well-managed patients from warfarin to an NOAC is a disservice to our patients and to our health care system. Improved TTRs translate into fewer strokes and hemorrhages and lower health care costs.

***The need to improve warfarin management in Canada.*** Like our non–family physician specialist colleagues, family physicians are not happy with the "standard care model" of warfarin management. It is inefficient and provides suboptimal INR control. We need government-funded access to better tools to provide optimal warfarin management. What are these proven tools?

- Computer software that is capable of dosing warfarin and measuring TTR must replace the manual warfarin-dosing system.[10] In addition, we need a single warfarin database in Canada as part of a national AF registry similar to Sweden's.
- Point-of-care INR testing must replace laboratory INR testing in most instances. Testing options need to be widened to provide patients with improved access and convenience. In New Zealand, the Community Pharmacy Anti-coagulation Management Service study achieved a mean TTR of 78.6% overall and 80.3% after 6 months.[11]
- Patient self-management systems should use point-of-care INR testing in a structured program taught by diabetes or anticoagulation educators and be supervised by family physicians. Such programs have existed in Germany for 25 years; their TTRs average greater than 80% (Dr Stephan Kress, oral communication, September 2014). Patients in these programs are tested weekly. There are 200 000 German patients who self-manage. Patients who are unable to self-manage warfarin dosing usually have caregivers who are trained to assist them. We need to train caregivers.
- Use of 1-mg warfarin tablets in most cases instead of our 9 different warfarin strengths might simplify warfarin dosing, avoid tablet confusion, and permit daily or weekly dose adjustments of 0.5 mg. In Germany, patients in the self-management programs use 1-mg tablets only (Dr Stephan Kress, oral communication, September 2014).

To implement the use of these tools in Canada, we need government funding for the following elements:

- computer software ($24 per patient per annum)[12];
- point-of-care INR strips ($7 per strip)[13] and devices ($375 per device)[14]; and
- patient training by diabetes or anticoagulant educators (4 hours per patient) (Dr Stephan Kress, oral communication, September 2014).

The total cost, including monitoring and the warfarin drug, is half the cost of the NOACs and provides TTRs greater than 70%, further reducing strokes, hemorrhages, and their associated costs to a level unattainable by NOACs. Finally, in addition with warfarin, we can now cheaply monitor the degree of anticoagulation and compliance (INR) plus the quality of warfarin management (TTR), and we can affordably and promptly reverse warfarin in the event of major or minor bleeding.

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**Competing interests**
**Dr Trusler** is Vice President of INR Online Canada Limited, a not-for-profit Canadian company dedicated to the improvement of warfarin management in Canada.

**References**

1. Douketis J, Bell AD, Eikelboom J, Liew A. Approach to the new oral anticoagulants in family practice. Part 1: comparing the options. *Can Fam Physician* 2014;60:989-95 (Eng), e504-11 (Fr).
2. Douketis J, Bell AD, Eikelboom J, Liew A. Approach to the new oral anticoagulants in family practice. Part 2: addressing frequently asked questions. *Can Fam Physician* 2014;60:997-1001 (Eng), e512-7 (Fr).
3. Connolly SJ, Ezekowitz MD, Yusuf S, Eikelboom J, Oldgren J, Parekh A, et al. Dabigatran versus warfarin in patients with atrial fibrillation. *N Engl J Med* 2009;361(12):1139-51. Epub 2009 Aug 30.
4. Patel MR, Mahaffey KW, Garg J, Pan G, Singer DE, Hacke W, et al. Rivaroxaban versus warfarin in nonvalvular atrial fibrillation. *N Engl J Med* 2011;365(10):883-91. Epub 2011 Aug 10.
5. Granger CB, Alexander JH, McMurray JJ, Lopes RD, Hylek EM, Hanna M, et al. Apixaban versus warfarin in patients with atrial fibrillation. *N Engl J Med* 2011;365(11):981-92. Epub 2011 Aug 27.
6. Bauman ME, Black K, Bauman ML, Bruce AA, Kuhle S, Bajzar L, et al. EMPoWarMENT: Edmonton pediatric warfarin self-management pilot study in children with primarily cardiac disease. *Thromb Res* 2010;126(2):e110-5. Epub 2010 Jun 26.
7. Wieloch M, Själander A, Frykman V, Rosenqvist M, Eriksson N, Svensson PJ. Anticoagulation control in Sweden: reports of time in therapeutic range, major bleeding, and thrombo-embolic complications from the national quality registry AuriculA. *Eur Heart J* 2011;32(18):2282-9. Epub 2011 May 26.
8. Rosendaal FR, Cannegieter SC, van der Meer FJ, Briët E. A method to determine the optimal intensity of oral anticoagulant therapy. *Thromb Haemost* 1993;69(3):236-9.
9. *INR log* [app]. Palmerston North, NZ: HealthObs Ltd; 2014.
10. Guidelines on oral anticoagulation: third edition. *Br J Haematol* 1998;101(2):374-87.
11. Harrison J, Shaw JP, Harrison JE. Anticoagulation management by community pharmacists in New Zealand: an evaluation of a collaborative model in primary care. *Int J Pharm Pract* 2014 Sep 23. Epub ahead of print.
12. INR Online [website]. Fairmont Hot Springs, BC: INR Online; 2014. Available from: **www.inronline.ca/.** Accessed 2014 Dec 15.
13. McKesson Canada [website]. Saint-Laurent, QC: McKesson Canada; 2014. Available from: **www.mckesson.ca/home**. Accessed 2014 Dec 15.
14. Roche Canada [website]. *Diagnostic products.* Laval, QC: Roche Canada; 2014. Available from: **www.rochecanada.com/portal/ca/diagnostics.** Accessed 2014 Dec 15.

## Response

We thank Dr Trusler for his interest in our articles,[1,2] but we disagree with his claim that we "ignored some very significant facts" pertaining to a comparison of the efficacy and safety of new oral anticoagulants (NOACs) with warfarin for stroke prevention in patients with atrial fibrillation (AF).

The objective of our articles[1,2] was not to compare NOACs with warfarin, which has been comprehensively reviewed elsewhere.[3,4] Instead, we specifically explained the following:

> [T]his review focuses on treating patients who are currently taking NOACs and does not consider the process for choosing an appropriate anticoagulant for

> AF or VTE [venous thromboembolism], whether an NOAC or warfarin.[1]
>
> We also stated:
>
> [Warfarin] remains a treatment option for patients with AF or VTE [venous thromboembolism] in whom excellent anticoagulation control is attainable.[1]

Rather than engage in a potentially protracted debate on the relative merits and drawbacks of NOACs and warfarin as anticoagulants, we urge readers to reach their own conclusions by reviewing the evidence and by considering patient values and preferences, as well as the costs, of these treatment options. We also would refer readers to clinical practice guidelines developed by the Canadian Cardiovascular Society, the American College of Chest Physicians, and the European Society of Cardiology, which endorse the use of NOACs as a first-line anticoagulant option for stroke prevention for most patients with AF based on at least comparable efficacy and safety, and less intracranial hemorrhage compared with warfarin.[5-7]

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**Competing interests**
None declared

**References**

1. Douketis J, Bell AD, Eikelboom J, Liew A. Approach to the new oral anticoagulants in family practice. Part 1: comparing the options. *Can Fam Physician* 2014;60:989-95 (Eng), e504-11 (Fr).
2. Douketis J, Bell AD, Eikelboom J, Liew A. Approach to the new oral anticoagulants in family practice. Part 2: addressing frequently asked questions. *Can Fam Physician* 2014;60:997-1001 (Eng), e512-7 (Fr).
3. Ruff CT, Giugliano RP, Braunwald E, Hoffman EB, Deenadayalu N, Ezekowitz MD, et al. Comparison of the efficacy and safety of new oral anticoagulants with warfarin in patients with atrial fibrillation: a meta-analysis of randomised trials. *Lancet* 2014;383(9921):955-62. Epub 2013 Dec 4.
4. Liew A, O'Donnell M, Douketis J. Comparing mortality in patients with atrial fibrillation who are receiving a direct-acting oral anticoagulant or warfarin: a meta-analysis of randomized trials. *J Thromb Haemost* 2014;12(9):1419-24. Epub 2014 Jul 25.
5. Verma A, Cairns JA, Mitchell LB, Macle L, Stiell IG, Gladstone D, et al. 2014 focused update of the Canadian Cardiovascular Society guidelines for the management of atrial fibrillation. *Can J Cardiol* 2014;30(10):1114-30. Epub 2014 Aug 13.
6. You JJ, Singer DE, Howard PA, Lane DA, Eckman MH, Fang MC, et al. Antithrombotic therapy for atrial fibrillation: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest* 2012;141(2 Suppl):e531S-75S.
7. Camm AJ, Lip GY, De Caterina R, Savelieva I, Atar D, Hohnloser SH, et al. 2012 focused update of the ESC guidelines for the management of atrial fibrillation: an update of the 2010 ESC guidelines for the management of atrial fibrillation. Developed with the special contribution of the European Heart Rhythm Association. *Eur Heart J* 2012;33(21):2719-47. Epub 2012 Aug 24.

## We stand by our conclusion

We thank Dr Lam for his comment[1] pertaining to our Tools for Practice article on the effects of nonsteroidal anti-inflammatory drugs (NSAIDs) on fracture healing.[2] Animal studies can be very useful for hypothesis generation; however, in this case the human and the animal data differ. The references Lam provided pertained to animal studies and the review article primarily also described animal studies.[1] The human studies referenced in the Boursinos et al study[3] did not show a deleterious effect of NSAIDs on fracture healing.

Recently, another randomized controlled study comparing an NSAID (ie, ibuprofen) with morphine for children with uncomplicated fractures found that ibuprofen provided equivalent short-term pain relief with fewer adverse events.[4] We hope that the authors will also report nonunion rates.

Until evidence from randomized controlled studies demonstrate adverse effects of NSAIDs on human fracture healing, we stand by our original conclusion that NSAIDs can be used for short-term pain relief for children and adults with orthopedic injuries or fractures.

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**Competing interests**
None declared

**References**

1. Lam C. Fracture healing and NSAIDs [Letters]. *Can Fam Physician* 2014;60:985-6.
2. Taylor IC, Lindblad AJ, Kolber MR. Fracture healing and NSAIDs. *Can Fam Physician* 2014;60:817 (Eng), e439-40 (Fr).
3. Boursinos LA, Karachalios T, Poultsides KN, Malizos KN. Do steroids, conventional non-steroidal anti-inflammatory drugs and selective Cox-2 inhibitors adversely affect fracture healing? *J Musculoskelet Neuronal Interact* 2009;9(1):44-52.
4. Poonai N, Bhullar G, Lin K, Papini A, Mainprize D, Howard J, et al. Oral administration of morphine versus ibuprofen to manage postfracture pain in children: a randomized trial. *CMAJ* 2014;186(18):1358-63. Epub 2014 Oct 27.