



Professional Health Care in Your Own Environment

NORTHERN SYDNEY

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CLINICAL GUIDELINES FOR HOME TREATMENT & MANAGEMENT

THROMBEMBOLIC DISEASE

ACUTE/POST ACUTE CARE (APAC) NORTHERN
SYDNEY CENTRAL COAST HEALTH

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NSWHEALTH

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THROMBOEMBOLIC DISEASE - CLINICAL GUIDELINES FOR HOME TREATMENT AND MANAGEMENT

APAC Contact Numbers

Northern Sydney

Hospital In-patients:

Monday to Friday 8.00am – 5.00pm

- **(02) 9926 7292**

Monday to Friday 5.00pm – 11.00pm.

Weekends and Public Holidays

- **(02) 9926 7111** ask for APAC Nurse to be Paged

APAC/GP Shared Care Program Patients:

7 days a week, including Weekends and Public Holidays

- **0421 582 997**

Central Coast

7 days a week, including Weekends and Public Holidays

- **(02) 4320 3482**
7.00am – 11.00pm
- **(02) 4320 3555**

Referrals taken from 7:00am to 11:00pm

Clinical Guideline Statement

APAC NSCCH Clinical Guidelines for Home Treatment and Management of Thromboembolic Disease are evidence based and have been developed through close consultation with the Haematology Consultants.

Patients who have been clinically diagnosed with thromboembolic disease and commenced treatment as per RNSH Anticoagulation Guidelines* may then be considered for referral to APAC and discharged home.

Background

APAC NSCCH recommends the home treatment of thromboembolic disease through the use of Warfarin and/or twice daily dosing with Low Molecular Weight Heparin (LMWH) 1mg/kg. Patients may be dosed at 1.5mg/kg daily. The final decision will be made by the treating physician who will assess and treat patients on an individual basis. (*Therapeutic Guidelines, 2003*)(See page 7- 8)

Scope of Practice

- First Dose of LMWH should be administered either within a Hospital facility or by/in the presence of the General practitioner.
- Accredited Registered Nurses – patient assessment and monitoring and education. Administration of medication and collection of pathology specimens.

- Medical practitioners – patient diagnosis, clinical management plan and review.
- Physiotherapist – patient assessment and physiotherapy.
- Occupational Therapist – patient and environment assessment and education.
- Pharmacists – medication review and patient education.
- Social Worker - liaise, assess and provide the patient with appropriate assistance and support.

Outcomes

- The patient will be admitted through either the in-patient, SMS (Senior Medical Staff) or directly via the GP (General Practitioner) route
- Clinical improvement and decline in symptoms.
- Haemodynamically stable with no evidence of over anticoagulation
- Improved health status and function.
- Identification and management of risk factors.
- Admission to Hospital if no improvement, deterioration, or signs of haemorrhage

Definitions

Antiplatelet - Any agent that destroys platelets or inhibits their function (*Mosby, 1998*).

Antithrombotic - An agent that prevents or interferes with the formation of a thrombosis. (*Biology-Online2007*)

Anti Xa - Unfractionated Heparin Assay (*PaLMs RNSH NSCCH intranet site*)

Creatinine Clearance – Technically the amount of blood that is “cleared” of creatinine per time period. It is usually expressed in mL per minute. Is an indication of a patient’s renal function (*Mosby, 1998*).

DVT – Deep Vein thrombosis

Embolus – Emboli is composed of clotted blood, fat, air, tumour cells, masses of bacteria or parasites, bone marrow, amniotic fluid, or atheromatous material from the vessel wall. (*Mosby, 1998*).

HITTS - Heparin Induced Thrombosis and Thrombocytopenia Syndrome

PE – Pulmonary Emboli

Thrombosis – An abnormal vascular condition in which a clot develops within a blood vessel or the body

Thromboembolism – A condition in which a blood vessel is blocked by an embolus carried in the bloodstream from the site of the formation of the clot. (*Mosby, 1998*).

GP - General Practitioner

SMS - Senior Medical Officer/Consultant

CCH - Central Coast Health Sector

NSH - Northern Sydney Health Sector

NSCCH - Northern Sydney Central Coast Health

Hospital Facility In-patient – A patient who has been admitted to APAC through the hospital facility either from the **Wards, Emergency** or **EMU** departments.

Mode of Referral – Refers to the form of medical health professional who is referring a patient, e.g. SMS/VMO, GP, Nursing or Allied Health Worker.

Clinical Management – Refers to the medical responsibility and management of a patient, this will be either the SMS or GP.

APAC /GP Shared Care Program (GP Direct Referrals) - The APAC/GP Shared Care program is an extension of the APAC service that enables GPs to **directly refer** and

access the APAC service. It enables GPs to determine and **initiate** the clinical management of their patient before referring the patient to APAC for them to perform the clinical treatment. The APAC program aims to avoid unnecessary hospital presentations.

Referral to APAC

APAC NSCCH has two main modes of referral designations, either In-patient/VMO or GP designations. To be admitted to APAC NSCCH the patient should fulfil the APAC Assessment Criteria

1. APAC NSCCH Admission Criteria

The patient is required to fulfil the APAC Assessment Criteria (*Howden & Grayson, 2002*)

- Live within the Northern Sydney Central Coast Health Area
- Are medically stable (*Corwin et al, 2005*)
- Have access to a telephone/fax (*Corwin et al, 2005*)
- Has designated Medical responsibility for the clinical management of the patient, for the duration of treatment from the APAC service (*Howden & Grayson, 2002*)
- Are able to or have a carer who is able to comprehend the treatment regimen
- Able to have treatment delivered in a safe environment.
- Consent to the APAC service (*Howden & Grayson, 2002*)

Patients residing outside the NSCCH Local Government Areas, who no longer meet the criteria for APAC, will be transferred to appropriate services in consultation with the GP/Medical team.

Planned/Unplanned Leave – If the GP/Medical team has patients under their care and has to take planned or unplanned leave, they have to either:

- Arrange an accredited APAC/GP Shared Care Locum or alternate Medical Management (when hospital team) to take over the patients' clinical management. OR

Organise for the patient to be transferred to a hospital management team.

2. APAC referral criteria for Antithrombotic Thromboembolic Criteria

- Establish ongoing clinical responsibility for the duration of the treatment with the APAC service
- Complete in-patient medication chart
- GP's complete the medication authority and fax to APAC together with and relevant pathology results (the original go home with the patient).
- GP's to give prescription to patient for warfarin
- If the antithrombotic therapy chosen is not from the APAC Clinical Guidelines, ensure that it has been approved for use by the Haematology Department used by the APAC service.
- Patients **may be excluded from APAC** if critical vital signs in the 24 hours prior to referral to APAC:
 - Temp >38.5°C
 - Pulse rate >100/minute

- Hypotension ($\leq 100/50$ mm Hg or 30 mm Hg $<$ 'normal' BP) (Micheal et al, 2006)

Patient Diagnosis and Assessment Requirements

1. **Base line investigations** (to be taken before patient begins Antithrombotic Therapy, if results already known)

- History of presenting illness: symptoms, duration and prior treatment.
- Co-morbidity:

Exercise **caution** in patients with the following co-morbidities;

- Diabetes
- Renal failure
- Cardiac failure
- Liver disease
- Confusion
- Malignancy
- Excess ethanol use
- Active gastrointestinal disorders eg; peptic ulcer or inflammatory bowel disease
- Recent surgical procedure within the last 2 weeks,
- Previous severe haemorrhage during treatment with warfarin
- Prior stroke or intracerebral haemorrhage
- Bleeding disorder, platelet dysfunction eg antiplatelet agents or low platelet count
- Falls risk
- Malnourishment
- Age >65 yrs
- Current medications that may interact with warfarin eg, Antibiotics, NSAIDs, antiplatelet agents, amiodarone, antiepileptics, complimentary medications etc. Use of NSAIDS (prescribed or over the counter), allergies

2. Investigations

- Radiology/imaging
- Blood tests
 - Haematology: FBC
 - Biochemistry: INR/EUC/LFT/BSL
 - Anti XA when indicated in high risk patients

3. Exclusion Criteria

- Temperature - constantly $>38^{\circ}\text{C}$
- Respiratory rate - > 28 rpm (unless within patients normal parameters)
- Pulse rate - Pulse rate >100 bpm (unless within patients normal parameters)
- Blood pressure - Hypertension (systolic >180 &/or diastolic >100 mmHg)
 - Hypotension (systolic <100 &/or diastolic < 50 mm Hg) unless within patients normal parameters (Micheal et al, 2006)
- Altered mental status, confusion or syncope

- Vomiting more than once in the past 12 hours or unable to tolerate oral fluids
- a. Allergy to LMWH &/or Warfarin
- b. O2 saturation's on room air < %90 (unless within patients normal parameters)

Criteria for Transfer to the Emergency Department

- Vital signs indicate severe illness or haemorrhage
- Evidence of thrombosis extension, particularly after 48 hours.
- Evidence of HITTS (*see page 9*)
- Any new problem needing prompt medical assessment.
- Drug reaction where review of antithromboembolic therapy is required.

NOTE: If a patient needs to transfer to the Emergency Department, the treating Medical team or GP should be contacted after the review by Emergency Staff.

General Care

1. APAC

- A home visit will be conducted by an APAC team member and documented in the progress notes within 24hrs of the patient returning home. Home visits are timed for assessment, monitoring, administration of LMWH and other patient requirements
- Provide standardised and evidenced based intervention
- Monitor vital signs and patients general condition for potential complications
- Monitor for evidence of over anticoagulation and clot progression.
- Education and support strategies:
 - Anticoagulation regimen (timing of doses, missed doses)
 - Disease process, signs of deterioration and action
 - The signs and symptoms of bleeding
 - Common drug interactions (including herbal/ OTC medications)
 - Dietary considerations
 - Alcohol consumption
 - Recreational drug use
- Assess patient's progress, and coping mechanisms.
- Assessment of precipitating factors for admission to hospital and implementation of strategies to prevent admission/re-admission to hospital.
- Prevent disease recurrence.
- Allied Health services, Occupational Therapy, Physiotherapy, Pharmacy and Social Work advice (*Howden & Grayson, 2002*).
- Liaise with senior medical staff and GP as required.
- Monitor pharmacotherapy and referral to APAC pharmacist if necessary
- Collect blood samples before 12 noon, if required
- Home risk assessment, assistance with domestic care if necessary.
- If a Hospital Facility In-patient, APAC Registered Nurses should complete the APAC Admission prior to discharge. If patient is referred from the GP, APAC staff member will complete the APAC admission on the first home visit to the patient.

Once the referral and admission are confirmed with APAC, the first home visit will be conducted within 24 hours.

APAC Multi-disciplinary team:

- Physiotherapists.
- Occupational Therapists.
- Respiratory Clinical Nurse Specialist.
- Pharmacist.
- Registered Nurses.
- Community Care Aids.
- Social Worker
- Access to a Clinical Psychologist

2. SMS/GP Clinical Management

- Complete Hospital Discharge letter if patient is a Hospital Facility In-patient

Medical Review

- Regular review every 2-3 days (at least)
- Re-ordering of medications on appropriate medication chart by attending Medical team/GP. Updating of treatment care plan in the patient's APAC health care file.

3. Criteria for Transfer to the Emergency Department or GP Review

- Vital signs indicate severe illness
- Impaired mental status
- Respiratory rate < 30/min
- Blood pressure (SBP <90mmHg or <60mmHg)
- Any new problem needing prompt medical assessment.
- Drug reaction so review of antibiotic therapy is required.

Ref.: American College of Chest Physicians, 2004

NOTE: If a patient requires transfer to the Emergency Department, the treating Medical team or GP should be contacted after the review by Emergency Staff.

Treatment

1. LMWH (Enoxaparin) Therapy

- Twice daily dosing with Enoxaparin is the treatment of choice but patients may be dosed at 1.5mg/kg daily. See Table 1.
- The final decision will be made by the treating physician who will assess and treat patients on an individual basis.
- For uncomplicated "below knee" DVT distal to and not involving the popliteal vein, Enoxaparin 1.5mg/kg subcutaneously daily **may** be used(*AMH, 2007*)

- If a single calculated dose of Enoxaparin is greater than >120mg, consult with the Haematologist department.
- APAC recommends:
 - **maximum daily dose of 120mg**
 - **maximum BD dose of 100mg**
- All patients must be weighed before commencing therapy. This weight should be used to accurately determine the Enoxaparin dose. Round the dose to the nearest 5mg
- LMWH should be given for a **minimum** of 5 days **and** until the INR has been above 2.0 on **two consecutive** days. (*Therapeutic Guidelines Limited 2003*)

Safety Alert

It is recommended that agents which affect haemostasis should be discontinued prior to enoxaparin therapy unless strictly indicated. These agents include medications such as anticoagulants, thrombolytics, nonsteroidal anti-inflammatory drugs (NSAIDs) (including ketorolac), preparations containing aspirin (acetylsalicylic acid), systemic salicylates, ticlopidine, dextran 40, clopidogrel, other antiplatelet agents including glycoprotein IIb/IIIa antagonists or systemic glucocorticoids. If the combination is indicated, Enoxaparin should be used with careful clinical and laboratory monitoring of the haemostatic factors where appropriate. Reference: Aventis Pharma Pty Limited - Prescribing Information Clexane and Clexane Forte 2005

2. Renal Impairment

- Patients with moderate renal impairment ie: creatinine clearance (CrCl) < **50ml/min** and > **30ml/min** should have had a dose reduction of 25%. See Table 1.
- Patients with severe renal impairment ie: CrCl of < **30ml/min** the treating physician should consult haematology for the appropriate dose of LMWH. See Table 1.

Table 1

ENOXAPARIN DOSE ADJUSTMENT IN RENAL IMPAIRMENT		
Normal renal function	Mild to moderate renal impairment (CrCl 30-50mL/min)	Severe renal impairment (CrCl < 30mL/min)
Prophylactic Doses		
20mg once daily	20mg once daily	20mg once daily
40mg once daily	40mg once daily	20mg once daily
Treatment Doses		
1mg/kg twice a day	0.75mg/ kg twice a day	1mg/kg once daily
1.5mg/kg once daily	1mg/kg once daily	1mg/kg once daily

3. Formula for calculating Creatinine Clearance

Cr Cl is calculated in males by:
$$\text{CrCl (mL/min)} = \frac{(140 - \text{age in yrs}) \times \text{Ideal Wt (kg)}}{0.814 \times \text{serum creatinine (micromols/L)}}$$

For females multiply by 0.85

If the ideal body weight is not easily calculated, the **actual weight** is usually satisfactory, except in the morbidly obese:

Ideal weight for a male = 50kg + 0.9kg/cm over 152cm

Ideal weight for a female = 45.5kg + 0.9kg/cm over 152cm

NB: This formula will not accurately predict clearance in patients with rapidly changing renal function. It is also inaccurate in patient populations with little muscle mass, such as the elderly, obese or cachectic patients.

There is a link on the NSCCH intranet within the Anticoagulation Guidelines for calculation of Creatinine Clearance to be performed automatically at

<http://intranet01.nsaahs.nsw.gov.au/intranet/rns/pharmacy/guidelines/anticoag/cockcroftgault.shtml>

4. Monitoring of LMWH Therapy

Heparin Induced Thrombosis and Thrombocytopenia Syndrome (HITTS)

- Occurs after 5-7 days on heparin (IV or SC). Thrombocytopenia and in some cases paradoxical thrombosis which may be venous or arterial. (RNSH Anticoagulation Guidelines 2005)
- Heparin-induced thrombocytopenia is defined as a decrease in platelet count during or shortly following exposure to heparin. Two different types of HIT are recognised. The first, HIT type I is a benign form not associated with an increased risk of thrombosis. The second form of HIT, HIT type II, is immune-mediated and associated with a risk of thrombosis. (Thrombosis Journal 2005)
- While LMWH are less likely to cause HITTS than unfractionated heparin, nevertheless monitor for signs of this condition. Patient may have increased bruising and tissue necrosis around injection sites.
- A FBC should be done on day 5 post commencement of LMWH therapy and weekly thereafter
- A liver function test is recommended if HITTS is suspected

IF ANY SUSPICION OF HITTS:

- Do not administer LMWH.
- Contact the on call Haematology consultant or registrar.
- The patient may require hospital admission

Anti Xa Levels.

Unfractionated Heparin Anti-Xa Assay. The anti-Xa test is the most accurate and only assay for monitoring unfractionated heparin therapy available for monitoring low molecular weight heparin. (*PaLMs RNSH NSCCH intranet site*)

This is only indicated in rare circumstances;

- Renal failure CrCl <30mL/min

- Extremes of body weight
- High enoxaparin dose
- Long term LMWH therapy
- To monitor peak levels of LMWH, collect blood at 4 hours post dose. If necessary contact Haematology for advice
- Collect one (1) blue-stopper tube (3.2% sodium citrate), filled to specified volume.
- Monitor anti-Xa levels second daily as directed by haematologist

NSCCH Clot Clinic

The Clot Clinic may be accessed via Royal North Shore Hospital for patient with:

- Strong family history of clotting
- Multiple clots
- History of bleeding complications
- Stabilization difficulties

5. Warfarin Therapy

- Exercise caution in patients listed under history (Pg4) and give a loading dose of 5mg daily for the first three days
- Measure INR before starting LMWH, then on the third day of warfarin therapy, then second daily, or as directed
- Collect the blood sample for INR before midday if possible
- Contact the treating Medical Officer with INR result.
- Recommend the use of the following nomogram to determine the following warfarin dose(s).
- Inform the patient of the warfarin dose and INR via telephone.
- Continue this procedure until the INR is therapeutic on 2 consecutive readings. The target INR is usually 2 – 3 but may be higher in certain circumstances
- **Contact APAC Pharmacist**
 - If INR above 3.5 (unless indicated)
 - If there is a **sudden rapid rise** in INR (>0.6) between 2 consecutive readings
 - If poor patient compliance
 - Concomitant interacting medications (see Appendix 2)
 - Multiple risk factors
- When the patient is stable (ie **INR > 2 on two consecutive readings**) contact the treating Medical Officer and recommend that enoxaparin be ceased (only if patient has received enoxaparin for minimum of 5 days). If appropriate discharge the patient from APAC to the care of the GP.

WARFARIN DOSING

Dosing Considerations:

- Warfarin initiation causes a transient hypercoagulable state.
- Overlap warfarin with full dose enoxaparin for a minimum of 5 days.
- Warfarin can be started on Day 1 of enoxaparin / heparin therapy, except in significant thromboembolic events, then it should be started after signs of response to enoxaparin / heparin are seen.
- Ensure 2 consecutive INR's >2.0 are achieved before ceasing enoxaparin / heparin.

Warfarin Nomogram

Day	INR	Dose
1	<1.4	5 mg *
2	<1.8	5 mg*
	1.8 - 2.0	1 mg
	>2.0	Nil
3	<2.0	5 mg
	2.0 – 2.5	4 mg
	2.6 – 2.9	3 mg
	3.0 – 3.2	2 mg
	3.3 – 3.5	1 mg
	>3.5	Nil
4	<1.4	10 mg
	1.4 – 1.5	7 mg
	1.6 – 1.7	6 mg
	1.8 – 1.9	5 mg
	2.0 – 2.3	4 mg
	2.4 – 3.0	3 mg
	3.1 – 3.2	2 mg
	3.3 – 3.5	1 mg
	>3.5	Nil
>4	Dose based on clinical judgement	

* If risk factors exist consider smaller loading doses (2-4mg) and seek specialist advice.

Nomogram based on Gedge et al. Age Aging 2000; 29:31-4

APAC Documentation:

- A comprehensive record of all patient contact, direct and indirect, including communication with the patients SMS/GP or any other health representative, must be documented in the patients main and/or flow notes within 24hrs of the patient contact.
- Patients clinical condition at each visit must be documented
- Official APAC documentation should be used and completed as required
- Each page of documentation must be headed with the patient's name, date of birth and medical record number.
- Each entry into the patients medical records must be dated, timed, and have the attending health care workers signature, first initial and surname, and employee identifying number.
- Document on patients Anticoagulation Chart (Located in the APAC share drive - see Appendix 1)
 - INR
 - Date of the next INR
 - Warfarin dose(s)
 - Cessation of LMWH (when required)

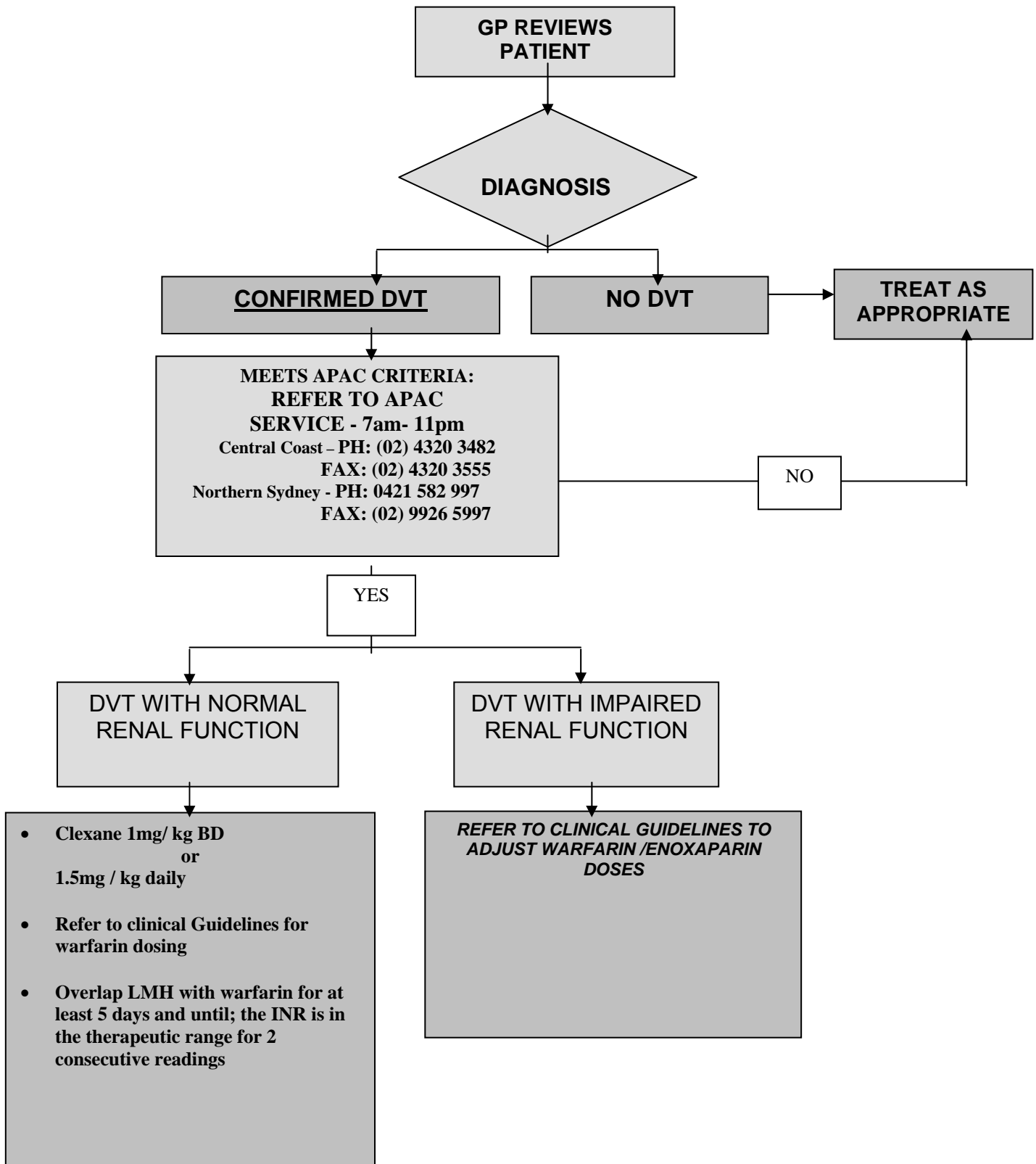
- Name of Medical Officer ordering the warfarin dose
- Name and designation of staff member

Discharge Process:

For patient discharge from APAC there should be:

- Final medical review from the treating Clinical Management team either in the patients home/hostel/nursing home, doctors consultation rooms or hospital department.
- When the patient is stable (ie: **INR > 2 on two consecutive readings**) and Enoxaparin has been ceased (recommend patient receives Enoxaparin for minimum of 5 days)
- If the GP has been not involved managing the patients care, the patient will be referred back to their GP, with details of their APAC admission, ongoing medical needs discharge letter, and anticoagulation management chart.
- General Practitioner to arrange for ongoing pathology
- Patient is referred to community services if required
- Reinforce **patient education** re anticoagulation
- APAC discharge letter and documentation to be completed
- Patient is referred to community services as appropriate

APAC/GP Shared Care Thromboembolic Flow Chart



NB*: Please refer to APAC GP Shared Care Clinical Guidelines for Home Management of Thromboembolic Disease

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RNSH Anticoagulation Guidelines 2005* (These guidelines are available on NSCCH

S:\Clinical & Operational Policies & Procedures\Apac Protocols\Clinical Guidelines for Home Treatment & Management of Thromboembolic Disease – June 07

Intranet via Pharmacy website – Prescribing Guidelines)

PaLMs RNSH, Test Directory 2007(NSCCH intranet site)

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Therapeutic Guidelines: Limited Revised July 2003

Add CMI reference for below knee DVT (also into Text under LMWH therapy)

Heparin-induced thrombocytopenia: an update

Massimo Franchini [/registration/technical.asp?process=default&msg=ce](#)
[/registration/technical.asp?process=default&msg=ce](#)

Servizio di Immunoematologia e Trasfusione, Azienda Ospedaliera di Verona, Verona, Italy

Thrombosis Journal 2005, **3**:14 doi:10.1186/1477-9560-3-14

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Appendix

Appendix 1

Some Warfarin Drug Interactions

NOTE: There are drugs **other than those listed below** which may affect warfarin control. All patients using oral anticoagulants should be advised to check their INR soon after any change in medication (conventional or complementary)

DRUGS WHICH MAY INCREASE ANTICOAGULANT ACTIVITY		
Abciximab	Ethacrynic acid	Paroxetine
Alcohol	Fluconazole	Penicillins
Allopurinol	Fluoxetine	Piroxicam
Amiodarone	Flutamide	Quetiapine
Anabolic steroids	Fluvoxamine	Quinidine
Aspirin (analgesic dose)	Garlic	Roxithromycin
Azithromycin	Gemfibrozil	Sertraline
Cefotetan	Glucagon	Simvastatin
Celecoxib	Indomethacin	Streptokinase
Cephmandole	Itraconazole	Sulphamethizole
Cephazolin	Ketoconazole	Sulphasalazine
Chloral hydrate	Ketoprofen	Sulphinpyrazone
Chloramphenicol	Ketorolac	Sulphonamides
Cimetidine	*Liothyronine	Sulindac
Ciprofloxacin	Mesalazine	Tamoxifen
Clarithromycin	Metronidazole	Tetracyclines
Clofibrate	Miconazole	*Thyroxine
Co-trimoxazole	Neomycin	Ticlopidine
Cytotoxics	Norfloxacin	Tirafiban
Danazol	Ofloxacin	Urokinase
Dextropropoxyphene	Olsalazine	Vitamin E
Diflunisal	Oral contraceptives	Zafirlukast
Doxycycline	Paracetamol (high dose / prolonged regular use)	Hormone Replacement Therapy
Erythromycin	Capecitabine	Ginseng

*In these cases altering underlying thyroid status causes the effect.

DRUGS WHICH MAY DECREASE ANTICOAGULANT ACTIVITY		
Azathioprine	Griseofulvin	Rifampicin
Barbiturates	Mercaptopurine	Sucralfate
Carbamazepine	Phenytoin	St John's wort
*Carbimazole	Primidone	Vitamin K
Cholestyramine	*Propylthiouracil	

*In these cases altering underlying thyroid status causes the effect.

COMMON DRUGS INFLUENCING PLATELET FUNCTION		
Abciximab	Dipyridamole	Naproxen
Aspirin	Ibuprofen	NSAIDS
Celecoxib	Indomethacin	Piroxicam
Clopidogrel	Ketoprofen	Sulindac
Diclofenac	Ketorolac	Ticlopidine
Diflunisal	Mefenamic Acid	