

PROTHROMBIN TIME/INTERNATIONAL NORMALIZED RATIO TESTING

SUMMARY

This skill describes the steps for performing a prothrombin time/international normalized ratio test

ALERT

Oral anticoagulant therapy has a narrow therapeutic range and, despite close monitoring of therapy, thromboembolism and bleeding are common concerns

Do not perform prothrombin time/international normalized ratio (PT/INR) testing on patients who are currently taking dabigatran etexilate mesylate, which is an oral direct thrombin inhibitor for the prevention of thromboembolism in atrial fibrillation

OVERVIEW

Oral anticoagulation therapy with vitamin K antagonists (e.g. warfarin) is prescribed both prophylactically and therapeutically for patients at risk of thromboembolism, such as those with prosthetic heart valves, atrial fibrillation, or venous thrombosis. The purpose of monitoring the PT/INR is to determine the clotting tendency of the blood.

Good therapeutic control via regular monitoring of PT/INR to analyze the clotting tendency of blood is imperative to minimize adverse events. Oral anticoagulant therapy required regular and frequent monitoring to ensure that the INR is within the therapeutic range and to reduce the risk of hemorrhage. Point-of-care INR testing eliminates delays in waiting for the result of PT measurements to be processed by a laboratory and the subsequent delay in adjustment of anticoagulation dosing.

In the home setting, monitoring of the INR can be done with a portable coagulometer via a finger-stick blood sample applied to a test strip (which may come in cartridge or cassette form, depending upon the manufacturer)

The therapeutic range is typically between 2 and 3 seconds. An INR below 2 seconds or above 3 seconds increases the risk of complications. Health care practitioners use the INR results to determine the appropriate dose of vitamin K antagonists. Excessively milking the finger-stick site, not allowing alcohol to dry before pricking the finger-stick site, delaying the application of the blood sample to the test strip, or applying an inadequate amount of blood to the test strip can cause inaccurate INR results. Optimized management of oral anticoagulation therapy improves the quality of treatment. Medication dosage changes are based on the INR results to reduce the risk of complications; therefore, all PT/INR results must be reported to the practitioner. Quality control is an important part of PT/INR testing to ensure that the coagulometer is functioning properly. The manufacturer of the coagulometer provides control solution with a known INR value to test functioning, not the accuracy of the monitor. Some devices also have internal quality control, eliminating the need for an external quality control solution.

EQUIPMENT

Ensure that all necessary supplies and durable equipment are available before the home visit

- Gloves
- Coagulometer
- Lancing device or sterile lancet
- Alcohol wipes
- Gauze pads
- Puncture-proof container
- Test strips
- Capillary tube (if needed)

PROCEDURE

1. Perform hand hygiene

2. Introduce yourself to the patient
3. Verify the correct patient using two identifiers
4. Explain the procedure to the patient and ensure that he or she agrees to treatment
5. Verify the practitioner's order and assess the patient for pain
6. Prepare an area in a clean, convenient location and assemble the necessary supplies
7. Place the monitor on a stationary, even surface and prepare the lancet. To avoid inaccurate results, do not move or touch the monitor while it is testing
8. Check the expiration date of a fresh test strip
 - a) If the strip has been refrigerated, let it come to room temperature before opening the pouch
 - b) The strip must be used within a specified time after opening the pouch. Refer to the manufacturer's instructions
9. If the monitor (coagulometer) has a power button, press it to turn the monitor on. When prompted by the monitor, insert the test strip into the test strip guide on the monitor. Monitors vary by manufacturer and may be turned on by pressing the power button or by inserting the test strip into the test strip guide.
10. To ensure that the monitor and test strips are functioning together properly, perform a quality control test, with some monitors, quality control is performed automatically with each patient test; for others, follow the manufacturer's recommendation. If the quality control test fails, attempt to correct the problem with the following steps:
 - a) Verify that the test strips were stored properly
Rationale: Excessive heat or humidity will affect the test strips
 - b) Verify that the strip code matches the code on the monitor display
11. Perform hand hygiene and don gloves
12. Locate a puncture site on the tip of the finger near the top to either side of the center. Choose a site that is free from scars, lesions, and calluses
13. Clean the puncture site with an alcohol wipe or with 70% isopropyl alcohol on a clean gauze pad. Dry the site thoroughly with a clean gauze pad
Rationale: If any alcohol remains on the finger, it may cause hemolysis and inaccurate results
14. Puncture the fingertip with a lancet or lancing device and apply light continuous pressure until a large drop of blood forms
Do not squeeze or milk the finger-stick site excessively, because doing so may release interstitial fluid into the blood sample, potentially causing inaccurate results
15. Remove the drop with a dry gauze pad
Rationale: The first drop of blood contains tissue fluids that may produce inaccurate results
16. When prompted by the monitor, immediately apply the blood sample onto the sample well on the test strip. With some monitors, a capillary tube may be used to collect and apply the blood sample
Rationale: The blood sample will begin to clot if it is not applied immediately, which will result in inaccurate results
Do not apply the blood sample before the monitor is ready; an error will occur
17. Ensure that the monitor beeps and counts down as it performs the test. If the monitor does not beep and count down, a sufficient blood sample was not used
Do not add more blood to the strip
18. If necessary, remove the test strip and retest using a fresh one
Rationale: Test strips are for single use only
19. Hold a gauze pad to the puncture site until the bleeding stops
20. Retrieve the test results, which are automatically stored in the monitor memory, along with the date and time of the test. Steps for retrieving stored results vary by manufacturer
21. Discard supplies, place the lancet in a puncture-proof container, clean the outside of the monitor with an alcohol pad, remove gloves, and perform hand hygiene
22. Report the PT/INR results to the authorized practitioner
23. Document the procedure in the patient's record

PATIENT AND FAMILY TEACHING

- Teach the patient and caregiver proper storage of test strips
- Teach the patient and caregiver to correctly perform the procedure
- Teach the patient and caregiver the importance of a wallet card or medical alert bracelet or necklace to inform emergency health care providers that the patient is taking oral anticoagulants
- Instruct the patient and caregiver to contact the authorized practitioner before taking any new prescription or over-the-counter medication
- Teach the patient and caregiver to distinguish between minor and major bleeding and emergency measures for major bleeding
- Teach the patient and caregiver the signs and symptoms of and emergency measures for a possible blood clot
- Discuss with the patient and caregiver any dietary concerns, including which foods are high in vitamin K
- Tell the patient to use an electric razor instead of a razor with a blade
- Encourage questions and answer them as they arise

REFERENCES

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ADDITIONAL READINGS

None