



Short communication

# Pediatric pharmacotherapy in the PharmD curriculum: Course design and student self-assessment of learning outcomes achievement

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## Abstract

**Background:** The typical pharmacy school provides limited opportunities for focused pediatric pharmacotherapy discussions. This finding served as the impetus for development of an elective course on pediatric pharmacotherapy. The purpose of this study was to describe course design and evaluate students' self-assessment of learning outcome achievement in a pediatric pharmacotherapy course.

**Methods:** Thirty second-year pharmacy students were enrolled in a ten-week pediatric pharmacotherapy elective course. This course integrated numerous teaching strategies and provided several opportunities for formative and summative feedback. Students completed a pre- and post-course survey consisting of 20 items. Pre- and post-course surveys were compared to evaluate changes in student self-assessments of learning achievement following this course.

**Results:** Twenty-nine and 27 students responded to the pre- and post-course survey, respectively. There was a significant improvement in post-survey results for all items that examined students' self-assessment of competency in course learning outcomes ( $p \leq 0.036$ ).

**Conclusions:** Following completion of a pediatric pharmacotherapy course, significant improvements were observed in students' self-assessment of learning outcome achievement. The course design appeared to have facilitated these improvements. Since this course was an elective offering, additional means of educating pharmacy students on the care of pediatric patients may need to be considered.

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**Keywords:** Pediatric; Pharmacotherapy; Education; Outcomes

## Introduction

Advances in pediatric medicine, increasing complexities of childhood disease, and unique dosing and pharmacokinetic challenges all support a growing need for the education of pharmacists in basic pediatric competencies. Additionally, despite the difficulties in quantification,

pediatric prescription medication usage is estimated to be substantial.<sup>1</sup> According to the Centers for Disease Control 2007–2008 data, 14–20% of patients between the ages of zero and 19 years reported using at least one prescription drug in the month prior to being surveyed.<sup>2</sup> In light of these findings, it is not an unrealistic expectation that pharmacy curricula should have some minimum level of pediatric pharmacotherapy emphasis.

The 2004 Accreditation Council for Pharmacy Education (ACPE) guidelines and Center for Advancement of Pharmaceutical Education (CAPE) outcomes support the education of the pharmacist as a generalist.<sup>3,4</sup> However, the ability of a pharmacist to provide ethical, professional, patient-centered, and evidence-based care for specific

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patient populations is dependent upon familiarity with the unique characteristics of those populations. Although the ACPE guidelines address the need for pharmacists to be able to provide care for special populations (pediatric, geriatric, etc.) in its Appendix B, “Additional Guidance on the Science Foundation for the Curriculum,” surveys of pharmacy program curricula have revealed inadequacies and inconsistencies in pediatric care education.<sup>3,5</sup> A survey of pediatric education in entry-level pharmacy programs demonstrated that the average number of hours dedicated to this subject matter was an average of 16.7 hours (range: 2.8–52.8 hours).<sup>5</sup> In a 2004 position paper, Aucoin et al.<sup>6</sup> asserted that time devoted to pediatric pharmacotherapy education within pharmacy programs is inadequate and recommended that pharmacy programs should have a minimum of 25 hours of pediatric contact time in the curriculum. Ideally such education should include a combination of didactic and experiential learning activities.<sup>7</sup>

The pharmacy program for which this course was designed is an accelerated PharmD program occurring in a lock-step fashion over 34 months (in contrast to the traditional 48-month PharmD program). Because of the accelerated nature of our program, achieving target numbers for pediatric-focused contact hours and introducing concurrent experiential learning in the curriculum is challenging. Initial surveys of our curriculum revealed that our students had approximately six contact hours of pediatric education (excluding specialty advanced pharmacy practice experiences). This finding was the impetus for developing an elective that focused on pediatric pharmacotherapy. The purpose of this report is to describe the structure of this course and report the results of the students’ self-assessment of learning outcome achievement. We hypothesized that students’ end-of-course self-assessments of competency would be significantly greater than their self-assessments at the start of the course.

## Methods

### *Course design*

The pediatric pharmacotherapy elective course was designed to specifically address content that was either not presented in the core curriculum, or was presented but warranted advanced discussion. Specifically, course learning outcomes (Table 1) addressed strengthening general pediatric drug knowledge, relating principles of growth and development to pediatric disease states, formulating therapeutic plans, discussing pharmaceuticals preparation and drug delivery, compounding aseptic products, applying evidence-based medicine, and utilizing active, team-based learning. The course content focused on providing functional approaches to thinking and understanding from the perspective of a pediatric pharmacist. Although few of these students are likely to become specialized pediatric pharmacists, such an approach is expected to give students a

Table 1  
Course learning outcomes

- |  |
|--|
| (1) Discuss pediatric drug therapy considerations for patients based upon age, pharmacokinetic issues, and concomitant issues. |
| (2) Relate basic principles of pediatric growth and development to a variety of disease states.                                |
| (3) Formulate therapeutic plans for pediatric and neonatal patients with a variety of disease states.                          |
| (4) Identify methods for appropriate pediatric pharmaceuticals preparation and drug delivery.                                  |
| (5) Discuss and apply pediatric literature towards the practice of evidence-based medicine.                                    |
| (6) Apply creative problem solving solutions to unique pharmaceutical and pharmacotherapeutic situations.                      |

heightened sensitivity to pediatric issues potentially encountered in the professional setting. The course featured several unique elements, including multiple group projects and presentations, hands-on practical sessions, and expert guest speakers to facilitate learning.

The ten-week course was module based, with topics ranging from basic elements of pediatric therapeutics to the in-depth management of specific disease states, such as pediatric diabetes and pain management (Fig. 1). Upon completion, this course provided an approximate 30 additional hours of pediatric education, accomplished by 10 three-hour classes conducted throughout the summer semester. Most topics were taught by faculty who were knowledgeable in pediatric therapeutics. Expert guest speakers were invited to discuss pediatric critical care, congenital heart disease, and pediatric medication safety. A variety of learning strategies were incorporated throughout didactic lectures to accommodate different learning styles. These strategies included guided notes, group discussions, debates, games, lectures, and student presentations. There were several assessments in the course including daily attendance, homework, quizzes, journal club, practical sessions, and a final case presentation. Students were assigned to small groups at the start of the course; these groups were utilized for the journal club and final case presentations.

### *Daily attendance*

Attendance was recorded for each class period and counted as 10% of the total course grade. Students received 0.5 points for attendance at each of the 20 classes. Attendance was stressed as a graded component of the course due to the emphasis on active and team-based learning.

### *Homework*

Four homework assignments, each worth 5% of the total grade, were given to facilitate class preparation and discussion. Homework activities consisted of the following:

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