

Teaching pharmacotherapeutics to family medicine residents

A curriculum

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ABSTRACT

PROBLEM BEING ADDRESSED Medication prescribing is becoming increasingly complex, and the need for formal curricula in pharmacotherapeutics and medication prescribing in accredited family medicine residency programs has been advocated.

OBJECTIVE OF PROGRAM The main objective of the pharmacotherapeutic curriculum is to support the development of family medicine residents' pharmacotherapeutic knowledge and medication prescribing skills required for rational prescribing.

PROGRAM DESCRIPTION The curriculum has 4 main components: 1) a medication prescribing framework based on the main tasks and key decisions related to the prescribing of medications, 2) 12 pharmacotherapeutic topics identified in the needs assessment, 3) a 5-step process for session design used by the curriculum development team, and 4) a description of specific roles of facilitators involved in delivering the curriculum. Formative evaluation of the curriculum using resident focus groups has helped to inform the further development of its components.

CONCLUSION A formalized curriculum was created to build knowledge of pharmacotherapeutics and effective medication prescribing skills, which are necessary for the current complex environment of patient care and medication management.

RÉSUMÉ

PROBLÈME À L'ÉTUDE Prescrire des médicaments est une tâche de plus en plus complexe, et on a suggéré d'inclure un cours formel en pharmacothérapie et prescription de médicaments dans les programmes de médecine familiale accrédités.

OBJECTIF DU PROGRAMME Le principal objectif du cours en pharmacothérapie est d'aider les résidents en médecine familiale à mieux connaître la pharmacothérapie et à acquérir la compétence qu'exige une prescription médicamenteuse rationnelle.

DESCRIPTION DU PROGRAMME Le cours comporte 4 éléments principaux: 1) un guide de la prescription médicamenteuse portant sur les principales tâches et décisions associées à la prescription médicamenteuse, 2) 12 sujets de pharmacothérapie identifiés lors d'une évaluation des besoins, 3) un processus en 5 étapes à l'intention de l'équipe chargée d'établir le plan du cours, et 4) une description des rôles spécifiques des animateurs chargés de diriger le cours. Une évaluation formative du cours à l'aide de groupes de discussion formés de résidents a fourni des renseignements permettant d'en améliorer les composantes.

CONCLUSION On a créé un cours formel pour améliorer les connaissances en pharmacothérapie et la capacité de prescrire qu'exige le contexte actuel des soins au malade et de l'utilisation des médicaments.

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Medication prescribing is more complex than ever before, posing a challenge for both clinicians and medical educators. Rational prescribing refers to the "selection of the most appropriate therapeutic regimen for a specific patient."¹ There is a need to teach principles of rational prescribing; one study found that 25% of medical students and residents do not always check for drug allergies and 70% do not always assess potential drug-drug interactions before prescribing.² Furthermore, prescribing or prescription errors have been discovered in as many as 11% of all prescriptions in primary care.³

Adcock et al suggest "at least some adverse drug reactions occur because no comprehensive pharmacotherapy review is provided during the third and fourth years of most medical curricula and during residency training."⁴ A survey of accredited American family medicine programs in 2000 found that only 38.5% offered a formal pharmacotherapy curriculum.⁵ In 2005, the Society of Teachers of Family Medicine Group on Pharmacotherapy published guidelines for a pharmacotherapy curriculum, which stated that one of the suggested outcomes of such a curriculum should be the ability to "make informed pharmacotherapy decisions that are patient focused, evidence based, cost effective, and clinically sound."⁶ Prescribing habits are developed during residency training; therefore, formal education regarding rational drug use should be an integral part of the residency curricula.⁶ Formalized curricula in pharmacotherapeutics and rational prescribing in family practice residency programs have been previously described.⁷⁻⁹

The Department of Family and Community Medicine at St Michael's Hospital in Toronto, Ont, an institution fully affiliated with the University of Toronto, is the training division for 24 to 30 residents annually, consisting of graduates from medical schools across Canada as well as international medical graduates. In 2001, a potential need for a formal pharmacotherapeutics curriculum was identified, and a needs assessment was conducted through 3 focus-group interviews (first- and second-year residents, and clinical teachers) and through direct

assessment of residents' therapeutic knowledge, using written tests. The results of the needs assessment supported the need for a formalized curriculum to enhance pharmacotherapeutic knowledge, drug information skills, and the residents' ability to select, individualize, and monitor medications for patients with medical conditions commonly encountered in family practice. Areas of highest priority included drug classes with multiple therapeutic alternatives, new products, and clinical problems lacking evidence-based medicine or consensus guidelines. Furthermore, the needs assessment also supported the need for a medication prescribing tool to assist residents in applying a systematic process to navigate available pharmacotherapeutic information and select the most appropriate medication for a patient in a given situation.

The main objective of the formalized pharmacotherapeutics curriculum was to support the further development of family practice residents' pharmacotherapeutic knowledge and medication prescribing skills required for rational prescribing.

Program description

The 4 main components of the curriculum are as follows: 1) a medication prescribing framework, 2) selected pharmacotherapeutic topics, 3) the process for session design, and 4) the roles of facilitators involved in delivering the curriculum.

Medication prescribing framework. Based on the findings of the needs assessment, a medication prescribing framework composed of 3 main parts was developed (**Figure 1**). The first part is a macro frame based on 6 key sequential medication prescribing decisions made by the clinician. The second part includes specific questions attached to each subcomponent, used to prompt the pharmacotherapeutic information that needs to be applied to a patient's case. The third part of the framework contains 7 specific pharmacotherapy subcomponents organized as a mnemonic (I Can PresCribE A Drug) according to the sequence of tasks.¹⁰

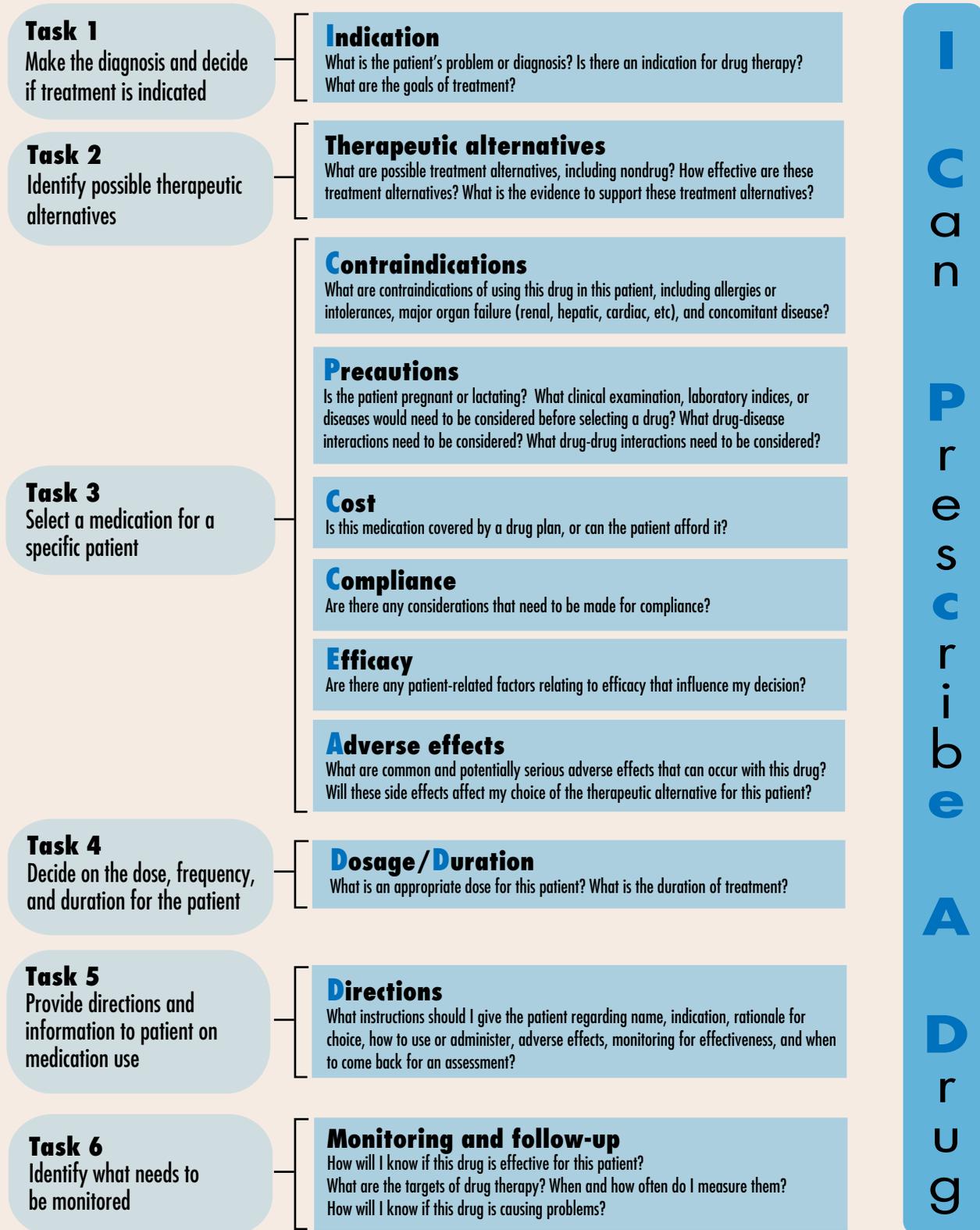
Pharmacotherapeutic topics. The curriculum comprises a series of 12 2.5-hour sessions conducted every 2 months over the 2-year residency program. Topics include drug information and *Helicobacter pylori* management, osteoporosis, hypertension, antibiotics, diabetes, warfarin, pain, migraine, hyperlipidemia, asthma, depression, and anticonvulsants.

Process for session design. A 5-step design process was used to develop each session: 1) a medical condition was selected based on the topics identified in the needs assessment; 2) specific pharmacotherapeutic content for discussion was decided, based on the main prescribing tasks of the medical condition, as well as common and routine

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Figure 1. Medication prescribing framework



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medication management issues, based on physician and pharmacist observation in daily practice and common gaps in care identified in the literature; 3) an authentic case scenario was developed to illustrate the common medication prescribing issues that occur in the context of daily practice; 4) the medication prescribing framework was used to sequence pharmacotherapeutic content for each session as illustrated in **Figure 2**; and 5) principles of adult education and the Kolb's Learning Cycle¹¹ were used to sequence the session, which included large group discussion, mini-lectures, and small group work.

During the education session, the residents work through the case collaboratively in large and small groups and answer the questions posed by the medication prescribing framework, making decisions in response to the 6 outlined tasks. Mini-lectures are interwoven throughout the session, focusing on pharmacotherapeutic alternatives, clinical evidence, and prescribing issues. The learning experience is not only guided and structured, but also interactive and flexible, encouraging discussion and debate. Potential drug information resources are also introduced and utilized during the sessions. Through these steps, residents have an opportunity to identify all the pharmacotherapeutic possibilities available to treat a particular patient, then use a rational and systematic approach to decision making that combines best practices with patient-centred care.

Roles of facilitators. A clinical pharmacist and a staff physician co-facilitate each session. The physician's role is to focus on the diagnostic knowledge and skills required for the case scenario, provide role modeling and coaching for the use of the framework, identify common issues from daily practice, and share real-life pearls. The clinical pharmacist's role is to coordinate the sessions, identify common drug-related issues for discussion, identify relevant clinical resources, and teach pharmacotherapeutic concepts such as therapeutic alternatives, relevant clinical evidence and practice guidelines, dosing, educating, and monitoring.

Formative evaluation. Formal focus groups with first- and second-year residents were conducted at the end of the first 2 years of the program to evaluate the usefulness of the medication prescribing framework. The study was approved by the institution's Research Ethics Review Board. The focus groups were run by an expert external facilitator and were attended by 45% of the residents. Two main themes relating to the utility of the framework emerged. First, the residents acknowledged the benefit and utility of a systematic medication prescribing framework with which to learn pharmacotherapeutics. In principle, they valued the systematic approach and felt that it improved their prescribing skills. Second, despite the considerable

assistance the framework provided, many residents remained overwhelmed by the amount of pharmacotherapeutic knowledge they needed to command in order to use it. Specifically, they recognized that a vast amount of pharmacotherapeutic and diagnostic information was required to tailor the selection of the therapy of a specific patient. Therefore, some residents stated that they, at the outset, found the framework too time-consuming for daily use in patient encounters. This feedback guided a reorganization and revision of the original prescribing framework to make the tasks and questions easier to follow; these revisions are a part of the final version (**Figure 1**). In addition, the medication prescribing tasks and specific mnemonic triggers were incorporated more explicitly into session handout materials to further stress the use of the framework (**Figure 2**). Residents continue to rate the sessions highly in informal reaction evaluations.

Discussion

The curriculum was designed to address the need for formal instruction in pharmacotherapeutics in a family medicine residency program. The specific components of the curriculum were created to support the development of the medication prescribing skills needed in the current complex environment of medication management. In addition, the learning environment was designed based on principles of adult education and provided the context of application in relation to daily primary care practice.

Three formalized curricula in pharmacotherapeutics and rational prescribing in family medicine residency programs, which described a variety of teaching strategies, were identified in the literature.⁷⁻⁹ In their pharmacotherapy curriculum, Bucci and Frey⁷ described the use of several teaching strategies: monthly noon conferences, a printed formulary and pharmacotherapy handbook, policy statements for drug representatives and the use of samples, a quarterly newsletter, and pharmacy consultation. In 1995, Gaspar described a curriculum that emphasized choosing prescription drug treatments for conditions where many options existed and developing skills in evaluating medical and commercial sources of drug information.⁸ Instructional strategies included lectures on drug treatments for common conditions seen in the outpatient setting and commercial promotion strategies by pharmaceutical manufacturers. The curriculum also included problem solving in clinical cases, writing simulated prescriptions, analyzing drug company promotional material, and a compiled drug therapy handbook. Cheng and Umland⁹ described a patient drug education curriculum, consisting of bimonthly 45-minute sessions that focused on core pharmacology concepts. Lectures, patient case studies, 1- to 2-page summaries, and quizzes were used to teach relevant content and reinforce key learning points. High rates

Figure 2. Format for pharmacotherapeutic sessions

CASE

Description of visit, medical history and physical examination, relevant medication and medication history, etc

TASK 1 Make the diagnosis and decide if treatment is indicated **Indication**

Exercise What are the management issues in this patient?

Exercise What are the targets of therapy and when is drug therapy indicated?

TASK 2 Identify possible therapeutic alternatives

What are effective pharmacologic and nonpharmacologic alternatives for this patient?

What are the differences of these treatment alternatives and evidence to support their use?

TASK 3 Select a medication for a specific patient

Exercise

Considering *all* the potentially effective treatment alternatives, select the best medication(s) for this patient by considering the following factors that will assist in the selection of the best agent.

Contraindications What are contraindications for using this drug in general and specifically in this patient?

Precautions Is the patient pregnant or lactating? Is the drug safe?
What baseline clinical examination or laboratory indices would need to be monitored before prescribing drug therapy?
What drug-drug or drug-disease interactions need to be considered before prescribing this drug?

Cost Is this medication covered by a drug plan, or can the patient afford it?

Compliance Are there any considerations that need to be made for compliance?

Efficacy Are there any patient-related factors relating to efficacy that influence my decision?

Adverse effects Are there any common or potentially serious side effects that might affect my choice of a therapeutic alternative for this patient?

Of all the treatment alternatives available, what is the best pharmacologic choice for this patient? Justify your response based on efficacy, best evidence, and suitability. Why were other therapeutic alternatives ruled out in this case?

TASK 4 Decide on a dose and frequency for the patient **Dose/Duration**

Exercise What is the best starting dose for this patient?

What is the best strategy for dose escalation?

What is the target dose?

TASK 5 Provide directions and information on medication use **Directions**

Exercise What instructions should I give the patient regarding dosage and administration?

TASK 6 Identify what needs to be monitored

Exercise What signs, symptoms and laboratory parameters would you monitor in this patient?

of satisfaction and improvements in knowledge were observed with these programs.

These 3 programs describe many components similar to our program, including the focus on pharmacotherapeutic content most relevant to the setting and the use of lectures and patient cases. However, the main difference in our approach is the use of a systematic process for medication prescribing, which is the backbone of the design and delivery of our curriculum. With this approach, the curriculum fosters the identification of multiple pharmacotherapeutic alternatives and the selection of a specific choice that is best for the patient. This kind of patient-centred decision making is proposed as a key skill required by students, residents, and practising physicians.¹²

The use of another rational process for medication prescribing as part of a problem-based training course in pharmacotherapy for undergraduate medical students has been described and robustly evaluated.¹³ The World Health Organization manual on the principles of rational prescribing was used in a short course and evaluated in a multicentre randomized controlled trial. Results demonstrated that students in the study group performed significantly better than controls on patient problem-based tests and were able to apply their skills to new patient problems. Both the retention of learning and transfer of skills were retained 6 months after the training session. This suggests that the use of a structured medication prescribing process is useful for building both knowledge and skills, which extend to new patient encounters.

Limitations

There are a few limitations to our program. First, the curriculum does not extend the teaching and application of the medication prescribing framework into residents' daily clinical encounters, including structured feedback with staff physician supervisors. In addition, due to the time requirements of delivering the curriculum, it is a challenge to cover all potentially relevant pharmacotherapeutic topics that are desired by the residents; this is a comment frequently seen on residents' evaluations. We hope that the use of our program's systematic process to build medication prescribing skills will allow residents to identify and expand their own pharmacotherapeutic knowledge independently in day-to-day practice. Another factor to consider when addressing relevant knowledge and skills is whether this type of pharmacotherapy education, which focuses on rational medication prescribing, could be introduced earlier in medical training, as described by De Vries et al.¹³

Future research is planned to formally evaluate the curriculum's impact on residents' pharmacotherapeutic knowledge and medication prescribing skills, and to determine whether this program can be effectively delivered by other academic residency teaching programs.

EDITOR'S KEY POINTS

- Up to 1 out of 10 prescriptions in primary care has prescribing or prescription errors.
- Although prescribing habits develop during residency, many family medicine programs lack formal curricula in pharmacotherapeutics.
- This paper describes the development and evaluation of such a program, including a useful 1-page medication prescribing framework.

POINTS DE REPÈRE DU RÉDACTEUR

- Dans les soins primaires, jusqu'à 1 prescription sur 10 comporte des erreurs de médicaments ou de mode d'emploi.
- Même si les habitudes de prescription se prennent durant la résidence, plusieurs programmes de médecine familiale n'ont pas de cours formel en pharmacothérapie.
- Cet article décrit le développement et l'évaluation d'un tel programme, incluant un guide pratique de prescription d'une page.

Conclusion

A formalized pharmacotherapeutic curriculum, which focuses on building pharmacotherapeutic knowledge in the context of effective medication prescribing, was created. The use of a medication prescribing framework, authentic case scenarios, and adult learning principles help support the development of knowledge and skills needed in the current environment of complex patient care and medication management. 

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Competing interests

None declared

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