



Metformin and type 2 diabetes mellitus

Each of the following statements about metformin as a treatment for type 2 diabetes mellitus is true *except*:

1. It lowers hemoglobin A_{1c} concentrations by 1.0% to 1.5%.
2. It is not associated with weight gain.
3. When metformin is used as monotherapy, hypoglycemia is a serious side effect.
4. It has been shown to reduce all-cause mortality.

Answer on page 452

Source: Cheng AY, Fantus IG. Oral antihyperglycemic therapy for type 2 diabetes mellitus. *CMAJ* 2005;172:213-26.

This question is based on Question 32, Metformin and type 2 diabetes mellitus. *Self Learning* 2005;20(4):38-9. Published 6 times yearly, each issue of *Self Learning* contains a blend of questions from a range of peer-reviewed medical journals. College of Family Physicians of Canada members who subscribe to the Self Learning program may claim up to 5 Mainpro-M1 credits for each completed issue and up to 30 Mainpro-M1 credits for each year in which they subscribe. For further information please visit the College of Family Physicians of Canada website, which includes information on free trials of the on-line program, at www.cfpc.ca/sli.

Practice tips

of prescriptions of Ontario family physicians overall. In 2001, 3.7% of my prescriptions were for antibiotics, and in 2002, 2.9%. I might not be able to reduce this further, but will keep an eye on my 2004 antibiotic prescriptions to make sure they do not increase. My patients now sometimes tell me that they know I will not prescribe an antibiotic, so perhaps expectations have changed over time.

I expect to prescribe more statins because the indications have broadened for primary prevention of heart disease⁵ and for diabetes care.^{2,6} In 2001, 4.1% of my prescriptions were for this class of medication; in 2002, 4.7%; and in 2003, 5.8%.

Conclusion

Audits will likely be much easier to do once electronic medical records are introduced. Recently, a large study documented improvements in quality of care with systematic use of information technology that enabled regular audits and feedback.⁷ Audits are a good first step toward quality improvement and can indicate where changes in practice are needed. Repeat audits let you see whether the steps you have taken are effective. ❁

References

- Godwin M. Conducting a clinical practice audit: fourteen steps to better patient care. *Can Fam Physician* 2001;47:2331-3.
- Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Canadian Diabetes Association 2003 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. *Can J Diabetes* 2003;27(Suppl 2):518-20, 550-65.
- Gaede P, Vedel P, Larsen N, Jensen GV, Parving HH, Pedersen O. Multifactorial intervention and cardiovascular disease in patients with type 2 diabetes. *N Engl J Med* 2003;348:383-93.
- Arroll B, Kenealy T, Kerse N. Do delayed prescriptions reduce antibiotic use in respiratory tract infections? A systematic review. *Br J Gen Pract* 2003;53:871-7.
- Genest J, Frohlich J, Fodor G, McPherson R, Working Group on Hypercholesterolemia and Other Dyslipidemias. Recommendations for the management of dyslipidemia and the prevention of cardiovascular disease: summary of the 2003 update. *CMAJ* 2003;169:921-4.
- Snow V, Aronson MD, Hornbake ER, Mottur-Pilson C, Weiss KB; Clinical Efficacy Assessment Subcommittee of the American College of Physicians. Lipid control in the management of type 2 diabetes mellitus: a clinical practice guideline from the American College of Physicians. *Ann Intern Med* 2004;140:644-9.
- Jha AK, Perlin JB, Kizer KW, Dudley RA. Effect of the transformation of the Veterans Affairs Health Care System on the quality of care. *N Engl J Med* 2003;348:2218-27.

We encourage readers to share some of their practice experience: the neat little tricks that solve difficult clinical situations. Tips can be sent by mail to Dr Tony Reid, Scientific Editor, *Canadian Family Physician*, 2630 Skymark Ave, Mississauga, ON L4W 5A4; by fax 905 629-0893; or by e-mail tony@cfpc.ca.

Answer to Self Learning

continued from page 449

The incorrect statement is:

3. When metformin is used as monotherapy, hypoglycemia is a serious side effect.

Metformin lowers blood glucose among patients with type 2 diabetes mellitus largely by decreasing hepatic glucose output. It is also thought to increase glucose uptake by skeletal muscle. It is not protein bound and has maximum accumulation in the small intestine wall. It is excreted unmodified by the kidney.

In placebo-controlled trials, metformin lowered hemoglobin A_{1c} concentrations by 1.0% to 1.5%. The efficacy of metformin monotherapy is equivalent to that of sulfonylurea monotherapy. It is associated with weight loss or at least no weight gain. Improvements in lipid profiles have also been noted. The United Kingdom Prospective Diabetes Study examined the long-term effects of metformin compared with conventional diet therapy and intensive sulfonylurea or insulin therapy in a subgroup of overweight patients. The metformin group experienced less hypoglycemia and weight gain than did the intensive groups. In addition, the metformin group experienced a 36% relative risk reduction in all-cause mortality, a 39% relative risk reduction in myocardial infarction, and a 30% relative risk reduction in all macrovascular end points compared with the conventional group.

Gastrointestinal side effects of metformin are observed in 10% to 15% of patients, depending on the dose, and include abdominal discomfort, anorexia, bloating, and diarrhea. Because insulin secretion is unaltered, hypoglycemia is not a side effect of metformin used as monotherapy.

To date, metformin is the only oral hypoglycemic agent to demonstrate substantial cardiovascular benefit over and above its glucose-lowering effect in diabetes. It is recommended as first-line therapy for overweight patients with type 2 diabetes mellitus.

If you chose answer 1

This is not the right answer. In placebo-controlled trials, metformin lowered hemoglobin A_{1c} concentrations by 1.0% to 1.5%.

If you chose answer 2

This is not the right answer. Metformin is associated with weight loss or at least no weight gain.

If you chose answer 3

This is the right answer. Because insulin secretion is unaltered, hypoglycemia is not a side effect of metformin used as monotherapy.

If you chose answer 4

This is not the right answer. In the United Kingdom Prospective Diabetes Study, the metformin group experienced a 36% relative risk reduction in all-cause mortality. ❁