

Warfarin Bundle Rationale

1. Warfarin dose is prescribed according to local guidance? *Is there evidence that the last advice re warfarin dosing given to patient followed current local guidance or uses computer assisted decision making e.g Dawn or INR star software?*
2. **Is the target INR and duration of treatment clearly documented in the notes?**
3. Patient complying with dosage instructions. *Has patient been taking the advised dose since last blood test?*
4. INR is taken according to previous recommendation. *INR is taken within 7 days of planned repeat INR?*
5. Patient receives regular education. **Patient has received education in the last 6 months.**
6. Have all measures been met?

Element	Justification
<p>Measure 1: Warfarin dose is prescribed according to local guidance? Is there evidence that the last advice re warfarin dosing given to patient followed current Local Guidance/ INR Star/ RAT?</p>	<p>The use of a dosing algorithm can significantly improve anticoagulant control</p> <p>Effect of a simple two-step warfarin dosing algorithm on anticoagulant control as measured by time in therapeutic range: a pilot study. Kim, Y.K., Nieuwlaat, R., Connolly, S.J., Schulman, S., Meijer, K., Raju, N., Kaatz, S. & Eikelboom, J.W. <i>Journal of Thrombosis and Haemostasis</i>, 2010 8, 101–106.</p> <p>Computerized dosing has been shown to increase the overall percentage time for which patients are in their target INR range and in some studies to reduce the frequency of testing of patients. Furthermore, it has been shown to significantly reduce the risk of bleeding and thromboembolic events and overall is a more cost-effective option to manual dosing</p> <p>Evaluation of computerized decision support for oral anticoagulation management based in primary care. Fitzmaurice, D.A., Hobbs, F.D., Murray, E.T., Bradley, C.P. & Holder, R. <i>British Journal of General Practice</i>, (1996) 46, 533–535. Effect of computer aided management on the quality of treatment in anticoagulated patients: a prospective, randomized, multicenter trial of APROAT (Automated Program for Oral Anticoagulant Treatment). Manotti, C., Moia, M., Palareti, G., Pengo, V., Ria, L. & Dettori, A.G. <i>Haematologica</i>, (2001) 86, 1060–1070.</p>

	<p>A multicentre randomised clinical endpoint study of PARMA 5 computer assisted oral anticoagulant dosage. Poller, L., Keown, M., Ibrahim, S., Lowe, G., Moia, M., Turpie, A.G., Roberts, C., van den Besselaar, A.M., van der Meer, F.J., Tripodi, A., Palareti, G. & Jespersen, J. <i>British Journal of Haematology, (2008a) 143, 274–283.</i></p> <p>An international multicenter randomized study of computer-assisted oral anticoagulant dosage vs. medical staff dosage. Poller, L., Keown, M., Ibrahim, S., Lowe, G., Moia, M., Turpie, A.G., Roberts, C., van den Besselaar, A.M., van der Meer, F.J., Tripodi, A., Palareti, G., Shiach, C., Bryan, S., Samama, M., Burgess-Wilson, M., Heagerty, A., Maccallum, P., Wright, D. & Jespersen, J. <i>Journal of Thrombosis and Haemostasis, (2008b) 6,935–943.</i></p> <p>Screening computer-assisted dosage programs for anticoagulation with warfarin and other vitamin K antagonists: minimum safety requirements for individual programs. Poller, L., Roberts, C., Ibrahim, S., Keown, M., Ageno, W., van Den Besselaar, A.M.H.P., Fitzmaurice, D., Harenbeg, J., Kitchen, S., Lowe, G., Moia, M., Palareti, G., Tripodi, A., Turpie, A.G.G. & Jespersen, J. <i>Journal of Thrombosis and Haemostasis, (2009) 7, 1736.</i></p> <p>The cost-effectiveness of computer-assisted anticoagulant dosage: results from the European Action on Anticoagulation (EAA) multicentre study. Jowett, S., Bryan, S., Poller, L., Van Den Besselaar, A.M., Van Der Meer, F.J., Palareti, G., Shiach, C., Tripodi, A., Keown, M., Ibrahim, S., Lowe, G., Moia, M., Turpie, A.G. & Jespersen, J. <i>Journal of Thrombosis and Haemostasis, (2009) 7, 1482–1490</i></p>
<p>Measure 2: Is the target INR and duration of treatment clearly documented in the notes?</p>	<p>As above</p>

<p>Measure 3: Has patient been taking the advised dose since last blood test?</p>	<p>Clearly the practice has to ensure that the patient is informed of the correct advice regarding warfarin dosage for the patient to be able to comply with the advice.</p>
<p>Measure 4: INR is taken within 7 days of planned repeat INR?</p>	<p>Patient's regular attendance for blood testing is associated with better anticoagulation control.</p> <p>Prompt repeat testing after out-of-range INR values: a quality indicator for anticoagulation care. Rose AJ, Hylek EM, Berlowitz DR, Ash AS, Reisman JI, Ozonoff A. Circ Cardiovasc Qual Outcomes. 2011 May 1; 4(3):276-82. Epub 2011 Apr 19.</p>
<p>Measure 5: Patient receives regular education. Patient has received education in the last 6 months. Patient education recorded every 6 months?</p>	<p>There is good evidence that improved patient knowledge and understanding of the use of warfarin improves anticoagulation control:</p> <p>Relationship between patients' warfarin knowledge and anticoagulation control. Tang EO, Lai CS, Lee KK, Wong RS, Cheng G, Chan TY. <i>Ann Pharmacother</i>. 2003 Jan; 37(1):34-9.</p> <p>Effect of a warfarin adherence aid on anticoagulation control in an inner-city anticoagulation clinic population. Nochowitz B, Shapiro NL, Nutescu EA, Cavallari LH. Ann Pharmacother. 2009 Jul; 43(7):1165-72. Epub 2009 Jun 23.</p> <p>A structured teaching and self-management program for patients receiving oral anticoagulation: a randomized controlled trial. Working Group for the Study of Patient Self-Management of Oral Anticoagulation. Sawicki PT. JAMA. 1999 Jan 13;281(2):145-50.</p>