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Pharmaceutical Care – A New Discipline in the Curriculum: Introducing Pharmacy Students to Medication Non-Compliance

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Abstract: Pharmaceutical Care (PC) is a new academic discipline with a direct link to patient care. Since 2003 it has been integrated into the Swiss five-year university pharmacy curriculum. This article aims to describe (1) the concept of PC as a systematic process through which a pharmacist cooperates with the patient and healthcare professionals in designing, implementing and monitoring a therapeutic plan that will produce specific therapeutic outcomes; (2) the didactic concept used for the new discipline; (3) an illustrative example of how to teach pharmacy students the issues of patient non-compliance.

Keywords: Compliance · Curriculum · Education · Pharmaceutical care · Pharmacy students

Introduction

Pharmaceutical Care (PC) has been defined as the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life [1]. The concept of PC is an approach to improve the drug use process [2]. It is important to recognise that the dispensing of a drug is neither the beginning nor the end of the drug use process. PC encompasses a continuum of care that starts with identifying drug-related problems and ends with outcome evaluation. The pharmacist establishes a therapeutic relationship throughout this process, from dispensing to monitoring, and maintains continuous follow-up aimed at helping patients to achieve desired therapeutic goals while avoiding or minimising the adverse consequences of medication (Fig. 1) [3].

PC involves collaboration between healthcare professionals, cooperation with the patient in designing, implementing and monitoring a therapeutic plan as well as patient education on his/her medications and disease state. Thus, PC goes beyond the traditional dispensing role of the pharmacist. PC requires several factors such as: a) a change of traditional professional attitudes, b) a re-engineering of the pharmacy environment, c) the use of new technologies and d) the acquisition of knowledge as well as skills in the areas of patient assessment, clinical information, communication, adult teaching and psychosocial aspects of care.

The pharmacy profession is currently confronted with the challenge of implementing PC into daily practice. Consequently, in 2003 PC was introduced into the Swiss five-year university pharmacy curriculum as a new discipline. This paper aims to describe the didactic concept used for this new discipline, and presents an illustrative example of teaching pharmacy students the issues of patient non-compliance.

Pharmaceutical Care Curriculum

The development of the new PC curriculum as part of the five-year master study

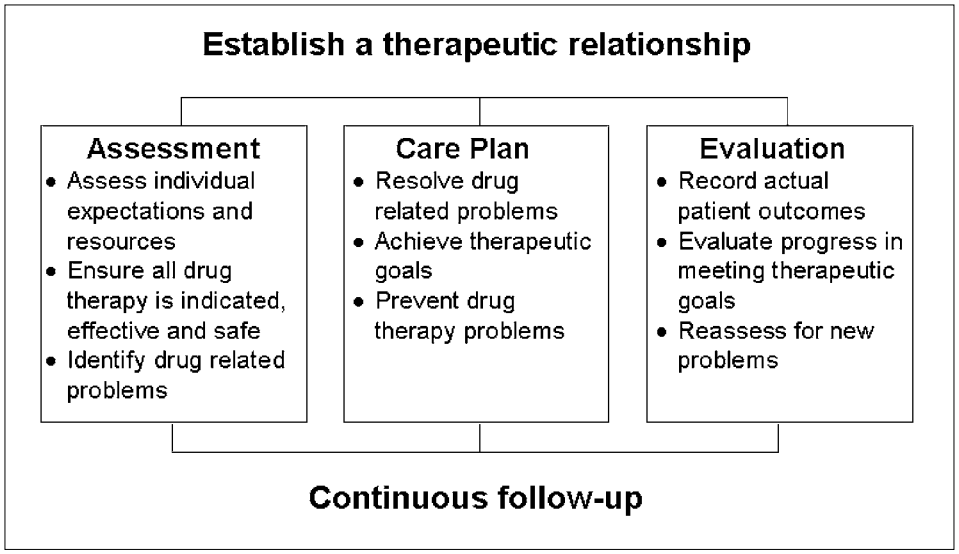

Fig. 1. Pharmaceutical Care Process (adapted from Becker, 2004 [3])

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programme was mainly based on and influenced by the 'Report of the task force for implementing pharmaceutical care into the curriculum' of the European Association of Faculties of Pharmacy (EAFP, 1999). The framework of the PC curriculum was designed by using the Berline model of didactics (Heimann, 1965 [4]). Our concept subdivides teaching into three phases, each with distinct learning targets (Table 1).

Phase I consists of twelve two-hour lectures that allow an introduction into the basics of PC with a focus on the methods. Since students are not yet involved in patient care, the presented case studies are restricted to two diseases (*e.g.* pain control, diabetes) and are thus exemplarily taught in a strict problem-based approach in the classroom.

During phase II, teaching is linked with clinical training, role play and counselling of pseudo-patients, thus applying the methods learned in phase I. In addition, students experience patient contact during a structured externship. They have to compile a portfolio with case reports, reports from visits in other healthcare institutions as well as a detailed PC report for one patient they had personally cared for.

Teaching consists of a combination of classroom and workshop. Skills are developed through practice-based instruction/experience (*e.g.* use of asthma devices, subcutaneous injection), with the active involvement of pharmacy practitioners and other health care professionals as teachers. Only a selection of main diseases can be covered (*e.g.* asthma, diabetes, COPD, CVD, dermatology, sleep disorders) and skills are restricted to a selection of PC activities. This approach is correct during an academic education, where methodological issues and showcase skills are appropriate teaching goals. A further important aspect of academic education is a direct link to research. The existing evidence [5–10] that PC can have an impact on health outcomes is used to support teaching.

In phase III, graduates start to use and develop their own skills in daily practice. They continuously expand their PC activities by, for example, specialisation in specific diseases.

Table 1. Phasing education in pharmaceutical care (PC)

Phase I: (Pharmaceutical Care Basics)

- Student knows the definition and philosophy of PC, and is able to explain the concept with two clinical examples.
- Student can detect manifest or potential drug-related problems (*e.g.* drug–drug interaction, non-compliance, adverse drug reaction), can retrieve appropriate information and can formulate recommendations to solve the problem.
- Student knows appropriate possibilities of interventions to optimise drug therapy.
- Student knows essential techniques for providing PC.

Phase II: (Teaching & Training)

- Student is able to assess individual patient information, identify drug-related problems, identify disease-related problems, identify opportunities in health promotion and disease prevention and characterise patient expectations. He/she follows a systematic procedure.
- Together with a patient, the student can formulate appropriate treatment goals and decide upon the most appropriate course of action (triage).
- Student can select an appropriate intervention together with the patient, rationalise individual treatments and design individualised treatment plans.
- Student can educate patients in the best use of drugs and devices.
- Student is able to design an individualised monitoring plan.
- Student is able to assess outcomes of the therapy.

Phase III: (Continuing Education and Implementation in Daily Practice)

- Graduate continuously adopts the PC concept in his/her daily practice with expansion of competencies in caring for patients with specific diseases and offering comprehensive services.
- Graduate can develop a patient documentation system.
- Graduate can collaborate with other health professionals and support them with drug-related knowledge and expertise.
- Graduate uses new technologies and performs laboratory tests.
- Graduate can systematically assure quality of care.

Introducing Pharmacy Students to Medication Non-Compliance

Any care activity around medicines and their use is designed to solve the actual drug-related problems or to prevent the potential ones. Drug-related problems (DRPs), also called drug therapy problems (DTPs), are the cornerstone of PC, and classification of DRPs is desirable for the PC process. In most classification systems non-compliance is listed as a main category [11].

Medication compliance (adherence) is defined as "the degree to which the person's behaviour corresponds with the agreed recommendations from a health care provider". Rates of non-compliance vary widely even in a tightly controlled environment of a clinical trial. Poor compliance can result in serious health consequences [12][13].

In ambulatory conditions, pharmacists providing PC are in an excellent position to have an impact on patient compliance. Because of the pharmacists' direct access to patients, they can identify poor compliance as well as help them to cope with barriers or facilitate medication use [6][14]. Therefore compliance is a major topic in the education of pharmacists.

Pharmacy students are introduced to issues relating to medication non-compliance in two steps: first an introduction to theoretical and methodological aspects in phase I of the curriculum (PC Basics), and secondly a simulated clinical setting in phase II (Teaching & Training).

Teaching Medication Compliance to Pharmacy Students (Basics)

The educational objectives of the two-hour lecture in basic aspects of medication compliance are given in Table 2, using Bloom's taxonomy [15]. In this early stage of teaching PC issues, it is evident that no complex cognitive behaviour can be addressed. Nevertheless, many crucial principles and methods should be learned before the students get into contact with patients.

Introducing Students to the Issues of Compliance in a Simulated Clinical Setting

In phase II of the curriculum, non-compliance is continuously addressed in each case study as an important issue of PC, and students learn to approach patients with compliance problems.

To confront students with their own perception and ability to comply with a strict dosing regimen, we initiated the following experiment. Two students out of the class had to prepare a compliance study enrolling their classmates according to an exercise described by Kastrissios [17]. The simulated patient situation was an antiretroviral post-exposure prophylaxis (PEP) after non-occupational exposure to HIV. The simulated drug treatment was chosen fol-

Table 2. Objectives and didactics in teaching basics of medication compliance
For classification the taxonomy of educational objectives by Bloom [15] is used: Knowledge (1), Comprehension (2), Application (3), Analysis (4), Synthesis (5), Evaluation (6)

Objectives [classification] Student ….	**Didactic method used**	**Comment**
… can define patient compliance (scope & forms) [2]	Discussion of a case: the physician has prescribed in conflict with evidence-based medicine, and the patient is fully compliant with antidiabetic treatment but not with diet.	Compliance of health care professionals is mentioned shortly, the focus is on patient compliance.
… can discuss the different nomenclature (adherence, concordance, compliance) [2]	Explanation of the different concepts of the patient–physician/pharmacist relationship.	
… knows impact of non-compliance as a drug-related problem (prevalence and consequences) [2]	Some recent figures from literature as an 'attention getter' to start the lecture.	
… can describe different methods to control compliance in a clinical and ambulatory setting [1]	Characteristics of methods are presented in an overview.	
… knows and is able to apply the concept of 'therapeutic coverage' [3]	Referring to knowledge about kinetics, the therapeutic coverage and examples of 'forgiving' drugs are discussed.	The topic is illustrated with results from electronically registered profiles of compliance (MEMS®).
… can evaluate non-compliance with respect to characteristics of drug treatment [4]	Adjunct question: How much compliance is enough/good for a distinct medication?	Student must judge different compliance rates of two different drug treatments.
… can adapt and use the trans-theoretical model of behaviour change (TTM, Prochaska [16]) in patient counselling [3]	The TTM-model is introduced with respect to smoking cessation and adapted to issues of non-compliance with an example (mother + asthmatic child with new corticoid treatment).	Later in the curriculum the TTM model is repeated and application is trained.
… knows different interventions (*e.g.* technical tools and devices) to support patients with compliance problems and/or to prevent non-compliance [1]	An overview of potential causes and interventions are presented with short discussion of characteristics.	This short input is repeated later in phase II in different situations.
… can use the presented theory in a learning exercise (Patient with diabetes). Analysis of a drug use profile over six months (multiple drugs) and suggestion of appropriate interventions [3]	This exercise is performed individually as homework. Students have to compile their solution on two slides, mailed to the teacher, who chooses one of them for presentation at the start of next lecture.	Homework is very helpful to tighten the theory. The presentation enables a short repetition and, if necessary, additional explanations in the following lecture. This concept further allows the students to become familiar with the disease (diabetes) used to illustrate the next topic (screening).

lowing international guidelines: Combivir® (300 mg Zidovudine/150 mg Lamivudine) and Stocrin® (600 mg Efavirenz) over four weeks. Dosing regimen: Combivir®: "Take 1 tablet twice a day (every 12 hours)"/ Stocrin®: "Take 1 tablet in the morning". Treatment was simulated using orange or green Tic Tac® sweets. Tablets were filled in electronic monitoring devices (MEMS® 6) or in Pharmis® (sealed blister pack as medication management system). Students received pre-filled MEMS® with 'Combivir®' or 'Stocrin®' for a two-week treatment and two blister packs. In a cross-over study design, students had to use MEMS® and Pharmis®, each for two weeks. They were randomly assigned to start either with MEMS® or Pharmis®. At days 0 and 28, the students completed a five-item questionnaire regarding their motivation and the self-evaluation of their compliance. After completion of the study, the electronic monitors were downloaded to a desktop computer, and individual patterns of dosing behaviour were examined graphically using PowerView® software (MEMS® devices and the software were provided in courtesy of Aardex Ltd, CH-6302 Zug, Pharmis® blister packs and sealing instruments by PHARMIS GmbH, CH-5712 Beinwil am See).

The blister packs were returned after the study period and a pill count was performed.

Results of intake patterns and of the questionnaires are given in Table 3. An example of a compliance profile out of the 14 participating students is shown in Fig. 2.

The results of this experiment were discussed with all students during the final session of phase II. In this experiment we achieved the following learning objectives: self-awareness of individual difficulties to follow a strict regimen, recognition of barriers and facilitators of compliance, experience in use of both blister packs and MEMS®, evaluation of pros and cons of the devices as tool to support and/or to measure compliance, interpretation of taking and timing compliance and of the therapeutic coverage. At the end of this session we returned to a patient perspective and addressed the individual issues of care for a patient with a PEP or HIV therapy.

Discussion and Conclusion

The new curriculum started successfully and received high ratings in the student evaluation. Students appreciated the permanent link to a patient situation and the involvement of other health care professionals as teachers. Similar efforts to introduce patient-oriented education are reported from different universities and a recent review reported that a change is currently taking place in most countries

Table 3. Self-estimated *vs.* measured compliance during a simulated PEP-HIV therapy among pharmacy students using placebo (Tic Tac®) in electronic devices and blister packs
Taking compliance: % number of doses taken (mean +/- SD) over the investigated period
Timing compliance: % doses taken on schedule (mean +/- SD) within prescribed dosing interval (12 +/- 2 h)
Student paired t-test, p-value <0.05 was considered to be significant

	Taking compliance (%)		Timing compliance (%)
Pharmis® blister pack	94.46 +/- 6.66	n.s.	
MEMS®	93.62 +/- 6.05		58.46 +/- 18.77
Estimated compliance at day "0"	84.29 +/- 9.6	p=0.007	
Estimated compliance at day "28"	87.14 +/- 9.2	n.s.	

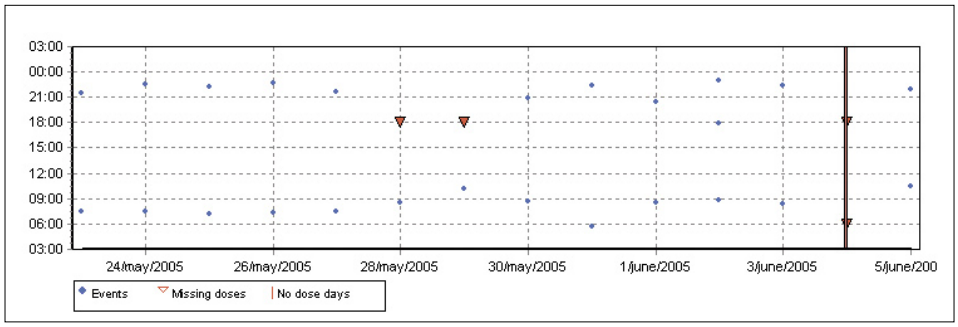

Fig. 2. Taking and timing compliance chronology of a simulated PEP HIV-therapy of student 91'646, monitored over 14 days. Taking compliance is 89.3%, four doses were missed and overdose appears at day 11. Timing compliance is 48.1% (drugs taken within prescribed schedule [12 h +/- 2 h]).

but not in a very deliberate or structured manner [18].

In our approach we experienced that initiating the PC curriculum with basics and methods by using illustrative case studies is a feasible option. Continuing with 'Teaching & Training' in phase II is essential to prepare pharmacy students for their future role as caregivers. Pseudo-patients and role plays are suitable substitutes, but they cannot replace patients and real clinical training. As PC is focused on individual patient outcomes, the patient situation should be even better embedded in the teaching.

In the future, theory and practice should be more interlocked. The structured externship with direct patient contact should be integrated and linked with teaching PC. Students could submit their own experiences and problems for discussion, and teachers could comment, or if required, add some background or theoretical input.

Finally, this change in the curriculum should be evaluated after graduates start working as health care professionals in order to continuously ameliorate the teaching.

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