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Implementation and impact of a chronic kidney disease elective for second-year pharmacy students

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ABSTRACT

Background and purpose: Pharmacists can make a great impact on the management of chronic kidney disease (CKD), which is a highly prevalent and costly disorder. This article describes the implementation and impact of a CKD elective course for second-year pharmacy students, which aimed to expose students to CKD and enhance their ability to care for these patients.

Educational activity and setting: Topics associated with CKD were covered in a fifteen-week, three credit hour course. Various active-learning techniques were utilized, including student presentations of pharmacotherapy and primary literature, team-based learning through patient case discussions, and interactions with standardized and actual patients. Surveys designed to assess students' career goals and level of confidence with assessing primary literature, delivering presentations to peers, working as members of a team, and communicating with patients were administered at the beginning and end of the course.

Findings: Twenty-three students (100%) participated in the initial survey, and nineteen (86.4%) participated in the final survey. Students gave more positive responses on the final survey that they were considering a career in ambulatory care ($P=0.03$), planning to pursue a career in ambulatory care ($P=0.02$), considering a career in kidney disease management ($P=0.02$), and planning to pursue a career in kidney disease management ($P=0.0498$). Students also felt more confident in their ability to assess primary literature ($P=0.005$) and deliver presentations to their peers ($P=0.02$).

Summary: Courses such as this can expose students to new and unique career paths and help them develop key skills to promote a successful and fulfilling pharmacy career.

Background and purpose

According to the Centers for Disease Control and Prevention, it is estimated that over ten percent of the adult population in the United States (more than 20 million people) may have chronic kidney disease (CKD).¹ The United States Renal Data System reported that patients with recognized CKD represent only ten percent of Medicare beneficiaries but account for twenty percent of total Medicare expenditures, which is over \$20,000 per patient per year. Medicare costs for CKD patients rose from \$29 billion in 2008 to over \$44 billion in 2012.² In addition to the high prevalence and cost of CKD, these patients are also at high risk for cardiovascular disease.^{3,4} As such, patients with CKD need to be managed closely to not only slow the progression of their kidney disease, but also to delay the development or advancement of cardiovascular disease.³ With so many different facets of care, the management of CKD is very complex and requires the coordination of multiple healthcare disciplines.⁵

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Table 1
2009 ACCP pharmacotherapy toolkit tier rankings ^{a,b}.

Tier I		Tier II	Tier III
Tier IA	Tier IB		
<ul style="list-style-type: none"> ● Chronic kidney disease ● Evaluation of renal function ● Drug dosing in renal dysfunction ● Diabetes mellitus type 2 ● Hypertension ● Lipid disorders 	<ul style="list-style-type: none"> ● Dialysis and renal replacement therapies ● Complications of renal disease 	<ul style="list-style-type: none"> ● Immuno-suppressants 	<ul style="list-style-type: none"> ● Renal transplantation ● Nutritional considerations

Abbreviations: ACCP=American College of Clinical Pharmacy.

^a Scale: Tier I = topics that must be covered by all colleges; tier IA=topics for which the graduate should have received extensive instruction and training in the treatment of the disease state (and any accompanying morbidities) and, by the time of graduation, be proficient in providing care to patients with the disease; tier IB=topics for which the graduate should have been exposed to the disease state and its treatments so that he or she has a good understanding of the disease processes and treatments, but the graduate may require additional resources to ensure appropriate treatment outcomes for patients with the disease or should be able to refer the patient to others who can ensure the appropriate treatment outcomes; tier II=topics that should be covered by most colleges; tier III=topics that could be covered if time and resources were available.

^b This table was adapted from the 2008 ACCP Educational Affairs Committee B Pharmacotherapy Didactic Curriculum Toolkit 2009.⁹

In the ambulatory care setting, pharmacists can take an active role in chronic disease state management.^{6,7} Potential roles for the pharmacist as a multidisciplinary CKD provider include screening for proteinuria, angiotensin-converting enzyme inhibitor/angiotensin-receptor blocker therapy, and metabolic bone disease; managing blood pressure, glycemia, anemia, and metabolic bone disease; adjusting medication doses to minimize nephrotoxin exposure and avoid harmful accumulation of certain medications; and educating patients about their medications.⁵ A systematic review found that pharmacists' interventions in CKD management reduced all-cause hospitalizations, cumulative time hospitalized, and incidence of end-stage renal disease or death in patients with diabetic nephropathy. Furthermore, pharmacists' interventions led to an improvement in the management of anemia, calcium and phosphate parameters, blood pressure, and hyperlipidemia. Uncontrolled studies resulted in reduced numbers of transplantation rejections and adverse effects.⁸

Due to the great potential impact that pharmacists can have with such a highly prevalent and costly disease, it is imperative that pharmacists are adequately prepared to care for patients with CKD and its related disease states, such as diabetes and hypertension. This preparation begins in the pharmacy school curriculum. The 2009 American College of Clinical Pharmacy (ACCP) Pharmacotherapy Didactic Curriculum Toolkit provides guidance on the breadth and depth of topics that should be covered in pharmacy curricula.⁹ Table 1 shows the tier ratings of topics related to chronic kidney disease and demonstrates that most of these topics are of the highest tier and should be covered extensively in all colleges of pharmacy. However, some of these topics "could be covered if time and resources were available," denoting that an institution may choose to not teach these topics at all in required courses. These ratings infer the high potential impact of an associated elective course to enhance the student's ability to be proficient in providing care for such patients and also to expose students to topics that may be excluded from required courses. Furthermore, the kidneys play a role in arguably every disease state, at the very least with regard to drug dosing. As such, it is imperative that students have a solid foundational knowledge in this subject area.

An elective course entitled, "Kidney is King: Renal Disease in Ambulatory Care," was offered to second-year pharmacy students in the Western New England University College of Pharmacy in spring 2015. The purpose of this course was multifaceted. The course served to explore in greater depth topics related to CKD, to expose students to ambulatory care and motivational interviewing, and to expand upon students' ability to assess primary literature, deliver presentations to peers, work as members of a team, and communicate with patients, specifically by practicing these skills in the setting of CKD management. These four areas of development were chosen as key skills fundamental to a successful career as a pharmacist, promoting the practice of evidence-based medicine, dissemination of knowledge, teamwork, and patient-provider partnerships. This course served to reinforce topics covered in the required nephrology pharmacotherapy module, while adding an ambulatory care and chronic kidney disease focus. While there have been publications of teaching efforts of required nephrology material, to the author's knowledge, no literature describing the implementation and/or impact of such an elective course has been published, whether within pharmacy school programs or other health-related curricula.^{10,11}

Educational activity and setting

Course design

A 15week, three credit hour chronic kidney disease elective course was offered for the first time in spring 2015 within a private, campus-based, four-year pharmacy program. This course was developed and taught by a full-time clinical faculty member who spent three days per week practicing at an outpatient nephrology clinic. Students were expected to achieve the following course objectives: 1) describe potential roles for pharmacists in CKD management; 2) given a patient case, accurately calculate and properly evaluate renal function; (3) compare and contrast appropriate medication doses based on renal function; (4) identify therapeutic goals and

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