandse Vereniging van Poliklinische Apotheken), <http://www.NVPF.nl>, consulted February 28, 2014

and relevance for pharmacy practice, the innovative character, overlap with other on-going or planned projects, feasibility, time and work load for participating pharmacies and quality of the project (methodology). After IRB approval, research projects are announced by e-mail to the pharmacies in the network. After start of the project, the project leader has to inform the IRB regularly (every 6 or 12 months, depending on the total project length) about the project progress. Participation in these projects is voluntary. Feedback about the results of the research projects is provided to the participants through a three-monthly newsletter and the UPPER website. UPPER also provides research tools, such as protocols for selecting and extracting data from the pharmacy dispensing databases, a variety of validated questionnaires and use of an online survey system.

Description of the network

Table 1 presents the number of network participants for the years 2005 and 2014 (current content of network) and the total number of pharmacies in the Netherlands. To date, the majority of the network participants are community pharmacies (n = 1,295, 75.8 %), this is approximately 65 % of the community pharmacies in the Netherlands (1,295/2000). In addition, the network includes 79 hospital pharmacies (4.6 % of the network participants) and several pharmacy-related companies such as administration related organizations (e.g. the Dutch Pharmacovigilance centre Lareb and the Medicines Evaluation Board), professional organizations (e.g. Royal Dutch Pharmacists Society) and commercial organizations (pharmaceutical companies).

Table 2 Student internships in 2012

Internship	Period (weeks)	Students internships (n)
Community pharmacy internship 1	5	154
Community pharmacy internship 2	6	116
Hospital pharmacy internship 1	1	75
Hospital pharmacy internship 2	8	116
Internship student's choice	6	157
Total		618

Activities of network participants

To date, 1,295 community pharmacies in the Netherlands participate in the network, 17.6 % is involved in internships, whilst originally (in 2005) 86.7 % of the community pharmacists were involved in internships (Table 1). The majority (n = 58) of the 79 Dutch hospital pharmacies are involved in students' internships.

In addition to the Dutch pharmacies, 125 hospital or community pharmacies in other countries participate in the network in order to offer students an opportunity to have an internship abroad. In 2012 the network supported over 600 student internships. This high number is a consequence of the large numbers of pharmacy students and the policy to subdivide the total of 26 weeks, in different short lasting pharmacy internships. Table 2 presents an overview of the different internships, organized in 2013.

Yearly, approximately 20 research projects are carried out through the UPPER network. Most research projects are initiated by researchers from Utrecht University, although the network is also regularly used by other researchers (NIVEL, UMCU, University of Groningen).

Table 3 Examples of research activities and output

Project title	Year (start)	Participants	Type of data collection	Output
Antidepressant use: reasons associated with non-acceptance of SSRIs	2005	185 patients in 37 community pharmacies	Patient questionnaire, pharmacy dispensing records	van Geffen et al. [9]
Asthma medication use in children during the first 8 years of life	2006	777 patients within the PIAMA birth cohort	Pharmacy dispensing records	Zuidegeest et al. [10]
Documentation quality in community pharmacy: completeness of electronic patient records	2007	403 patients in community pharmacies	Patient (telephone interview), electronic patient records	Floor-Schreuderling et al. [11]
Efficacy of asthma medication use in children: the PACMAN study	2008	Inclusion of 1,000 pediatric asthma patients in community pharmacies	Pharmacy dispensing records, patient (parent) questionnaire, DNA sample	Koster et al. [12]
Adherence to oseltamivir guidelines during influenza pandemic	2009	361 patients in 19 community pharmacies	Patient questionnaire	Fietje et al. [13]
Patient understanding of drug labels	2010	Four populations of first-generation immigrants: 168 Antilleans, 180 Persians, 155 Surinamese, 188 Turks, 153 first-year pharmacy students (reference)	Patient questionnaire	Koster et al. [14]
NSAID-antihypertensive drug interactions	2011	112 patients in community pharmacies	Patient interview, blood pressure measurement	Floor-Schreuderling et al. [15]
Treatment perceptions towards hormone therapy	2012	37 patients for focus groups, 241 patients for questionnaire study	Online focus groups, pharmacy dispensing records, patient questionnaires	Wouters et al. [16, 17]
Adherence to national recommendations for safe methotrexate dispensing	2012	Community pharmacy staff in 78 pharmacies: 95 pharmacists, 337 technicians	Structured interviews, pharmacy dispensing records	Koster et al. [8]
Prescribing with indication: uptake of regulations in practice and patients opinions	2012	528 patients in 57 community pharmacies	Structured patient interviews, pharmacy dispensing records	Holsappel et al. [18]
Reporting of adverse effects in hospitals	2012	30 hospital pharmacies	Reports of adverse drug effects	±50 reports submitted and entered into LAREB database

Examples of completed research projects carried out within the network are listed in Table 3. To date, most research has been performed in community pharmacy and research questions frequently concerned prescribing behavior, patient counseling and adherence. But also uptake of regulations or adherence to specific guidelines in the pharmacy setting were research themes.

Strength and weakness of the network

The overview presented in this paper shows that the UPPER network successfully facilitates internships for pharmacy students and research activities. Many research projects have been facilitated by the participating pharmacies in the network, however, some barriers may exist.

First of all, for some of the research projects initiated within the network it is difficult to find participating pharmacies. This barrier is shared with other research networks. A survey carried out among Australian pharmacists to determine their attitudes towards pharmacy practice research and their involvement in research activities showed that pharmacists acknowledge the value of practice research for the pharmacy profession, however, only few actually participated in research [6]. Results from a Canadian study confirmed this finding. Pharmacists are interested in participating in practice based research networks, however they are not always aware of the opportunities to participate in research activities [7]. Besides this, there may be other reasons for not participating in research projects as the study of Peterson et al. [6] showed that lack of time and no personal interest were also frequently

mentioned. We believe these are also important reasons for non-participation in the UPPER network. To overcome these barriers, first of all, the selection of research topics that appeal to network participants is very important. Therefore, recently a consultative group consisting of both community and hospital pharmacists, researchers and members of the Royal Dutch Pharmaceutical Society has been established, to provide us with new ideas for research and education that connect with the current needs of the work field.

Second, good communication is a basic condition for the success of a well-functioning (pharmacy practice) research network. Pharmacists in the UPPER network are invited to participate in research by various channels such as e-mail, telephone and the UPPER newsletter. Many projects are carried out by the researchers themselves or students (during internships) which limits the (time) burden for participating pharmacists, this should be emphasized in communications. Furthermore, pharmacists could be encouraged to participate by rewarding them. Within the UPPER network, researchers are urged to give feedback to participating pharmacists both on an individual basis (sometimes with benchmarks), through research updates in the UPPER newsletter and occasional symposia. In addition, pharmacists who are involved in educational activities (internships for pharmacy students) are regularly invited for student symposia or other educational activities at Utrecht University. In addition, a member of staff can visit a pharmacy to assess if a pharmacy still fulfills the criteria for training of students. UPPER aims to continuously improve communication between UPPER staff and network participants. Furthermore, in the future, the UPPER network could also be more effectively used to implement results of research outcomes (e.g. interventions for specific patient groups) or new guidelines.

As shown in the overview with examples of completed projects most projects were carried out within the community pharmacy setting. This is partly related to the fact that community pharmacies are small organizations with less management layers than in hospitals. Especially independent community pharmacists can decide whether they want to participate in a project, whereas hospitals often have internal procedures to approve research protocols. Moreover hospitals often have a specified research agenda and projects have to be approved by the local or regional committee, whilst for individual community pharmacies UPPER institutional review approval fulfills. Another reason might be the underestimation of and limited experiences with pharmacy practice research in hospital pharmacy practice.

We believe our practice based network is a good representation for the Dutch pharmacy. To ensure good educational quality, pharmacies that are involved in educational activities have to meet certain selection

criteria, however for other network participants these strict criteria do not apply. Therefore, we do not believe this hamper generalizability of results of research as only a proportion of the network is involved in educational activities. It is reasonable to assume that network participants are perhaps be more motivated or committed to guideline implementation than pharmacists not involved in the network. However, as shown in previous studies conducted through our network, general characteristics of the participating pharmacies are similar to pharmacies in the Netherlands in general [8].

Conclusion

In conclusion, the UPPER network of pharmacies has become an established education and research tool that has added value for all network participants. Researchers have the opportunity to obtain different types of data, pharmacies can be involved in research activities, receive input on the functioning of their own pharmacy. Students get in depth insight into pharmacy practice during internships and are involved in pharmacy practice research activities. Therefore, this network is a valuable synergy and provides us with many opportunities for research.

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Conflicts of interest No conflicts of interest to declare.

References

1. van Mil JW. Pharmaceutical care in community pharmacy: practice and research in the Netherlands. *Ann Pharmacother.* 2005;39(10):1720–5.
2. Mays GP, Hogg RA, Castellanos-Cruz DM, Hoover AG, Fowler LC. Public health research implementation and translation: evidence from practice-based research networks. *Am J Prev Med.* 2013;45(6):752–62.
3. Marinac JS, Kuo GM. Characterizing the American college of clinical pharmacy practice-based research network. *Pharmacotherapy.* 2010;30(8):865.
4. Goode JV, Mott DA, Chater R. Collaborations to facilitate success of community pharmacy practice-based research networks. *J Am Pharm Assoc (2003).* 2008;48(2):153–62.
5. Pruchnicki MC, Rodis JL, Beatty SJ, Clark C, McAuley JW, Mehta BW, et al. Practice-based research network as a research training model for community/ambulatory pharmacy residents. *J Am Pharm Assoc (2003).* 2008;48(2):191–202.
6. Peterson GM, Jackson SL, Fitzmaurice KD, Gee PR. Attitudes of Australian pharmacists towards practice-based research. *J Clin Pharm Ther.* 2009;34(4):397–405.
7. Hebert J, Laliberte MC, Berbiche D, Martin E, Lalonde L. The willingness of community pharmacists to participate in a practice-based research network. *Can Pharm J (Ott).* 2013;146(1):47–54.

8. Koster ES, Walgers JC, van Grinsven MC, Winters NA, Bouvy ML. Adherence to national recommendations for safe methotrexate dispensing in community pharmacies. *J Manag Care Pharm.* 2014;20(2):194–200.
9. van Geffen EC, van Hulten R, Bouvy ML, Egberts AC, Heerdink ER. Characteristics and reasons associated with nonacceptance of selective serotonin-reuptake inhibitor treatment. *Ann Pharmacother.* 2008;42(2):218–25.
10. Zuidegeest MG, Koster ES, Maitland-van der Zee AH, Smit AH, Brunekreef B, Leufkens HG, et al. Asthma therapy during the first 8 years of life: a PIAMA cohort study. *J Asthma.* 2010; 47(2):209–13.
11. Floor-Schreuderling A, De Smet PA, Buurma H, Egberts AC, Bouvy ML. Documentation quality in community pharmacy: completeness of electronic patient records after patients' first visits. *Ann Pharmacother.* 2009;43(11):1787–94.
12. Koster ES, Raaijmakers JA, Koppelman GH, Postma DS, van der Ent CK, Koenderman L, et al. Pharmacogenetics of anti-inflammatory treatment in children with asthma: rationale and design of the PACMAN cohort. *Pharmacogenomics.* 2009;10(8):1351–61.
13. Fietje EH, Philbert D, van Geffen EC, Winters NA, Bouvy ML. Adherence to oseltamivir guidelines during influenza pandemic, the Netherlands. *Emerg Infect Dis.* 2012;18(3):534–5.
14. Koster ES, Blom L, Winters NA, van Hulten RP, Bouvy ML. Interpretation of drug label instructions: a study among four immigrants groups in the Netherlands. *Int J Clin Pharm.* 2014;36(2):274–81.
15. Floor-Schreuderling A, Smet PA, Buurma H, Kramers C, Tromp PC, Belitser SV, et al. NSAID-antihypertensive drug interactions: which outpatients are at risk for a rise in systolic blood pressure? *Eur J Prev Cardiol.* 2013; september 16 [Epub ahead of print].
16. Wouters H, van Geffen EC, Baas-Thijssen MC, Krol-Warmerdam EM, Stiggelbout AM, Belitser S, et al. Disentangling breast cancer patients' perceptions and experiences with regard to endocrine therapy: nature and relevance for non-adherence. *Breast.* 2013;22(5):661–6.
17. Wouters H, Maatman GA, Van Dijk L, Bouvy ML, Vree R, van Geffen EC, et al. Trade-off preferences regarding adjuvant endocrine therapy among women with estrogen receptor-positive breast cancer. *Ann Oncol.* 2013;24(9):2324–9.
18. Holsappel IG, Koster ES, Winters NA, Bouvy ML. Prescribing with indication: uptake of regulations in current practice and patients opinions in the Netherlands. *Int J Clin Pharm.* 2014; 36(2):282–6.