Web exclusive

Curriculum to enhance pharmacotherapeutic knowledge in family medicine

Interprofessional coteaching and Web-based learning

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Abstract

Problem addressed Prescribing is an essential skill for physicians. Despite the fact that prescribing habits are still developing in residency, formal pharmacotherapy curricula are not commonplace in postgraduate programs.

Objective of program To teach first-year and second-year family medicine residents a systematic prescribing process using a medication prescribing framework, which could be replicated and distributed.

Program description A hybrid model of Web-based (**www.rationalprescribing.com**) and in-class seminar learning was used. Web-based modules, consisting of foundational pharmacotherapeutic content, were each followed by an in-class session, which involved applying content to case studies. A physician and a pharmacist were coteachers and they used simulated cases to enhance application of pharmacotherapeutic content and modeled interprofessional collaboration.

Conclusion This systematic approach to prescribing was well received by family medicine residents. It might be important to introduce the process in the undergraduate curriculum—when learners are building their therapeutic foundational knowledge. Incorporating formal pharmacotherapeutic curriculum into residency teaching is challenging and requires further study to identify potential effects on prescribing habits.

EDITOR'S KEY POINTS

• By having a physician-pharmacist team coteach a pharmacotherapeutics curriculum, residents observed each professional's expertise and interprofessional collaboration.

• The combination of preparatory Web-based learning and interprofessional coteaching in rational prescribing provided residents with a positive educational experience that had not previously been available in the residency program.

• A systematic approach to rational prescribing should be used to support effective medication prescribing in family medicine residency, and it should be introduced earlier in medical education.

Programme pour accroître la connaissance de la pharmacothérapie en médecine familiale

Collaboration interprofessionnelle pour l'enseignement et apprentissage sur le Web

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Résumé

Problème à l'étude Pour les médecins, prescrire est une activité essentielle. Malgré le fait que les habitudes de prescription continuent de se développer durant la résidence, il est plutôt rare que les programmes de résidence offrent des cours formels de pharmacothérapie.

Objectif du programme Enseigner à des résidents de 1re et de 2e année de médecine familiale une façon systématique de prescrire à l'aide d'un document cadre portant sur la prescription de médicaments, lequel pourrait être reproduit et distribué.

Description du programme On s'est servi d'un modèle hybride d'apprentissage dans Internet (rationalprescribing.com) suivi d'un séminaire en classe. Tous les modules d'apprentissage dans Internet portaient sur des notions fondamentales de pharmacothérapie et étaient suivis d'une séance en classe où ces notions étaient appliquées à des cas. Un médecin et un pharmacien partageaient l'enseignement; ils utilisaient des cas simulés pour faciliter l'application des notions de pharmacothérapie et encourager la collaboration interprofessionnelle.

Conclusion Les résidents en médecine familiale ont bien accueilli cette façon systématique de prescrire. Il pourrait être intéressant d'ajouter ce type d'apprentissage au programme du premier cycle – au moment où l'étudiant approfondit ses connaissances thérapeutiques fondamentales. L'introduction de cours formels en pharmacothérapie dans les programmes de résidence pourrait présenter des difficultés; des études additionnelles seront également nécessaires pour évaluer les effets éventuels sur les habitudes de prescription.

POINTS DE REPÈRE DU RÉDACTEUR

• À l'occasion de cours de pharmacothérapie donné conjointement par un médecin et un pharmacien, des résidents ont pu constater la compétence de chacun de ces professionnels et leur collaboration.

• Grâce à un apprentissage préparatoire dans Internet combiné à des cours interprofessionnels sur la façon rationnelle de prescrire, les résidents ont profité d'une expérience éducationnelle positive qui était jusque-là absente des programmes de résidence.

• Pour aider les résidents en médecine familiale à prescrire des médicaments de façon efficace, on devrait leur proposer une façon rationnelle de prescrire. Ce type de formation devrait être introduit plus tôt dans le cours de médecine.

Although prescribing is an essential skill of physicians,[1-3] their training in safe prescribing is not optimal.[4,5] Errors occur in more than 10% of primary care prescriptions,[6,7] with the most common errors being related to drug direction and dosage.[7] In a study involving final-year family medicine residents in Bahrain,[8] errors relating to dosage and frequency of dosing were identified in 88.1% of prescriptions.

Prescribing habits begin to develop during clerkship and are reinforced during residency. Methods to build prescribing skills have been created. The World Health Organization's *Guide to Good Prescribing*[9] provides a stepwise process to prescribing and uses the mnemonic ESSEnCE[10] to help the prescribing steps be remembered. Gasper devised a prescribing program for family medicine residents, incorporating a variety of skills from simulated prescription writing to evaluating commercial sources of drug information.[11] In residency, bimonthly lectures,[12] continuous assessment of prescriptions,[13] and delaying prescribing privileges until passing a prescription writing test[14] have been shown to be effective in increasing pharmacotherapeutic knowledge and developing prescription competence. Training in pharmacotherapeutics results in improvement in knowledge[12] and decreases the number of prescription errors made by family medicine residents.[14]

The Society of Teachers of Family Medicine states that education regarding rational drug use should be an integral part of the residency curricula.[2] Required elements should include the following: designated faculty co-coordinators, involvement from pharmacists and physicians, emphasis on common conditions, a review of general pharmacotherapy principles, flexibility to incorporate new material, an evaluative component, and the opportunity to learn in a variety of settings.

A 2002 survey conducted across family medicine residency programs in the United States found that only 38.5% of family medicine training programs offered a formal pharmacotherapy curriculum.[15] A Canadian study of resident training sites reported that 25.3% of family medicine residency training sites had pharmacist teachers directly involved in training residents but none included a formal pharmacotherapy curriculum.[16] It has been suggested that the role of pharmacists in medical resident education be expanded and that a formal curriculum be implemented for pharmacist educators to follow.[17]

Objective of program

In order to address this need, a pharmacotherapeutics curriculum was developed in the Department of Family and Community Medicine at St Michael's Hospital in Toronto, Ont.[18] It sought to incorporate required elements by using a coteaching model consisting of a pharmacist and a physician to teach a rational prescribing process. The backbone of the program, developed previously, was a medication prescribing framework using the mnemonic I Can PresCribE A Drug,[19] which could be applied to most disease paradigms. After being effectively delivered for a number of years, the curriculum was tested at another family medicine program at North York General Hospital (NYGH) in Toronto and was found to be transferrable in pilot testing (Iglar et al, unpublished data, 2006).

The 2 teams collaborated to see how the program could be enhanced and disseminated more widely. The objective of the program was to develop a hybrid model of Web-based learning and interprofessional teaching of a systematic pharmacotherapeutics curriculum for family medicine residents.

Description of program

The first tenet of the design was to make the program as reproducible for others as possible. With funding from a HealthForceOntario grant, a website (ie, **www. rationalprescribing.com**) was created as a hub for educational materials. The website was used in the learning design to deliver key basic pharmacotherapeutic content and to serve as a resource for material at the completion of the module. It was postulated that by providing foundational material in a Web-based format that could be reviewed before class, the interprofessional seminar could move beyond reviewing basic drug information to higher-level learning.
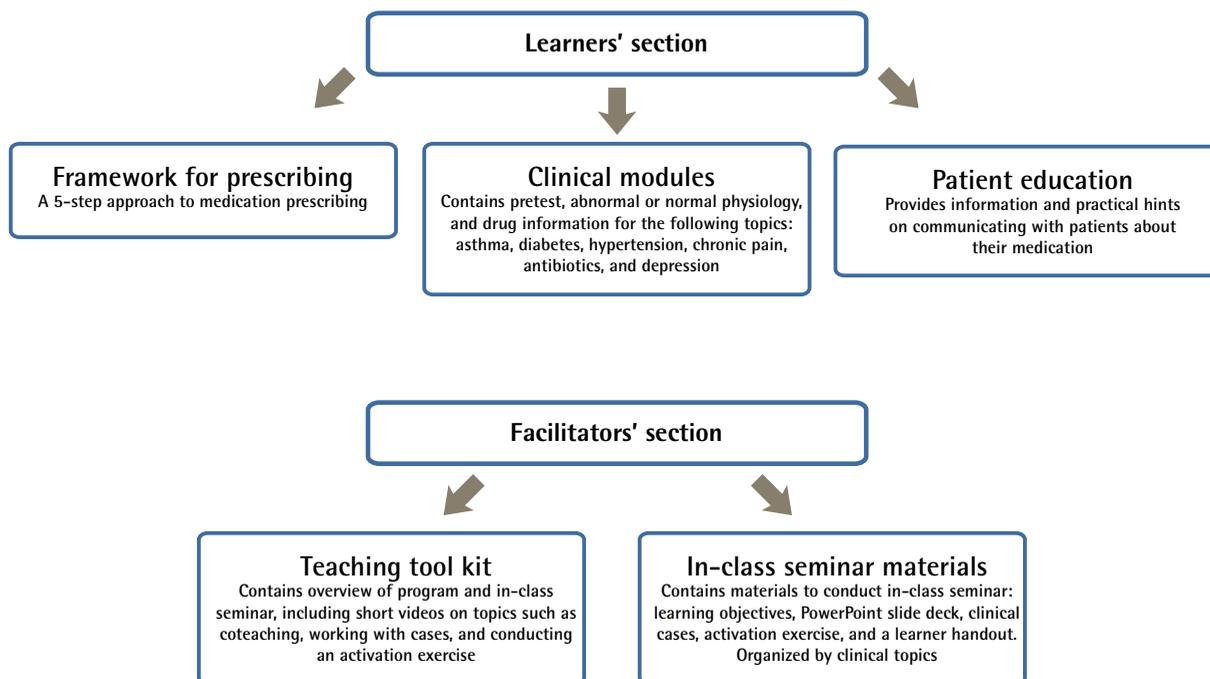
The Rational Prescribing website consisted of a learners' area and a facilitators' area (**Figure 1**). The learners' area comprised the following sections:
- Framework for Prescribing, which presented an osteoporosis case and several interactive examples to reinforce rational prescribing using a 5-step process (**Box 1**[18,19]);
- Clinical Modules, which had disease-specific units, that contained pretests, basic information relating to the pathophysiology, clinical presentations, therapeutic options, and relevant links; and
- Patient Education, which guided the learner through the cognitive process of how to talk with patients about their medications.

The facilitators' site not only provided a dynamic repository for PowerPoint presentations, cases, and exercises for teachers to download and modify, but it also allowed the development of faculty training modules that could be stored and accessed any time new faculty needed to be trained.

The second component of the hybrid learning model was the in-class seminar. For each clinical module the seminar began with an activation exercise, the purpose of which was to engage the class and to mobilize previous knowledge. A detailed mock interview case was used to situate learning in an authentic everyday context and to help apply pharmacotherapeutic knowledge and medication pre-

Figure 1. Outline of the Rational Prescribing website*

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                    ┌─────────────────────────┐
                    │    Learners' section    │
                    └─────────────────────────┘
        ↓                       ↓                        ↓
┌──────────────────┐  ┌──────────────────────┐  ┌──────────────────┐
│ Framework for    │  │   Clinical modules   │  │ Patient education│
│ prescribing      │  │ Contains pretest,    │  │ Provides         │
│ A 5-step approach│  │ abnormal or normal   │  │ information and  │
│ to medication    │  │ physiology, and drug │  │ practical hints  │
│ prescribing      │  │ information for the  │  │ on communicating │
│                  │  │ following topics:    │  │ with patients    │
│                  │  │ asthma, diabetes,    │  │ about their      │
│                  │  │ hypertension,        │  │ medication       │
│                  │  │ chronic pain,        │  │                  │
│                  │  │ antibiotics, and     │  │                  │
│                  │  │ depression           │  │                  │
└──────────────────┘  └──────────────────────┘  └──────────────────┘

                    ┌─────────────────────────┐
                    │   Facilitators' section │
                    └─────────────────────────┘
              ↓                              ↓
   ┌──────────────────────┐      ┌──────────────────────────┐
   │   Teaching tool kit  │      │  In-class seminar        │
   │ Contains overview of │      │  materials               │
   │ program and in-class │      │ Contains materials to    │
   │ seminar, including   │      │ conduct in-class seminar:│
   │ short videos on      │      │ learning objectives,     │
   │ topics such as       │      │ PowerPoint slide deck,   │
   │ coteaching, working  │      │ clinical cases,          │
   │ with cases, and      │      │ activation exercise, and │
   │ conducting an        │      │ a learner handout.       │
   │ activation exercise  │      │ Organized by clinical    │
   │                      │      │ topics                   │
   └──────────────────────┘      └──────────────────────────┘
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*The Rational Prescribing website, **www.rationalprescribing.com**, and all educational materials are available at no cost for educators; send an e-mail to **info@rationalprescribing.com** for a password to the site.

scribing skills. Focused mini-lectures were developed and used throughout the session to highlight key concepts and address learning needs. A number of "what if" scenarios were also used to enhance the

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Box 1. Medication prescribing framework

1. Identify the problem or diagnosis that requires treatment
2. Identify all potentially effective treatment options. If drugs are a consideration, proceed to step 3
3. From the list of potentially effective options, select the best drug for a specific patient. Use the systematic approach I Can PresCribE A Drug to guide drug selection:
   - Indication
   - Contraindications
   - Precautions
   - Cost, Compliance
   - Efficacy
   - Adverse effects
   - Dosage, Duration, Direction
4. Write the prescription
5. Develop and follow a monitoring plan for the drug in terms of evaluating effectiveness and detecting side effects

Data from Bajcar et al[18] and Iglar et al.[19]

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application of pharmacotherapeutic principles to other common issues arising in primary care. The in-class seminar was designed to be facilitated by a pharmacist-physician team to illustrate each professional's expertise and scope of practice, as well as to model interprofessional collaboration. For this seminar, the pharmacist and the physician were both affiliated with the residency program and had worked together previously in a clinical setting.

Evaluation of the program

For the program evaluation, 1 clinical module (ie, diabetes) was tested with family medicine residents at NYGH as part of their academic half-day. At NYGH, both teachers and learners are community based. Learners were asked to complete the Web-based module before attending the in-class session. The seminar lasted 2.5 hours and was facilitated by a physician-pharmacist team (R.B. and L.F.).

The Rational Prescribing program was evaluated using a focus group format to collect data on the residents' experience and satisfaction with the module. The project's health care educator (J.B.) conducted the focus group. A semistructured format was used and thematic analysis was conducted.[20] The Research and Ethics Board at NYGH approved the study.

Emerging themes

A total of 22 residents (13 first-year and 9 second-year residents) attended the in-class seminar, half of whom (9 first-year and second-year residents) participated in the focus group. Several key themes emerged: the positive educational value of the Web-based module, the benefit of applying learned content to authentic cases during the in-class session, the usefulness of a systematic process to prescribing, and the benefits and challenges of pharmacotherapeutic interprofessional coteaching.

Educational value of the Web-based module. Participants indicated that the module was educational. They thought that the materials would be useful as a resource and many participants requested future access to the website. Some suggested an option to print the materials from the site. Participants thought the online materials were well organized but at times daunting. The presented materials had varying levels of complexity. While a number of the participants believed that some of the material was too simplistic and more relevant to undergraduate medical learners, others thought that it was useful to have some of the foundational material available as a quick review. However, owing to the volume of information presented online, the expectations for preparatory work required for their in-class session needed to be clarified.

Applying learned content to authentic cases during the in-class session. The in-class session was also well received. Participants liked having the opportunity to apply the systematic prescribing process and the content to cases, as it provided a relevant context. In fact, they suggested increasing the number of cases that focused on adjusting medications and dosages typically seen in the family medicine environment and reducing the time spent on the activation exercise and the main case presented.

Usefulness of the systematic process to prescribing. The framework and the systematic approach to prescribing were well received by participants and also eye-openers for some. Many focus group participants suggested that it would have been useful to have learned the systematic approach during their undergraduate training. They explained that by the time they were in residency they had already started to develop prescribing habits and that learning the process at that point created challenges; they found themselves having to pause, go back to basic principles, and deconstruct their current approach to prescribing. The issue was not that the process was too long or that it had redundant steps, but that they would be more efficient in using the process had they learned it earlier in their training. Also, participants found they needed more time to properly go

through the online module than they had allotted (0.5 to 1.5 hours) and residents' time was limited.

Benefits and challenges of interprofessional co-teaching. Participants liked and valued the coteaching aspect of the face-to-face session. Teachers bantered back and forth sharing different perspectives on cases, discussed personal vignettes, and provided practical tips to model real-life situations. Participants suggested that the pharmacist take on a greater teaching role and that the cases be enhanced to illustrate the need for and benefits of collaborative medication management.

Discussion

The medication prescribing framework was found to be constructive. The use of a systematic approach to teach residents how to select a medication allowed the application of a cognitive apprenticeship approach to teaching.[21] When acquiring knowledge and applying knowledge are separated in time, "context learning" appears to be more effective than sequential learning.[22] By using clinical scenarios that residents were likely to encounter in practice, the process served as scaffolding to support the integration of information. As this approach is practised over time, the learner requires less coaching and can operate with increased independence in more complex and ill-defined situations.

A family physician and a pharmacist cotaught the described curriculum to family medicine residents. The benefits of teaching interprofessionally include an opportunity to observe how different providers have unique perspectives on applying pharmacotherapeutic concepts to patient cases.

Because the teaching in prescribing is done over many years and by a variety of instructors, having a common teaching framework can create cohesion and more effective longitudinal learning. Our participants and others have suggested that such a process should be introduced in the undergraduate medical curriculum.[5,23] In one study, a rational prescribing program in undergraduate medical education improved the prescribing skills of final-year medical students compared with general practitioners and non-participating students.[24] The introduction of the prescribing framework earlier in medical education would provide an opportunity to focus on higher-level prescribing skills, areas of controversy, and challenging situations during the family medicine residency program.

There were several limitations to the pilot. First, the study was formally evaluated in only one topic area and with one group of learners. However, the entire project used an iterative design of multiple opportunities to test and redesign with different groups of learners before the formal evaluation described above took place. Many of the themes identified through this study resonated with

what was observed previously. Second, whether this program ultimately improves knowledge or prescribing skills to decrease medication errors was not evaluated in this pilot and is an area for future research.

Using the feedback gathered from the focus group, the website was further enhanced to provide 5 additional modules on hypertension, depression, antibiotics, chronic pain, and asthma. Answers to the pretest were provided instantly, more illustrations were added, and any audio was removed. To address the request for more complex clinical scenarios and interprofessional modeling, 6 mini-cases were added to each module to allow for more discussion in areas of complexity (polypharmacy, pregnancy, patient compliance, etc). Increased time for dialogue was found by alternatively providing the introductory case in paper format and de-emphasizing a review of material already on the website.

Conclusion

The hybrid combination of preparatory Web-based learning and interprofessional coteaching in rational prescribing provided a positive educational experience that had not previously been available in the residency program. However, a systematic approach to rational prescribing might be used more often if it were introduced in undergraduate medical education—when it can become part of learners' clinical cognitive scaffolding while they are building their therapeutic foundational knowledge. The process then needs to be reviewed and enhanced in family medicine residency with a focus on practical, controversial, and challenging situations. As the program evolves, more research will be needed to demonstrate if there is improvement in prescribing habits in order to justify the time, money, and effort that is required to develop the program. 🍁

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