Editor’s Note: In this month’s column, Karl Iglar, MD; Natalie Kennie, PharmD; and Jana Bajcar, MScPharm, EdD, of St Michael’s Hospital and the University of Toronto, present the I Can PresCribE A Drug mnemonic, which summarizes the systematic approach to prescribing that they teach their residents. Office-based teachers can similarly use this approach to help residents and students select the most appropriate medication for their patients.

I welcome your comments about this feature, which is also published on the STFM Web site at www.stfm.org. I also encourage all predoctoral directors to make copies of this feature and distribute it to their preceptors (with the appropriate Family Medicine citation). Send your submissions to williamh@bcm.tmc.edu. William Huang, MD, Baylor College of Medicine, Department of Family and Community Medicine, 3701 Kirby, Suite 600, Houston, TX 77098-3926. 713-798-6271. Fax: 713-798-7789. Submissions should be no longer than 3–4 double-spaced pages. References can be used but are not required.

Count each table or figure as one page of text.

I Can PresCribE A Drug: Mnemonic-based Teaching of Rational Prescribing

Karl Iglar, MD; Natalie Kennie, PharmD; Jana Bajcar, MScPharm, EdD

Rational prescribing refers to the “selection of the most appropriate therapeutic regimen for a specific patient.” There is a need to teach learners principles of rational prescribing since one study found that medical students and residents often do not perform important tasks such as checking dosage calculations or searching for possible drug-drug interactions prior to writing a new prescription. Further, prescribing or prescription errors have been discovered in as many as 11% of all prescriptions in primary care.

A previous survey found that only 38.5% of family medicine residency programs offered a formal pharmacotherapy curriculum. More recently, the Society of Teachers of Family Medicine Group on Pharmacotherapy has published guidelines for a pharmacotherapy curriculum that can be offered during family medicine residency training. Proper training in rational pharmacotherapy does result in rational prescribing habits, at least in the short term and therefore should be an integral part of residency curricula.

Several systematic approaches to selection of pharmacotherapy have been described in the literature. The World Health Organization has published the Guide to Good Prescribing that promotes a global approach to rational prescribing. It includes creating a personal formulary of effective medications that are likely to be used frequently, defining the problem (diagnosis), specifying the therapeutic objective, ensuring that a medication from the personal formulary has proven efficacy and safety for the patient under consideration, informing the patient about the treatment, and then monitoring the results and stopping the drug when the problem has resolved. More recently, Bazaldua et al have incorporated these same principles including the consideration of non-drug therapy into the ESSEnCE approach to rational prescribing. In his description of a family medicine residency curriculum on prescribing, Gaspar lists efficacy, convenience, safety, and cost as “rational criteria” in choosing prescription drugs. Not surprisingly, various authors report similar components that are important in the rational prescribing process.
After focus groups of residents and faculty identified a need to develop a systematic approach to drug prescribing, the Family Medicine Residency Program of St. Michael’s Hospital, a fully-affiliated teaching institution within the University of Toronto, developed and adopted a formal curriculum in 2001 focusing on relevant pharmacotherapeutics knowledge and medication prescribing skills. Since then, through the therapeutics curriculum, residents have learned a systematic approach to prescribing, easily remembered by the mnemonic, I Can PresCribE A Drug, that isolates specific steps that lead to an individualized selection of a medication for a specific patient. This paper describes this approach and the related medication knowledge that the learner will need to consider at each step, which will ideally lead to the best medication being prescribed to a specific patient. This tool can be used by family medicine residents during their residency training as well as by medical students doing their clinical rotations.

I Can PresCribE A Drug Mnemonic

The mnemonic, comprised of seven components related to rational prescribing, starts with the learner creating a list of all potential pharmacotherapeutic and non-drug alternatives. This is followed by a sequence of steps that systematically eliminate or retain certain alternatives from the initial list. The end result is a selection of the best medication for a patient at a given time. Table 1 shows how this mnemonic can be applied to a specific patient situation and potential drug information resources that can be used or accessed by the learner to acquire the pharmacotherapeutic content for each step.

1. **Indication**
   The first step is to identify the diagnosis for the patient and decide if therapy is indicated. The learner must consider the general goals of therapy as well as the needs and expectations of the patient. The learner may access therapeutic information from clinical practice guidelines as well as other available evidence from clinical trials or systematic reviews. From this evidence, the learner identifies all potentially effective alternatives for therapy, both drug and non-drug, and learns if medication is indicated.

2. **Contraindications**
   The second step is to determine if any medications are absolutely contraindicated and thus need to be eliminated from the list of potential alternatives. This prompts the learner to consider drug allergies, ...

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**Table 1**

Use of the I Can PresCribE A Drug Mnemonic

**Case Scenario:**
Mrs DM, a 67-year-old woman (weight 70 kg, ideal body weight 65 kg), presents with poorly controlled diabetes mellitus (A1c 8.4%). She is currently treated with glyburide 10 mg by mouth twice per day. Her past medical history is significant for myocardial infarction complicated by congestive heart failure 1 year ago (symptoms now stable). Her medications include: glyburide 10 mg twice per day, gemfibrozil 600 mg twice per day, ramipril 10 mg once per day, aspirin 81 mg once per day, Furosemide 40 mg once per day.

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<thead>
<tr>
<th>Mnemonic Components</th>
<th>Case Example Description</th>
<th>Potential Resource Type</th>
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| I                   | Indication                | • Evidence from clinical trials  
|                     | Treatment is indicated to achieve optimal control of glycemia of an A1c < 7%. In this case, the patient is currently taking glyburide at a maximum dose, and combination therapy is recommended from clinical practice guidelines, along with lifestyle changes. (Information such as this can be found in recent evidence-based clinical practice guidelines on diabetes mellitus.) |
|                     | Potential therapeutic available alternatives to choose from include:  
|                     | • biguanides (eg, metformin)  
|                     | • glitazones (eg, pioglitazone, rosiglitazone)  
|                     | • α-glucosidase inhibitors (eg, acarbose)  
|                     | • insulin secretagogues (eg, nateglinide, repaglinide)  
|                     | • insulin |
| C, a n              | Contraindications         | • Drug product monographs, including those from:  
|                     | Due to this patient’s history of congestive heart failure, one can eliminate glitazones as a potential choice.  
|                     | • Published drug information references  
|                     | • Electronic drug information databases such as Epocrates®, Lexi-comp®, and Micromedex® Healthcare Series |

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### Table 1
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<th>Mnemonic Components</th>
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<tr>
<td><strong>Precautions</strong></td>
<td>Pregnancy and lactation as a precaution is not applicable in this case. Laboratory indices that should be performed prior to drug therapy include a serum creatinine and liver enzymes. Potential drug-drug interactions should be considered. In this case, one can eliminate repaglinide (a short-acting secretagogue) as a potential choice, since when used in combination with gemfibrozil, it may cause severe and prolonged hypoglycemia.</td>
<td>• Resources on medications during pregnancy and lactation (eg, Briggs et al. Drugs in Pregnancy and Lactation17) • Drug product monographs from published drug information references or electronic drug information databases noted above • Drug interaction references including: • Published references20,21 • Electronic drug information databases14,20</td>
</tr>
<tr>
<td><strong>Cost/Compliance</strong></td>
<td>In consulting drug benefit formularies, one may eliminate some alternatives due to their excessive cost. For example, acarbose and insulin secretagogues may have limited coverage based on specific criteria. One may rule out the use of insulin at this stage since the need for subcutaneous administration is inconvenient for the patient and has the potential to lead to noncompliance.</td>
<td>• Drug benefit or managed care formularies • Drug product monographs from published drug information references or electronic drug information databases noted above</td>
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<td><strong>Efficacy</strong></td>
<td>One can rule out acarbose at this stage as it usually produces only a mean decrease in A1c of 0.5% to 0.8%, which is inadequate for this case scenario. Other oral hypoglycemic alternatives such as insulin secretagogues and metformin are likely to produce an average A1c lowering of 1.0% to 1.5%. Use of drug classes with similar mechanisms of action (eg, sulfonylureas and insulin secretagogues) is less effective than combination therapy with agents that have different mechanisms of action. For this reason, use of insulin secretagogues such as nateglinide can be ruled out at this stage. Metformin, when used in obese patients, may improve cardiovascular outcomes, which would be of further benefit for this patient. At this stage, one realizes that metformin is a good option. Fasting blood glucose and A1c will need to be monitored to determine the effectiveness of drug therapy.</td>
<td>• Evidence from clinical trials • Evidence-based clinical practice guidelines • Evidence from systematic reviews (including Cochrane reviews14 or Clinical Evidence reviews23)</td>
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<td><strong>Adverse effects</strong></td>
<td>Potential common and serious side effects for potential treatment alternatives are considered, discussed with the patient, and monitored. For example, with metformin, a common side effect is gastrointestinal intolerance, while more-serious but rare side effects include hypoglycemia and lactic acidosis.</td>
<td>• Drug product monographs from published drug information references or electronic drug information databases noted above • Adverse drug reaction reports (such as US Food and Drug Administration SafetyAlerts25)</td>
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<td><strong>Dose/Duration/Direction</strong></td>
<td>An appropriate starting dose for this patient would be metformin 500-1,000 mg orally each day and titrate by 500 mg increments every 7 days if home blood sugar readings remain high, to a maximal dose of 2,500 mg/day based on efficacy and tolerability.</td>
<td>• Drug product monographs from published drug information references or electronic drug information databases noted above</td>
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Considering the step-wise process above, metformin is determined as the most appropriate alternative for this case, as other therapeutic alternatives have been ruled out.
major organ disease (eg, renal or hepatic, etc) or other concomitant disease in a given patient that would contraindicate the use of each therapeutic option. Drug product monographs that can be found in written references or electronic database products can be useful resources for this type of information.

3. **Precautions**

   The evaluation of precautions has three distinct steps that may lead to further reducing the list of potential alternatives. First, the learner considers if the patient is pregnant or lactating. Second, the learner is asked to determine if there are any laboratory indices that need to be assessed prior to starting therapy to ensure that all potential precautions have been considered. Third, the learner considers the patient’s medical history and other drug therapy the patient may be taking to ascertain if there are any significant drug-disease or drug-drug interactions with the therapeutic option in question. Drug product monographs can be useful for this step as well as specialized resources on drug-drug interactions and the use of medications in pregnancy and lactation.

4. **Cost/Compliance**

   This step prompts the learner to inquire about drug coverage the patient possesses and whether the therapeutic option is covered. The learner should also determine the cost of the medications being considered and consider which drug formulation allows for better compliance or easier administration, such as those that minimize the frequency of dosing.

5. **Efficacy**

   The learner now must consider the efficacy of treatment and compare the relative efficacy of the alternatives that remain as potential choices. In this step, the learner considers whether there are any patient-related factors relating to efficacy that could influence the decision and what parameters will indicate that the therapy being considered is effective. On many occasions, the learner may also consult applicable evidence from clinical trials, systematic reviews, or clinical practice guidelines to ensure the most efficacious medication is chosen.

6. **Adverse Drug Effects**

   The learner then considers not only the common adverse drug reactions a patient may encounter as a result of the therapy but also the potentially serious side effects that could further influence the choice of drug therapy. Drug product monographs from written references or electronic databases are useful resources for this step.

   At this point in the stepwise process, the learner has narrowed down the choice to the best possible pharmacotherapeutic alternative and is ready to proceed with step 7.

7. **Dosage/Duration/Direction**

   The learner must determine the appropriate dosage, duration of therapy, and any additional directions for the specific patient scenario. Drug product monographs from written references or electronic databases are potential resources for this step.

   Once the appropriate therapy is selected, the mnemonic can serve as a communication framework when discussing the rationale for therapy with a patient. Failure to consider or inform patients of important aspects of new medications, such as the name, purpose, adverse effects, and duration of therapy, may lead to nonadherence by the patient.

**Discussion**

Our I Can PresCribE A Drug mnemonic has served as a useful framework for delivering a pharmacotherapeutics curriculum to family medicine residents at St. Michael’s Hospital, Toronto. When discussing specific patients and their need for drug therapy, office-based teachers of family medicine can use this approach to help students or residents learn how to select the most appropriate medication for the patient.

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**REFERENCES**


