MANAGING THE INR CLINIC
: IJN EXPERIENCE
Anticoagulation Workshop 21st August 2015

KAMALESWARY ARUMUGAM
PRINCIPAL PHARMACIST

LEE LEE HO1
NURSE MENTOR, INR CLINIC
HISTORY & OVERVIEW OF THE INR CLINIC
HISTORY

- Established in July 2003 by Dr. Lam Kai Huat
- It is for better management of warfarin therapy by a team of health professionals fully trained in anticoagulation management
- Laboratory dept - priority was given to warfarin patients and the old blood bank location was used as the INR clinic
- Pharmacy dept - pharmacists guided staff nurses in educating warfarin patients as well as provide warfarin dose adjustments & dispensing warfarin from the clinic
- Emergency dept - Patients with out of range INR referred to M.O.
- Since then:
  - our INR clinic has further expanded to 3 permanent clinic rooms and the patients numbers have increased steadily over the last 10 years
  - Dispensing of Warfarin has been centralised - Pharmacy Outpatient Block B
HISTORY

- Protocol and policy has been developed to standardise anticoagulant management
- Staff nurses and pharmacists were sent to Singapore GH to attend Anticoagulation workshop - 2005 onwards
- Pharmacy/INR Clinic collaborate with IJN College to organise the first Oral Anticoagulation workshop in August 2010
- In 2014, we started training our own nurses and pharmacists and a second Anticoagulation workshop was successfully conducted in September 2014
INR CLINIC LOCATION & OPERATING HOURS

» The INR clinic is located on Ground Floor, Block B, IJN
» The clinic is operated based on normal working hours
  » 8:00am to 5:00pm, 5 days a week (Monday to Friday), excluding public holiday
  » During the lunch hour (Monday to Thursday 1:00pm-2:00 pm; Friday 12:30pm-2:30pm), the clinic is closed
OBJECTIVES

- To assist physicians in the management of patients on oral anticoagulation therapy
- To provide service continuity and enhance patient care through education, monitoring and close follow-up to patients who require anticoagulation therapy
- To serve as an information resource regarding warfarin for patients and family/care provider
- To conduct research regarding anticoagulation therapy and related areas
SCOPE

- All IJN Out-patients who are scheduled for INR test in IJN
- All IJN POCT patients
- Patients newly started on warfarin therapy in the ward, physicians shall refer patient to the INR clinic upon discharge
- Physicians will have to document the patient’s indication for anticoagulation, intended duration of anticoagulation, and targeted INR in the patient warfarin record book upon referral
MANPOWER REQUIREMENT

- The INR clinic is staffed by full time nurses 5 days a week:
  - From 2003 - 2014: 2 staff nurses
  - From March 2014 onwards: 3 staff nurses
- A pharmacist is on-site from 8:00am to 1:00pm (Monday to Thursday) and 8:00am to 12.30pm (Friday) to provide support for the anticoagulation services in dose adjustments and general management of the clinic
- The physician provides support of the clinical services and medical authority in management of the clinic services
MANPOWER REQUIREMENT

Anticoagulation Symposium & Workshop 2015
ROLES & RESPONSIBILITIES OF THE INR CLINIC NURSES & PHARMACISTS

- Conduct interview using INR Clinic - Patient Assessment Form
- Evaluate patient’s response to warfarin therapy through the INR results and information gathered from patient’s interview
- Adjust dose according to patient specific response (INR trend, compliance issues and outcomes from initial assessment interview)
- Complete documentation in warfarin record book, patient assessment form
- Schedule appointments
# INR Clinic - Patient Assessment Form

<table>
<thead>
<tr>
<th>No.</th>
<th>Name &amp; MRN No</th>
<th>Bleeding</th>
<th>Nutritional</th>
<th>Thrombosis</th>
<th>Diet Appetite</th>
<th>Medication Change</th>
<th>NSAIDs</th>
<th>Hematopoietic Supplements</th>
<th>Illness/Hospitalization</th>
<th>Emergency/Injury</th>
<th>Exercise</th>
<th>Stress</th>
<th>Compliance</th>
<th>Indication</th>
<th>Target INR</th>
<th>INR Today</th>
<th>Previous Warfarin Dose</th>
<th>Warfarin Dose Prescribed Today</th>
<th>Duration Supplied</th>
<th>Remarks</th>
<th>SJU Pharmacist</th>
<th>Signature</th>
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</table>
SPECIFIC ROLES & RESPONSIBILITIES OF THE INR CLINIC NURSES

- At the end of the day transfer information into INR clinic database in Trakcare®
- Ensure Prescriptions Slips are collected for endorsement by physician at the end of the day
- Administer Vitamin K & SC Anticoagulant to patients, if indicated
- Teach patients to self-administer SC Anticoagulant
- Arrange for patient admission, if indicated
DOSE ADJUSTMENTS

- Dosage adjustment and duration of recall are generally done referring to Appendix 4
# Appendix 4: Warfarin Therapy Maintenance Guidelines

## Maintenance of Warfarin Therapy

<table>
<thead>
<tr>
<th>Patient's INR</th>
<th>Dose Adjustment</th>
<th>Follow-Up Algorithm</th>
<th>Number of Consecutive IN-RANGE INRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1.5</td>
<td>Increase 10-20%</td>
<td>3-7 days</td>
<td>1</td>
</tr>
<tr>
<td>1.5-1.9</td>
<td>Increase 5-10%</td>
<td>7-14 days</td>
<td>2</td>
</tr>
<tr>
<td>2.0-3.0</td>
<td>No Change</td>
<td>7-14 days</td>
<td>3</td>
</tr>
<tr>
<td>3.1-3.9</td>
<td>Decrease 6-10%</td>
<td>7-14 days</td>
<td>4</td>
</tr>
<tr>
<td>4.0-4.9</td>
<td>Hold 0-2 doses and decrease 0-15%</td>
<td>3-7 days</td>
<td>4</td>
</tr>
<tr>
<td>&gt; 5.0</td>
<td>Refer to Management of Over-Anticoagulation with Warfarin</td>
<td>3-7 days</td>
<td>4</td>
</tr>
</tbody>
</table>

### Rules for Stability and Change

1. Patients with stable therapeutic INRs presenting with a single subtherapeutic INR value do not routinely need bridging therapy. Consider no change with repeat INR in 7-14 days. Consider bridging therapy only when patient's INR has been chronically subtherapeutic.
2. If patient's INR is ± 0.2 from the therapeutic range and has been previously stable, consider no change with repeat INR in 7-14 days.
DOSE ADJUSTMENTS

- Dosage adjustment and duration of recall are generally done referring to Appendix 4
- The pharmacist or nurse is authorised to adjust warfarin dosage using a doctor’s standing instruction on the Prescription Slip
- The prescription will be counter-signed by the appointed physician later on
DOSE ADJUSTMENTS

- In general, the pharmacist or nurse manage all patients with INR of 1.4 to 5.0
- If INR <1.4 - refer to physician (unless AVR & MVR)
- If INR >4.0:
  - check for any sign and symptoms of bleeding and determine any cause or triggers for the increase in INR
  - where there’s unexplained increase in the INR, the patient management & therapy is discussed with a physician
  - if deemed appropriate, patient’s INR of ≤5.0 & there is a significant factor attributing to the increase in INR, the pharmacist or nurse can manage the patient anticoagulation therapy provided that there is no actual or suspected signs or symptoms of bleeding
REFERRAL TO PHYSICIAN

- The patient are referred to a physician in the following situation:
  - Actual or suspected signs and symptoms of severe haemorrhage regardless of INR value
  - Actual or suspected signs and symptoms of thromboembolism
  - INR values >5.0, with or without signs and symptoms of haemorrhage
  - Patients with prosthetic valve replacement: mechanical aortic valve with INR ≤ 1.6 or mechanical mitral valve with INR ≤1.7
  - When patient consistently miss appointments or remain non-compliant to therapy
APPENDIX 3: WARFARIN THERAPY INITIATION GUIDELINES

General Principles
- An anticoagulation effect generally occurs within 24 hours after administration of warfarin. However, peak anticoagulant effect may be delayed 72 to 96 hours because of a delayed decrease in several circulation clotting factors.
- Loading dose for rapid induction of warfarin should be avoided as it can increase a patient's risk of supratherapeutic INR and make it more difficult to determine a steady state dose.

Dosing Initiation
- For patients with ongoing thrombosis, warfarin should be started concomitantly with low molecular weight heparin or standard heparin. Patients without active thrombosis but require warfarin for prophylactic indication can be initiated on warfarin alone.
- In patients beginning warfarin therapy, the initial dose may start with doses between 2mg to 5mg for the first 1 or 2 days for individuals and subsequent dosing based on the INR response on the third day.

Monitoring
- Baseline PT/INR/PTT, full blood count (FBC) with platelets count and liver function test (LFT) shall be obtained prior to warfarin initiation. If baseline level not available, it should be obtained within 24 hours.

INITIATION OF WARFARIN (Target INR: 2.0-3.0)*

<table>
<thead>
<tr>
<th>Day</th>
<th>INR</th>
<th>Warfarin Dose (mg)</th>
<th>Age &lt; 70 years</th>
<th>Age &gt; 70 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 1.4</td>
<td>5mg</td>
<td>3mg</td>
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<tr>
<td>2</td>
<td></td>
<td>5mg</td>
<td>3mg</td>
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<td></td>
<td>&lt; 1.2</td>
<td>6mg to 8mg</td>
<td>4mg</td>
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<td>1.2 - 1.5</td>
<td>5mg</td>
<td>3mg</td>
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<td>1.5 - 2</td>
<td>3mg</td>
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<td>2 - 3</td>
<td>2mg</td>
<td>1mg</td>
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<tr>
<td>&gt;3</td>
<td>Hold dose and recheck INR next day</td>
<td>Hold dose and recheck INR next day</td>
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</tbody>
</table>

PRECAUTIONS DURING INITIATION OF WARFARIN
Assess each patient for sensitivity to warfarin and adjust dose:
- Age > 70
- Weight > 50kg
- Baseline INR > 1.4 or low platelet count
- Drug interactions (e.g. Amiodarone, Rifampicin)
- Malnutrition
- Severe CCF or liver disease
- Presence of Malignancy
- Increased risk of bleeding (history of falls or BGIT)
- Major surgery within 10-14 days
- HAS-BLED score ≥ 3

HAS-BLED SCORE:

| Drug or Alcohol (1 point each) | 1 or 2 | Bleeding tendency/predisposition | 1 |
| Stroke                        | 1       | Elderly (>65) | 1 |
| Abnormal renal/liver disease (1 point each) | 1 or 2 | Labile INRs, if on warfarin, TTR <60% | 1 |
| Hypertension >160mmHg        | 1       |                 |    |

*Deviation from this algorithm may be necessary for goal INR 2.5-3.5

References:
1. The University of Michigan Cardiovascular Center, Anticoagulation Management Service for Health Professionals Guidelines. Revised 10/8/08.
2. Singapore General Hospital, Warfarin Treatment Guidelines and Prescripion Chart; Revised January 2006.
### MANAGEMENT OF OVER-ANTICOAGULATION WITH WARFARIN

<table>
<thead>
<tr>
<th>INR 4.5</th>
<th>• Decrease the total weekly dose by 5-20%, omit 1-2 doses of warfarin and monitor next INR within 3-8 days</th>
</tr>
</thead>
</table>
| **INR > 4.5 but < 9** | • Omit the next 1 or 2 doses of warfarin and recheck INR within 2-3 days. Resume warfarin at a lower dose when INR is therapeutic.  
  • For patients at increased risk of bleeding, give ORAL Vit. K 1-2.5mg once.  
  • If more rapid reversal is required because the patient requires the urgent surgery, hold the warfarin therapy and give ORAL Vit. K 2.5-5mg once (expect INR to reduce within 24 hours). Repeat ORAL Vit. K 1-2mg once if INR still remains high |
| **INR > 9** | • Hold warfarin therapy, give ORAL Vit. K 2 5-5mg once. Monitor INR after 8 hours and daily for next 3 days and use additional Vit. K if necessary (Half-life of Vit. K is less than that of warfarin). |
| **Significant bleeding with any elevation of INR** | • Hold warfarin therapy, give Vit. K 5-10mg by slow IV infusion, **NOT** bolus injection (10mg over 30 minutes). Repeat IV Vit. K after 12 hours if necessary.  
  • Supplemented with FFP, PPC or FVIII, depending on the urgency of situation |

**Vitamin K (phytonadione): Appropriate use**

1. **High dose** of Vitamin K is **NOT** recommended since it causes very slow fall of INR to therapeutic range in hospital stage and increase in hospital stay.
2. Oral route is preferred over SubQ and IV as it is predictably effective, safe, and convenient and corrects INR within 24-48 hours. SubQ route is **NOT** recommended due to unpredictable absorption while IM route might cause intramuscular hemorrhage.
3. However, for anticoagulant-associated major bleed, IV delivery is the fastest and most reliable route. Also, there is a high risk of delayed enteral uptake in patient with major bleeding, therefore IV Vitamin K is recommended.
4. The onset for oral Vitamin K is 6-10 hours and peak seen at 18-24 hours while the onset for IV Vitamin K is 1-2 hours, significant effect seen at 6-8 hours and peak at 12-14 hour.
5. IV bolus of Vitamin K can cause **severe fatal allergic reaction** such as facial flushing, diaphoresis, chest pain, hypotension, dyspnea, and anaphylaxis reaction. Therefore, IV Vitamin K should be dilute in minimum of 50ml of Normal Saline and infuse over 30 minutes, or at rate not exceeding 1mg/min.

**References:**

## APPENDIX 7: INTERACTIONS OF WARFARIN

This list is not all-inclusive; INR should be monitored after initiating or modifying any drug therapy. Take extra precaution when patient is on drugs marked *, as preventative dosage adjustment might be required (refer table below for more information). Legend: 1 being least significant and 4 being most significant.

### Drug Interactions with Warfarin - Requiring Preventive Dosage Changes

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Reaction</th>
<th>Warfarin adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amiodarone</strong></td>
<td>• Amiodarone decreases warfarin metabolism within 1 week of co-administration and may last 1-3 months after discontinuation of amiodarone.</td>
<td>✓ If concurrent use is required, decrease the warfarin dose by approximately 5-10% at 1-2 weeks interval (usually a total of 30-50% is required). INR should also be closely monitored with the withdrawal of amiodarone and periodically reassessed during concurrent therapy.</td>
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<td>• Co-administration of amiodarone and warfarin increases the prothrombin time by 100% after 3-4 days.</td>
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<td>• INR&gt;3 occurred most commonly during the first 12 weeks of concomitant warfarin and amiodarone therapy.</td>
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<td>• Patients who develop hyperthyroidism secondary to amiodarone may have an additional increased anticoagulant effect.</td>
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<td><strong>Co-trimoxazole</strong> (Bactrim®)</td>
<td>• Co-trimoxazole may impair the hepatic metabolism of warfarin but may also involve displacement of warfarin from protein binding sites.</td>
<td>✓ If concurrent use is required, decrease warfarin dose by 10-20% may be considered. INR should be closely monitored, especially during initiation and discontinuation of co-trimoxazole.</td>
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<tr>
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<td>• Co-administration of co-trimoxazole and warfarin may increase the plasma concentrations of warfarin and result in significant increased INR.</td>
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<tr>
<td><strong>Fluconazole</strong></td>
<td>• Fluconazole increased the mean plasma half-life of (S)-warfarin by 276% and (R)-warfarin by 210% and result in significant increased INR.</td>
<td>✓ If concurrent use is required, decrease warfarin dose by 30-40% gradually may be considered. Due to the long half-life of fluconazole, continue monitoring for 4-5 days after fluconazole discontinuation.</td>
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<tr>
<td><strong>Metronidazole</strong></td>
<td>• Metronidazole inhibit warfarin metabolism and result in a significant increase in PT and INR.</td>
<td>✓ If concurrent use is required, decrease warfarin dose by 10% and reassess within 3-4 days.</td>
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<thead>
<tr>
<th>Drugs Reported</th>
<th>Increased INR</th>
<th>Decreased INR</th>
<th>Drugs Reported</th>
<th>Increased INR</th>
<th>Decreased INR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>1</td>
<td>1 (chronic)</td>
<td>Grapefruit</td>
<td>2</td>
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<tr>
<td>Allopurinol</td>
<td>4</td>
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<td>Grisofulvin</td>
<td>2</td>
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<tr>
<td>Amiodarone*</td>
<td>4</td>
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<td>Itraconazole</td>
<td>3</td>
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<tr>
<td>Amoxicillin/clavulanate</td>
<td>1</td>
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<td>Ketocapazole</td>
<td>3</td>
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<td>Anabolic steroid</td>
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<td>Levofloxacin</td>
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<td>Aspirin</td>
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<td>Levotiron</td>
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<td>Avocado (large amount)</td>
<td>2</td>
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<td>Melatonin</td>
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<td>Azathioprine</td>
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<td>Metronidazole*</td>
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<td>Azithromycin</td>
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<td>Carbamazepine*</td>
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<td>Metronidazole*</td>
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<td>Celecoxib</td>
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<td>Metronidazole*</td>
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<td>Chloramphenicol</td>
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<td>Metronidazole*</td>
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<tr>
<td>Chlorothiazide</td>
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<td>Metronidazole*</td>
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<tr>
<td>Clofibrate</td>
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<td>Metronidazole*</td>
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<tr>
<td>Cimidine</td>
<td>2</td>
<td></td>
<td>Metronidazole*</td>
<td>3</td>
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<tr>
<td>Clopidogrel</td>
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<td>3</td>
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<tr>
<td>Co-enzyme Q10</td>
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<td></td>
<td>Metronidazole*</td>
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<td></td>
</tr>
<tr>
<td>Co-trimoxazole*</td>
<td>4</td>
<td></td>
<td>Metronidazole*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cranberry</td>
<td>3</td>
<td></td>
<td>Metronidazole*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cyclosporine</td>
<td>2</td>
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<td>Metronidazole*</td>
<td>3</td>
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<tr>
<td>Dapsone</td>
<td>3</td>
<td></td>
<td>Metronidazole*</td>
<td>3</td>
<td></td>
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<tr>
<td>Epinephrine</td>
<td>4</td>
<td></td>
<td>Metronidazole*</td>
<td>3</td>
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</tr>
<tr>
<td>Evening Primrose Oil</td>
<td>1</td>
<td></td>
<td>Metronidazole*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fenugreek</td>
<td>1</td>
<td></td>
<td>Metronidazole*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fibrates</td>
<td>2</td>
<td></td>
<td>Metronidazole*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Fish Oil</td>
<td>3</td>
<td></td>
<td>Metronidazole*</td>
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<td></td>
</tr>
</tbody>
</table>
### APPENDIX 8: CONVERSION OF ORAL-ANTICOAGULANTS

<table>
<thead>
<tr>
<th>Convert FROM warfarin</th>
<th>Newer oral anticoagulants</th>
<th>Convert TO warfarin</th>
</tr>
</thead>
</table>
| Discontinue warfarin and start dabigatran when INR is below 2.0 | Dabigatran (PRADAXA®) | - For CrCL > 50ml/min, start warfarin 3 days before discontinuing dabigatran  
- For CrCL 30-50ml/min, start warfarin 2 days before discontinuing dabigatran |
| (1) For patients treated for prevention of stroke and systemic embolism, discontinue warfarin and start rivaroxaban when INR is below 3.0.  
(2) For patients treated for DVT, PE and prevention of recurrence, discontinue warfarin and start rivaroxaban when INR is below 2.5. | Rivaroxaban (XARELTO®) | Give warfarin and rivaroxaban concurrently until the INR is ≥ 2.0. |
| Discontinue warfarin and start apixaban when INR is below 2.0 | Apixaban (ELIQUI®) | Give warfarin and apixaban concurrently until the INR is ≥ 2.0. |

References:
2. Pradaxa® Summary of Product Characteristics, Boehringer Ingelheim Limited, last reviewed 05/2014.
4. Eliquis® Summary of Product Characteristics, Bristol-Myers Squibb-Pfizer, last reviewed 07/2014.
POCT

Anticoagulation Symposium & Workshop 2015
HOME MONITORING

- In 2006, Dr. Lam took a step forward, introducing the patient self-management of INR (POCT - Point of Care Test)
- Patients perform POCT at home and contact the INR clinic for warfarin dosage adjustment
- The home monitoring program for patients is ongoing - low numbers currently
- Advantages:
  - Convenience - time & cost saved from travelling to hospital
  - Compliance to treatment is better
  - Improved quality of life

Anticoagulation Symposium & Workshop 2015
STAFF COMPETENCY
COMPETENCY ASSESSMENT

- Formally started in 2015
- All nurses & pharmacists working in the INR Clinic must undergo competency assessment
- Yearly assessment
- 3 components:
  - Peer review
  - Case presentation
  - Written assessment
- Must pass all 3 components
Each assessment in the clinic must include **5 peer reviews (i.e. total 10 patients)**.

<table>
<thead>
<tr>
<th>Element</th>
<th>Performance Criteria &amp; Assessment</th>
</tr>
</thead>
</table>
| 3.4.1 Introduction to consultation | - Greet patient and family appropriately  
                                      - Introduce self and other colleagues as applicable  
                                      - Establish rapport with the patient and/or carer to support ongoing communication  
                                      - Establish patient identity (at least 2 identifiers) and verify patient data on green file against Warfarin Recording Book |

<table>
<thead>
<tr>
<th>Consistently</th>
<th>Usually</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Unable to comment</th>
</tr>
</thead>
</table>

**Initial assessment**

- Name & signature of evaluator
- Date of evaluation

<table>
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<th>Sometimes</th>
<th>Rarely</th>
<th>Unable to comment</th>
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</thead>
</table>

**Second assessment**

- Name & signature of evaluator
- Date of evaluation
### 3.4.3 Review of INR result and action taken

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Makes appropriate dose adjustments based on indication:</td>
</tr>
<tr>
<td></td>
<td>* Previous &amp; current INR result</td>
</tr>
<tr>
<td></td>
<td>* INR is within therapeutic range</td>
</tr>
<tr>
<td></td>
<td>* INR is below/above therapeutic range</td>
</tr>
<tr>
<td></td>
<td>• Refers patient to doctor when patients’ INR is too high/too low as defined by local policy/protocol</td>
</tr>
<tr>
<td></td>
<td>• Makes appropriate referral when:</td>
</tr>
<tr>
<td></td>
<td>* Patient has signs of minor/major bleeding</td>
</tr>
<tr>
<td></td>
<td>* Patient has signs of TIA/stroke</td>
</tr>
<tr>
<td></td>
<td>* Patient has other illness/symptoms that calls for referral</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consistently</th>
<th>Usually</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Unable to comment</th>
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</thead>
<tbody>
<tr>
<td>Initial assessment</td>
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</tr>
<tr>
<td>Name &amp; signature of evaluator</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Date of evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistently</td>
</tr>
<tr>
<td>Second assessment</td>
</tr>
<tr>
<td>Name &amp; signature of evaluator</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Date of evaluation</th>
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</thead>
</table>

### 3.4.4 INR monitoring

<table>
<thead>
<tr>
<th>Element</th>
<th>Performance Criteria &amp; Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Able to decide on appropriate frequency of INR test</td>
</tr>
<tr>
<td></td>
<td>• Able to advise patient on the importance of INR test and attending the clinic</td>
</tr>
<tr>
<td></td>
<td>• Able to advise patient on another cause of action if patient is unable to attend the appointment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consistently</th>
<th>Usually</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Unable to comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial assessment</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assessed on 8 elements:
- Introduction to consultation
- Patient interview
- Review of INR result & action taken
- INR monitoring
- Provision of information for ongoing care
- Knowledge application
- Communication skills
- Documentation of clinic activities
COMPETENCY ASSESSMENT

- Case presentation:
  - 2 subtherapeutic & 2 supratherapeutic cases & management
  - Presented to Pharmacists & Nurses who work in the INR clinic, students & interns
- Written assessment - knowledge based
- Must have attended Anticoagulation Workshop/Training

Anticoagulation Symposium & Workshop 2015
STATISTICS
PATIENT VISITS - 11 YEARS DATA

INR CLINIC PATIENT VISITS - 11 YEARS DATA

YEAR

NO OF PATIENT VISITS

2004 10060
2005 10748
2006 11317
2007 13044
2008 15017
2009 15810
2010 16478
2011 16817
2012 16935
2013 18141
2014 20589
INR CLINIC VISITS BY INDICATION (YEAR 2014)

- Valve Replacement, 10819, 53%
- PE/DVT, 426, 2%
- Valve Repair, 492, 2%
- Other indications, 2339, 11%
- AF, 6513, 32%
TTR

- Time in therapeutic range = TTR
- Percentage of time when patient has an INR in the prescribed range when stroke & bleeding risk is lowest
- Good TTR is INR in the range 2-3 >70% of the time
- Calculation is done based on Traditional method

INR RESULTS FOR TARGET RANGE 2.0-3.0 (YEAR 2014)

- 1.8-3.2, 7818, 72%
- 3.3-5.0, 984, 9%
- above 5, 97, 1%
- below 1.8, 2011, 18%
FUTURE PLANS
ANTICOAGULATION SOFTWARE

- Many available on the market
- Designed to help establish a more efficient, effective and safer way of managing patients
- Complete anticoagulation decision support package covering induction, maintenance, bridging, novel oral anticoagulants and VTE diagnosis assessment
ANTICOAGULATION SOFTWARE - PRODUCT SPECIFICATIONS/FUNCTIONS

Objectives

- Increase efficiency
- Reduce repetitive tasks
- Reduce potential errors in transcribing
- Countercheck dose & dosing interval
- Alert any drug interactions
- Highlight high-risk patients for further management
- Easy data retrieval for future research
- Able to track patient load/day
- Benchmark clinic against other organisations for further improvement
- Individual TTR report for better management
- Report yearly patient visits & patient numbers
- Overall clinic TTR reporting
- Easy data retrieval for future research
- Benchmark clinic against other organisations for further improvement
- Individual TTR report for better management
- Report yearly patient visits & patient numbers
- Overall clinic TTR reporting
- Increase efficiency
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- Overall clinic TTR reporting
Objectives

- Increase efficiency
- Reduce repetitive tasks
- Reduce potential errors in transcribing
- Countercheck dose & dosing interval
- Alert any drug interactions
- Highlight high-risk patients for further management

Overall clinic TTR reporting
- Report yearly patient visits & patient numbers
- Individual TTR report for better management
- Benchmark clinic against other organizations for further improvement
- Easy data retrieval for future research
- Able to track patient load/day
- Monitor patients who missed appointments
- Generate letters/reports for external physicians caring for patient

WITHOUT ANTICOAGULATION SOFTWARE

Manual process
ANTICOAGULATION SOFTWARE - BENEFITS

Objectives

- Increase efficiency
- Reduce repetitive tasks
- Reduce potential errors in transcribing
- Counterclockwise dose & dosing interval
- Alert any drug interactions
- Highlight high risk patients for further management
- Overall clinic TTR reporting
- Report yearly patient visits & patient numbers
- Individual TTR report for better management
- Generate letters/reports for internal/external physicians caring for patients
- Easy data retrieval for future research
- Benchmark clinic against other organizations for further improvement
- Easy to track patient load/day
- Monitor patients who missed appointments
- Able to track patient load/day
- Improve patient safety

Easy data retrieval for future research
Objectives

Increase efficiency

Reduce repetitive tasks

Reduce potential errors in transcribing

Alert any drug interactions

Highlight high risk patients for further management

Overall clinic TTR reporting

Report yearly patient visits & patient numbers

Benchmark clinic against other organisations for further improvement

Individual TTR report for better management

Easy data retrieval for future research

Able to track patient load/day

Monitor patients who have missed appointments

Generate letters/reports for internal/external physicians caring for patient

ANTICOAGULATION SOFTWARE - BENEFITS

Increase efficiency
Objectives

- Increase efficiency
- Reduce repetitive tasks
- Reduce potential errors in transcribing
- Countercheck dose & dosing interval
- Alert any drug interactions
- Highlight high risk patients for further management
- Benchmark clinic against other organisations for further improvement
- Easy data retrieval for future research
- Individual TTR report for better management
- Overall clinic TTR reporting
- Report yearly patient runs & patient numbers
- Easy data retrieval for future research
- Improvement on all processes

ANTICOAGULATION SOFTWARE - BENEFITS
The patient screen layout enables easy viewing of all the key patient information in one place with great use of colour and alerts to boost mistake proofing. Less scrolling, Less Jumping from window to window. Minimum clicks.
RISK STRATIFICATION & TTR INDICATOR

RISK STRATIFICATION

A patient risk class can be specified here to create subsets of patients by risk. Risk class names and criteria are manually defined by the DAWN user.

% TIME IN THERAPEUTIC RANGE INDICATOR

The patient’s overall time in range figures can be viewed here. Hovering the cursor over each color will display the % time in, above and below range.
INTERACTING MEDICATIONS

Any drugs that the patient is taking can be logged on the patient screen. Any relevant interaction for the drug is also displayed. Red flag icons present beside the drug and on the drugs tab, indicate that the patient is currently taking an interacting drug.

PATIENT EVENTS

Events can be logged on the patient screen, including the event severity and date. Red flag (exclamation marks) icons present beside the event and on the events tab indicate that the patient has had a recent event. Event classifications and severities can be defined by the user.
DOSE SETTING - CLEAR

CUSTOMISED DOSE SETTING & BRIDGING

The DAWN AC user has complete autonomy over the dose authorised using the DAWN AC software. The patient’s dose, next test can be set by the user. The DAWN user can double-click on the dosing instruction to produce an editable dosing section on the right hand side of the screen. LMWH Drugs can be logged within the patient visit and the LMWH regime can be specified by the user. Daily dosing amounts can be amended in editable text fields.

[Image of DAWN AC software interface displaying customized dosing instructions for Warfarin and Lovenox.]
SUMMARY

- INR Clinic is successfully managed by MDT
- In the last 11 years patient numbers have increased significantly
- Process improvements have been made in the clinic
- Future plans include implementation of an anticoagulation software to increase patient safety & efficiency
THANK YOU