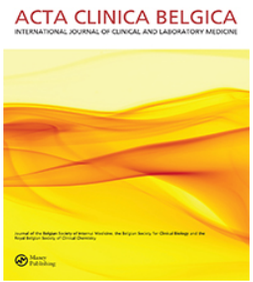

Acta Clinica Belgica
International Journal of Clinical and Laboratory Medicine

ISSN: 1784-3286 (Print) 2295-3337 (Online) Journal homepage: http://www.tandfonline.com/loi/yacb20

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To cite this article: A. Somers, A. Spinewine, I. Spriet, S. Steurbaut, P. Tulkens, J. D. Hecq, L. Willems, H. Robays, M. Dhoore, H. Yaras, I. Vanden Bremt & M. Haelterman (2018): Development of clinical pharmacy in Belgian hospitals through pilot projects funded by the government, Acta Clinica Belgica, DOI: 10.1080/17843286.2018.1462877

To link to this article: https://doi.org/10.1080/17843286.2018.1462877

ACTA CLINICA BELGICA, 2018
https://doi.org/10.1080/17843286.2018.1462877

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ORIGINAL PAPER

Development of clinical pharmacy in Belgian hospitals through pilot projects funded by the government

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ABSTRACT

Objectives: The goal is to develop clinical pharmacy in the Belgian hospitals to improve drug efficacy and to reduce drug-related problems.

Methods: From 2007 to 2014, financial support was provided by the Belgian federal government for the development of clinical pharmacy in Belgian hospitals. This project was guided by a national Advisory Working Group. Each funded hospital was obliged to describe yearly its clinical pharmacy activities.

Results: In 2007, 20 pharmacists were funded in 28 pilot hospitals; this number was doubled in 2009 to 40 pharmacists over 54 institutions, representing more than half of all acute Belgian hospitals. Most projects (72%) considered patient-related activities, whereas some projects (28%) had a hospital-wide approach. The projects targeted patients at admission (30%), during hospital stay (52%) or at discharge (18%). During hospital stay, actions were mainly focused on geriatric patients (20%), surgical patients (15%), and oncology patients (9%). Experiences, methods, and tools were shared during meetings and workshops. Structure, process, and outcome indicators were reported and strengths, weaknesses, opportunities, and threats were described. The yearly reports revealed that the hospital board was engaged in the project in 87% of the cases, and developed a vision on clinical pharmacy in 75% of the hospitals. In 2014, the pilot phase was replaced by structural financing for clinical pharmacy in all acute Belgian hospitals.

Conclusion: The pilot projects in clinical pharmacy funded by the federal government provided a unique opportunity to launch clinical pharmacy activities on a broad scale in Belgium. The results of the pilot projects showed clear implementation through case reports, time registrations, and indicators. Tools for clinical pharmacy activities were developed to overcome identified barriers. The engagement of hospital boards and the results of clinical pharmacy activities persuaded the government to start structural financing of clinical pharmacy.

KEYWORDS
Clinical pharmacy; patient safety; hospital pharmacist; national pilot project; indicators

Introduction

Clinical pharmacy is defined as the provision of patient-oriented pharmaceutical care, with the goal to maximize drug efficacy and to minimize drug harm by preventing drug-related problems [1,2]. In hospitals, clinical pharmacists are active on the wards, where they analyze the patients' pharmacotherapy having full access to medical and laboratory data. They recommend drug therapy changes with regard to efficacy, safety, costs, and patients' preferences, and answer questions concerning drugs. Clinical pharmacists can also be implicated in medication reconciliation, patient counseling, and education of other health care providers.

In practice, clinical pharmacy is patient-oriented, and is closely connected to the centralized pharmacotherapy policy of the hospital elaborated by the Pharmacy & Therapeutics Committee, the Antibiotic Stewardship Program, and several other committees such as the patient safety team.

The application of clinical pharmacy activities has changed the pharmacy profession from a traditional drug-oriented perspective toward a patient-centered

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approach [3–5]. Although clinical pharmacists guide the pharmaceutical care process to manage the patient's drug therapy in everyday clinical practice, the physician takes the ultimate responsibility for the pharmacotherapeutic care of the patient. Therefore, clinical pharmacists work in close collaboration with physicians, nurses, and other caregivers.

In 2004, the Belgian association of hospital pharmacists requested the federal government to finance pilot projects for the development of clinical pharmacy, based on the positive experience of a few teaching and non-teaching hospitals in Belgium. At the same time, the Belgian Government funded pilot projects on clinical risk assessment and patient safety in some hospitals, in which the added value of clinical pharmacy in terms of improved patient outcomes was demonstrated. Besides, evidence on cost reduction related to clinical pharmacy activities was gathered and reported to the government. In 2006, the government agreed to start up funded clinical pharmacy projects and dedicated an amount for the salary of 20 full-time hospital pharmacists within the hospital budget. In July 2007, this budget for starting up pilot projects was liberated and a national Advisory Working Group on Clinical Pharmacy (AWG-CP) was started. This group consisted of members of the Belgian Government and practicing clinical pharmacist, pharmacologists and physicians. They were responsible for the selection, evaluation, and guidance of the pilot projects and for reporting the results to the government.

All acute and psychiatric hospitals in Belgium (209 hospitals in 2007) were informed about the pilot projects and could apply for a full-time or half-time clinical pharmacist. Out of 80 submissions, 28 hospitals were selected. Criteria for selection were a multidisciplinary approach, patient-oriented interventions, seamless pharmaceutical care, documentation of interventions, and support by the hospital board and the Medical Council of the hospital. Two years later, the positive outcomes thus far resulted in an increased budget for the pilot projects toward 54 hospitals.

The goals of this paper are to give detailed information on the organization of clinical pharmacy services by describing and discussing 1) the type and organization of the pilot projects, 2) the guidance and tools provided by the AWG-CP to the pilot projects, and 3) the vision of the federal government on clinical pharmacy.

Method

From 2007 to 2014, each funded hospital yearly described its clinical pharmacy activities by means of an activity report, case reports, and indicators. The AWG-CP elaborated the template for these reports and evaluated yearly for each pilot project further financing.

The clinical pharmacy projects were analyzed descriptively by type of activity and implicated hospital wards, implicated staff, collaboration with other health care providers within the hospital, developed indicators as well as the changed role of the hospital pharmacist, the vision of the government upon this altered position and possible barriers for development of clinical pharmacy. Each year, the AWG-CP provided recommendations for future development for each hospital, and made a summary of the main results which was provided to the government.

The type of activity for the clinical pharmacist was divided into ward-specific versus hospital-wide service, both implicating projects concerning:

- Medication reconciliation upon admission/discharge
- Medication review of chronic (poly)pharmacy
- Chart review of (acute) pharmacotherapy during hospital stay
- Elaboration or follow-up of pharmacotherapeutic guidelines for specific drugs or specific patient groups
- Education of patients and/or healthcare professionals

Furthermore, the guidance by the AWG-CP was described as well as the developed tools for reporting and evaluation of clinical pharmacy activities.

Results

In 2007, 13 and 15 hospitals received financial support for a full-time and half-time clinical pharmacist, respectively, taking into account the difference in size of the Belgian hospitals (varying from around 200 beds toward almost 2000 beds). In 2008, two projects with half-time clinical pharmacists were stopped, one by the hospital itself, and one after discussion with the AWG-CP. In 2009, funding was enlarged to another 11 hospitals with a full-time and 17 hospitals with a half-time clinical pharmacist. In total, clinical pharmacy projects were started in 54 of the 112 Belgian hospitals, including general, psychiatric, long-term care and university hospitals. A total of 40 full-time equivalent hospital pharmacists were financed by the government between 2009 and 2014. In 74% of the involved hospitals, additional personnel was recruited in order to organize a pilot project, in most cases a hospital pharmacist.

Table 1 represents a time-line including the different steps of activity reports and evaluations, as well as the meetings that were organized for pilot hospitals.

Type and organization of the pilot projects

For the first 28 pilot projects, the activity concerned clinical pharmacy services for geriatric patients, drug information about medicines on admission and at discharge, drug information to patients and nurses, assessment of nutritional status of the patient, and recommendations concerning nutritional support, and follow-up of specific drugs or drug-related problems [6].

Table 1. Time-line with the different steps of the financed pilot projects, accompanied with the elements of the obligatory activity report.

Year	Project steps	Activity report
2007	Start of project – allocation of budget (1.250.000 EUR) Selection of 28 pilot projects & kick-off meeting Interim activity report (07/2007–12/2007)	Registration of interventions 10 case reports
2008	Interim activity report (01/2008–05/2008) Infosession of the Advisory Working Group on Clinical Pharmacy Report 2008 for the government (07/2007–12/2008)	Registration of interventions 10 case reports
2009	Enlarged activity reporting for each pilot project Analysis of activities by the Advisory Working Group on Clinical Pharmacy Second budget allocation (2.500.000 EUR)	Registration of interventions 3 case reports, 3 time registrations
2010	Selection of 28 additional pilot projects Follow-up meeting with 10 hospitals for assistance Article in newsletter	Registration of interventions 4 case reports, 4 time registrations
2011	Follow-up meeting with 11 hospitals for assistance Article in newsletter Report 2011 for the government	Registration of interventions 4 case reports, 4 time registrations
2012	Follow-up meeting with hospitals for assistance Clinicamp I (workshops and exchange of information) Article in newsletter	Registration of interventions 4 case reports, 4 time registrations
2013	Enlarged activity reporting for each pilot project Clinicamp II (workshops and exchange of information) Analysis of all case reports, definition of standard indicators	Registration of interventions, case reports, time registrations, indicators, self-appraisal
2014	Analysis of activities by the Advisory Working Group on Clinical Pharmacy Clinicamp III (workshops and exchange of information) End of pilotprojects and start of structural financing	Registration of interventions, case reports, time registrations, indicators, self-appraisal

Table 2. Type of activities of clinical pharmacy projects (main activity concerned).

Nr	Activity	Description	Type	Focus	% of projects
1	Admission	Medication reconciliation, substitution, electronic recording	Ward-specific	Patients	29.7
2	Guidelines	Pharmacotherapeutic guidelines and pharmacotechnical informations	Hospital-wide	Drug process	21.5
3	Discharge	Medication reconciliation, counseling, drug schemes, discharge letters, resubstitution	Ward-specific	Patients	15.8
4	Chart & medication review	Review of drugs upon and during hospital stay	Ward-specific	Patients	10.0
5	Education and communication	Training about drugs/the drug process inside and outside the pharmacy	Hospital-wide and ward-specific	Healthcare practitioners	9.0
6	Review of specific drugs	Review of specific drug classes: antibiotics, anticoagulants, nutrition,…	Hospital-wide and ward-specific	Patients	7.7
7	Medication errors	Reporting and analysis of medication errors, preventive actions	Hospital-wide	Drug process	3.3
8	Drug process	Redesign of the (different steps of the) drug process	Hospital-wide	Drug process	1.9
9	Electronic prescribing	Clinical decision support for safe electronic drug prescribing	Hospital-wide	Drug process	0.5
10	Prescription validation	Pharmaceutical validation of prescriptions	Hospital-wide	Patients	0.5

The type of activities reported in 2014 were divided into ward-specific or hospital-wide (Table 2). Most projects (72%) concerned a patient-related activity on one or several wards, whereas some projects (28%) had a hospital-wide approach. The patient-related projects considered activities at admission including medication reconciliation and medication review (30%), and activities at discharge (16%) including patient counseling and transfer of information about discharge medicines and important treatment changes during hospital stay. Furthermore, there were activities focusing on chart review during hospital stay (10%) and specific drug use evaluations (8%). The hospital-wide activities concerned elaboration of guidelines for specific drugs (e.g. anti-infectives, nutrition, anticoagulants,…) or for specific drug use (e.g. crushing drugs, dose adjustments in renal failure,…) (22%), information for healthcare providers within the hospital (9%), and drug-related problems or medication errors (3%).

The patient-related projects focused mainly on geriatric patients (20%), surgical patients (15%), oncology patients (9%), and patients at internal wards (7%). The clinical pharmacy activities took place at hospital admission (30%), during hospital stay (52%), and at discharge (18%).

A total of 85% of the hospitals reported that the clinical pharmacist had access to the medical patient file, and 13% seemed to have 'limited' access'. In 60% of the hospitals, the medical patient file was reported to be electronic. A large number of hospitals (75%) reported that the clinical pharmacist could record their interventions into the electronic patient file; 15% reported that

Table 3. Recommended indicators by the advisory working group on clinical pharmacy.

	Numerator	Denominator	Examples
Structural indicators	Number of full-time equivalents pharmacists (funded by Belgian government)	Total number of full-time equivalents clinical pharmacists	
	Number of full-time equivalents clinical pharmacists	Total number of full-time equivalents hospital pharmacists	
Process indicators	Number of screened patients	Number of admissions	Medication reconciliation
	Number of screened patients	Number of patient days	Chart & medication review
	Number of screened patients	Number of discharges	Discharge counseling
	Number of screened prescriptions	Total number of prescriptions	Chart & medication review Prescription validation
	Number of screened situations (specific for the project)	Total number of situations (specific for the project)	IV/PO switch, review of specific drugs (e.g. antibiotics)
Outcome indicators	Number of (accepted) recommendations	Number of screened patients	All types of projects
	Number of (accepted) recommendations	Number of screened drugs	
	Number of (accepted) recommendations	Number of screened situations (specific for the project)	

this was possible 'sometimes'. In 53% of the hospitals, the clinical pharmacist could record recommendations into the medical patient file.

In most of the hospitals (77%), the pilot projects were carried out by pharmacists combining clinical activities with the regular hospital pharmacy activities (e.g. by sharing the clinical pharmacy activities among several pharmacists). In 4 of the 54 hospitals, pharmacy technicians were also engaged into the project, mostly for projects related to medication reconciliation. The hospitals reported that in 70% of cases, the clinical pharmacist was able to realize clinical pharmacy activities on a continuous basis. In 30% of the hospitals, there was discontinuation of the project due to the absence or leave of the clinical pharmacist without replacement, or due to other important projects that had a higher priority ranking.

In the activity reports, a registration of time investment was requested several times per year, whereby the hospital pharmacists had to report the time dedicated to activities for individual patients (e.g. medication reconciliation, medication review), for the hospital ward(s) (i.e. education session for nurses, writing of a protocol), for the other hospital pharmacy activities, and for education and training (e.g. for pharmacy trainees). From 2009 until 2013, there was an increase in patient-related activities, from 40% to 45%, and a decrease in hospital-related activities, from 40% to 35%.

Guidance and tools provided by the government to the pilot projects

When starting the clinical pharmacy projects in 2007, the government decided that a national AWG-CP was responsible for the selection and follow-up of the pilot projects. This working group yearly discussed the activity reports by means of a standardized form (organization, strengths, and weaknesses of the project, points for improvement,...). All activity reports were first revised independently by two members of the working group and were then discussed plenary. The pilot projects were classified as A = OK, B = modifications are needed or C = not OK. In case of a B-report, the hospital had to motivate why clinical pharmacy was not well installed and which modifications should be made. In case of a C-report, the hospital was invited to discuss the activity report with the members of the AWG-CP, and the financing of the pilot project was stopped in some cases.

In order to enhance the development of clinical pharmacy, the AWG-CP organized so called Clinicamp meetings, to disseminate experience through workshops and lectures. Both methodological and pharmacotherapy-related aspects were discussed in these Clinicamp meetings, yearly attended by around 120 pharmacists of the involved pilot hospitals. Exchange of tools, posters, methods, references,… was possible at the meetings and also by means of the website.

Since 2012, the hospitals were requested to develop indicators to measure their clinical pharmacy activities. This was primarily meant for the hospitals themselves, in order to follow-up the activities, but also for future comparison of similar projects across different hospitals in Belgium. It was recommended by the AWG-CP to take into account structure, process, and outcome-related indicators. A lot of indicators were reported by the hospitals in the activity report, which were commented by the AWG-CP in order to optimize feasibility and validity. In 2013, a template of recommended indicators was developed by the AWG-CP (Table 3).

Furthermore, the activity report had to be completed with a SWOT (strengths, weaknesses, opportunities, and threats) analysis for the clinical pharmacy activities [7]. This way, the pilot hospitals were encouraged to reflect upon barriers and facilitators for clinical pharmacy and to discuss the vision and future development needed both within the pharmacy and within the hospital.

In 2013, the form for case reports was changed, since the AWG-CP had difficulties for the interpretation and the assessment of the clinical relevance of these case reports. In around 10% of the cases, information was lacking (e.g. medical history of the patient, laboratory data, role of the pharmacist). Therefore, it was decided to use a structured format to report the cases, which comprises subjective and objective data (e.g. request of the pharmacist to review the patient's medicines, and

e.g. medical and laboratory data), as well as the analysis (e.g. underlying drug-related problem), and the plan of action (e.g. change drug and follow-up).

The majority of the hospitals (89%) reported that the clinical pharmacist was integrated into the clinical team. They reported collaboration with the local patient safety team (92%), the quality coordinator (89%), and the internal geriatric team (43%). In 64% of the hospitals with activities during admission, the clinical pharmacist was present at least once per week in the multidisciplinary meetings on the ward. Moreover, the clinical pharmacist seemed to be involved in the development of electronic prescribing systems (92%), seamless care (77%), elaboration of guidelines, and clinical pathways (55%). In 85% of the projects, additional clinical pharmacy services were also started next to the financed projects, and 96% of the hospitals reported that other medical disciplines had requested clinical pharmacy activities to be initiated.

A total of 43% of the hospitals reported that the recommendations of the clinical pharmacist were always or nearly always recorded, and another 22% reported this was sometimes the case. In the comments of the reporters, we could sometimes read that not all recommendations were recorded since they were provided during the ward round or the multidisciplinary meeting and already accepted by the physicians. Furthermore, the acceptance of the recommendations was followed up in 69% of the pilot projects.

Indicators that were measured included the percentage of clinical pharmacists within the hospital pharmacy, the percentage of patients that could benefit of the provided clinical pharmacy activities, the acceptance of the recommendations, and the percentage of resolved unintended discrepancies during medication reconciliation.

Each year, the activity report had to be signed by the hospital director, the head of the Medical Council, the president of the Pharmacy & Therapeutics Committee, and the chief pharmacist. It was asked that the activity report would be discussed within the Medical Council and the Pharmacy & Therapeutics Committee, in order to increase the awareness and to discuss the progression of clinical pharmacy. The activity reports revealed that the hospital board was engaged in the project in 87% of the cases, and developed a vision on clinical pharmacy in 75% of the hospitals. In 87% of these, a vision on clinical pharmacy was developed within the pharmacy itself.

Vision of the government on clinical pharmacy

Different interim reports for the federal authority were made based on the main results of the activity reports. Items reported concerned: involvement of the pharmacist in the multidisciplinary team, vision of the hospital on clinical pharmacy, and main results of the SWOT analysis.

A summary of the SWOT analyses led to the following general conclusions: 1) clinical pharmacy cannot be managed by one single pharmacist, it has to be performed by a team, 2) the main task of the hospital pharmacy is to offer safe, qualitative, and economically sound pharmaceutical care, 3) lack of drug information and communication is the main source for drug-related problems, 4) there is no simple and clear instrument to measure the added-value of clinical pharmacy activities, and 5) the pilot projects seem to have brought a change into the vision on the hospital pharmacy profession.

Based on the summary report of the pilot projects, the federal authority decided to stop the pilot projects in July 2014, and to provide structural financing for clinical pharmacy in all non-psychiatric Belgian hospitals, that would be further accompanied by the AWG-CP. Financing of 0.25 FTE pharmacist is provided for every 200 hospital beds, with further follow-up by means of a yearly activity report.

In 2015, a new report was submitted to the federal government, with a vision for clinical pharmacy development, and a plan of action for the next five years. It was stated that clinical pharmacy should be further developed in hospitals under supervision of the Pharmacy & Therapeutics Committee, focusing on four areas:

- Providing optimal and safe pharmacotherapy to patients
- Ensuring seamless pharmaceutical care at transition moments
- Developing, maintaining, and increasing pharmacotherapeutic knowledge
- Developing adequate communication skills

The plan of action for 2015–2020 consists of five different steps, and one theme is added every year:

- 2015: ensuring the basic conditions for the implementation of clinical pharmacy
- 2016: developing a structured method for drug history taking, registration, and communication of the medication scheme upon admission and at discharge
- 2017: applying clinical pharmacy for (a) specific patient group(s) and/or therapies
- 2018: performing risk assessment for patient groups
- 2019: performing risk assessment for pharmacotherapeutic classes/pathologies
- 2020: assessing the 5 years of structural clinical pharmacy

Discussion

The financed pilot projects for clinical pharmacy were both a challenge and an opportunity to develop this activity in Belgian hospitals. The number of hospital pharmacists in Belgium is very limited (1 per 150 beds), but postgraduate education and continuous professional development have evolved substantially over the last 10 years. Almost half of the Belgian hospitals

could develop clinical pharmacy activity through the pilot projects. A total of 40 full-time equivalents pharmacists were financed and provided a unique opportunity to launch clinical pharmacy on a large scale.

It is interesting to see that 70% of the projects concerned patient-related projects, which was in fact the aim of the pilot projects. Of course, hospital-wide improvements in the drug process, the elaboration of guidelines or specific drug use evaluations are very useful, but the real aim of the initiative was to gain experience with pharmacist coming out of their pharmacies and giving recommendations next to the bed of the patient.

The clinical pharmacist seemed to be well integrated in the multidisciplinary team (89%), and it is also positive to notice that in 85% of the projects, additional clinical pharmacy services were started next to the financed projects. In three out of four hospitals (77%), the clinical pharmacy activities were divided among multiple pharmacists, meaning that in the majority of hospitals clinical activities were combined with the regular hospital pharmacy activities. This way, a possible gap between the 'clinical' pharmacist and the 'hospital' pharmacist can be avoided.

The activity reports showed that the hospital boards and other health care providers within the hospitals noticed the activities of the clinical pharmacist, and that many hospitals already had developed a vision on this activity within their institution. Together with the improved education in clinical pharmacy, the structured financing of clinical pharmacy has led to a changed role of the pharmacist in Belgian hospitals. The hospital pharmacist is no longer only a provider of medicines, but has developed toward a provider of pharmaceutical care.

Despite the positive evolution, some points of attention should although be highlighted. First, only in 74% of the involved pilot hospitals, extra personnel was recruited. Possibly, clinical pharmacy activities were already ongoing, or other activities were replaced by clinical pharmacy, but might also be that clinical pharmacy was not properly carried out. Furthermore, it is also possible that despite the structural financing no clinical pharmacist is engaged in some hospitals.

Secondly, it seemed that in 13% of the pilot projects, the pharmacist had 'limited' access to the medical file, and in 25%, the pharmacist could not record interventions into the medical file. Only in half of the hospitals, the pharmacist could record recommendations into the medical file. These items are considered to be 'basic conditions' for applying clinical pharmacy services, and are therefore taken as the first theme of the plan of action elaborated by the government.

Several remarks can be made when interpreting the results. First, we have to state that evaluating the clinical pharmacy activities in a large set of hospitals with mostly inexperienced pharmacists was difficult. There were attempts to develop sound reporting tools, and to organize meetings to exchange experiences, with an AWG-CP readily available to answer questions and to give recommendations to improve the projects. However, it would probably have been preferable that experienced clinical pharmacists would have provided on-site audits in order to monitor closely the pilot projects, e.g. by accompanying the clinical pharmacists during several days on their workplace in each pilot hospital. By doing so, methodological support would have been more efficient. Second, it was not possible to study the impact of the clinical pharmacy projects on the quality of prescribing as the recommendations are depending on different aspects such as the drug process, the knowledge of physicians/nurses, the availability of data for the clinical pharmacist, and the type of patients. Assessing the impact of clinical pharmacy was not the aim of the AWG-CP, but especially since the enlargement of the project in 2010, a more extensive reporting of the activities was demanded, as well as the description and results of the indicators used to measure the activities. We would advise to define clear key performance indicators at the start of a clinical pharmacy project, preferably outcome indicators, and to measure these indicators on a regular basis, as well as to measure the clinical and economic impact of recommendations periodically. Third, we must recognize that the hospitals applying for a clinical pharmacy project were probably the most eager to start this activity, and it is even possible that in some hospitals that did not participate in the pilot project phase, no clinical pharmacy will be started although they receive structural financing.

Overall, we must recognize that there was a lot of positive attention from the hospital pharmacists on the pilot projects, with interesting case reports, SWOT analyses, and performance indicators. Although we cannot demonstrate that the clinical pharmacist positively contributes to more appropriate and safer pharmacotherapy, we are convinced that clinical pharmacy added a new dimension toward the hospital pharmacy profession in Belgium, which should be further explored by studying the clinical and economic impact on patient care.

Conclusion

The pilot projects in clinical pharmacy funded by the federal government provided a unique opportunity to launch clinical pharmacy activities on a broad scale in Belgium. The Advisory Working Group on Clinical Pharmacy elaborated and evaluated the activity reports in order to obtain information with regard to the developed clinical pharmacy services, and organized meetings in order to disseminate experience. The pilot projects enabled hospital pharmacists in Belgium to demonstrate the added-value of the hospital pharmacist which led to structural financing of clinical pharmacy in Belgium. Although this structural financing remains limited for each hospital, it meant a start to define, document, evaluate, and visualize clinical pharmacy activities. The benefits of clinical pharmacy should further be proved,

and this should, together with new opportunities, lead to its extension in the near future.

Acknowledgments

Minister of health, Laurette Onkelinx (2007–2014) and Maggie De Block (2014). Director-General Healthcare at Federal Public Service Health, Food Chain Safety and Environment: Christiaan Decoster (until 2017) and Pedro Facon (2017).

Disclosure statement

No potential conflict of interest was reported by the authors.

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