

Inpatient Anticoagulation Service - The Singapore Experience

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Overview

- Why an Inpatient Anticoagulation Service was set up
- Studies done to justify need
- How it was implemented
- Scope of the service
- Outcomes measured



Problems Identified

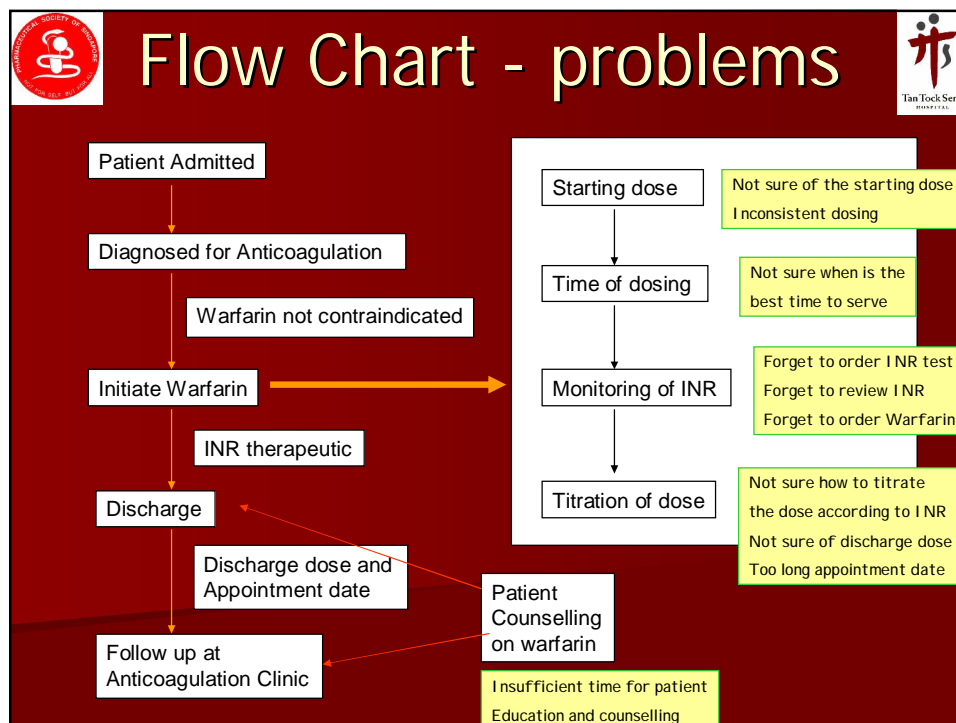
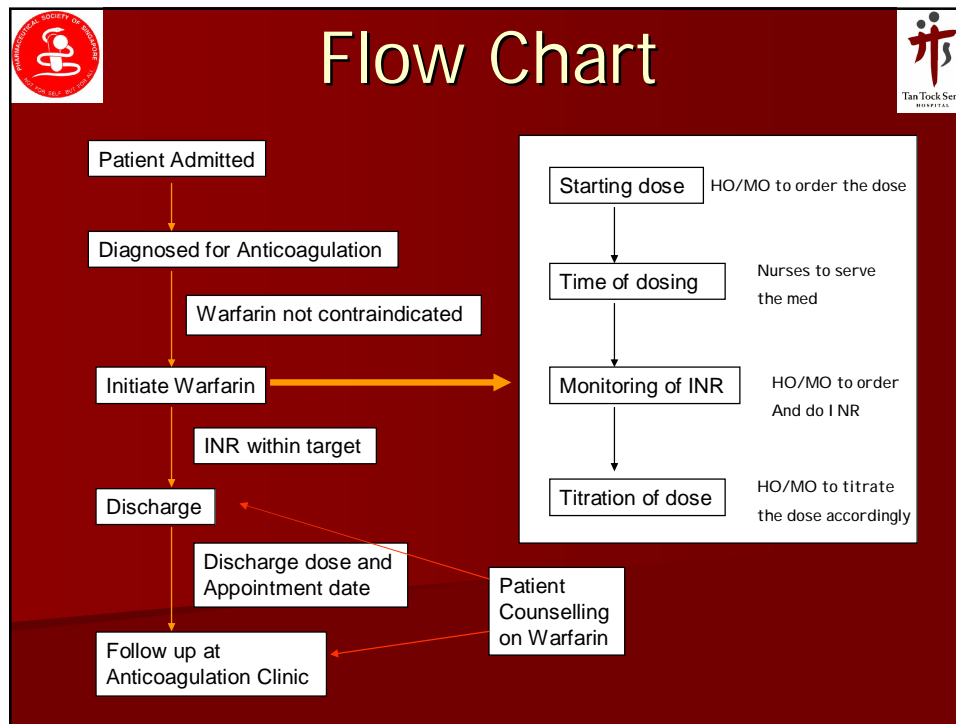
- Long inpatient stay for warfarin titration
- Erratic INR on first visit to ACC
- Not enough medication till clinic appointment
- Incomplete education
- High INR during inpatient stay
- Interacting medication given during admission
- Changes in medical condition affecting INR



(Dager *et al.* Optimization of inpatient warfarin therapy: Impact of daily consultation by a pharmacist-managed anticoagulation service. *The Annals of Pharmacotherapy* 2000; 34:567-72.)

Physician-managed cohort	Pharmacist-managed cohort
27 of 60 patients (45%) required ≥ 8 days of hospitalization following initiation of warfarin	Only 12 of 60 patients (20%; $p = 0.003$) remained in hospital ≥ 8 days after starting warfarin





Interventions

1. In-patient Pharmacist ACC service

- Supervisory role
 - assist junior staff in warfarin titration
 - ensure correct consistent dosing (correct dose ordered and served)
 - ensure INR done and results traced
- Warfarin counselling to patient before discharge
- Improve transition from in-patient to out-patient ACC follow up

2. Standard Warfarin titration protocol

- Educate and Standardise Warfarin dosing for junior staff
- Assist junior staff on practical aspects of warfarin titration
- Circulate to all doctors, nurses and pharmacists



Inpatient Anticoagulation Service

- Initiation of warfarin – dose recommendation and INR check
- Titration of warfarin dose
- Coordinate follow-up appointment
- Patient counselling
- Manage drug interaction
- Monitor disease state affecting anticoagulation management



Warfarin Initiation Protocol

Starting Warfarin For <75 YO		
Day	INR	Dose (mg)
1		5
2		5
3	< 1.5	5
	1.5 - <3.0	3
	≥3.0	NIL
4	< 1.3	6
	1.3 - <1.5	5
	1.5 - <1.7	4
	1.7 - <2.0	3
	2.0 - <2.5	2.5
	2.5 - <3.0	2.0
	3.0 - <3.5	1.5
	3.5 - <4.0	Omit for 1 day, then 1mg
	≥4.0	Omit for 2 days, then 0.5mg
≥5		Refer to pharmacist entry in casenotes

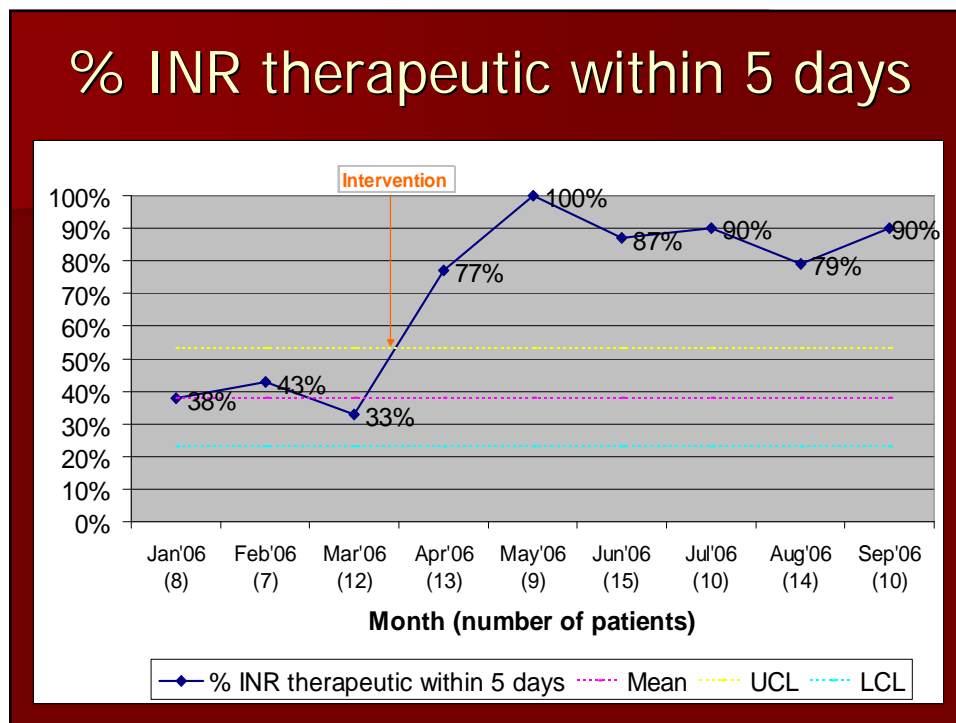
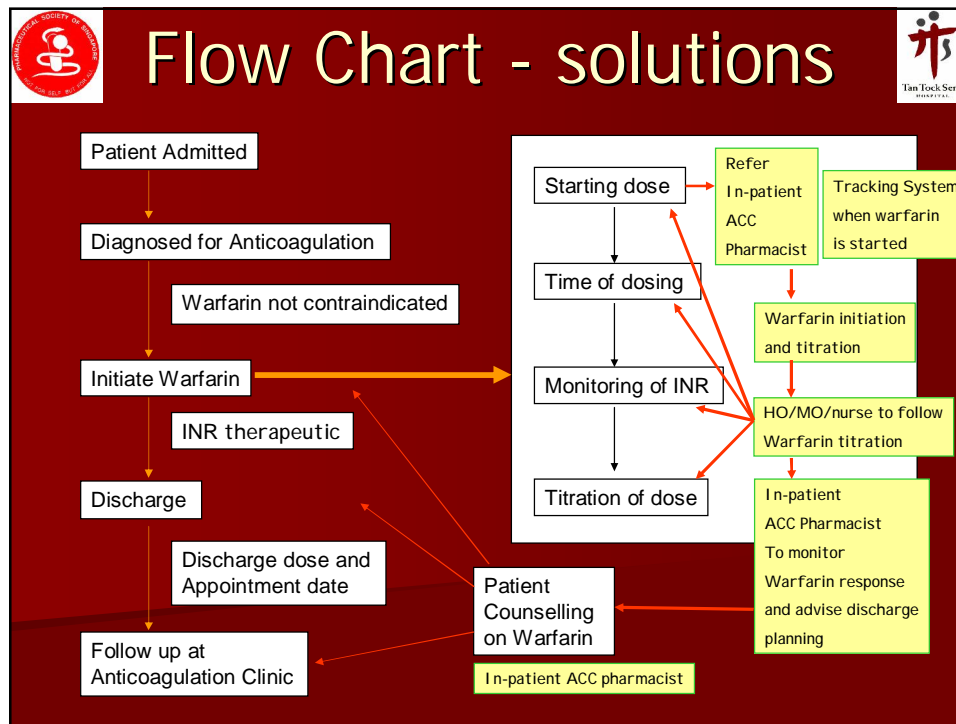
Starting Warfarin For >75 YO		
Day	INR	Dose (mg)
1		3
2		3
3	< 2.0	3
	2.0 - <3.0	2
	≥3.0	NIL
4	< 1.3	5
	1.3 - <1.5	4
	1.5 - <1.7	3
	1.7 - <2.0	2.5
	2.0 - <2.5	2.0
	2.5 - <3.0	1.5
	3.0 - <4.0	Omit for 1 day, then 1mg
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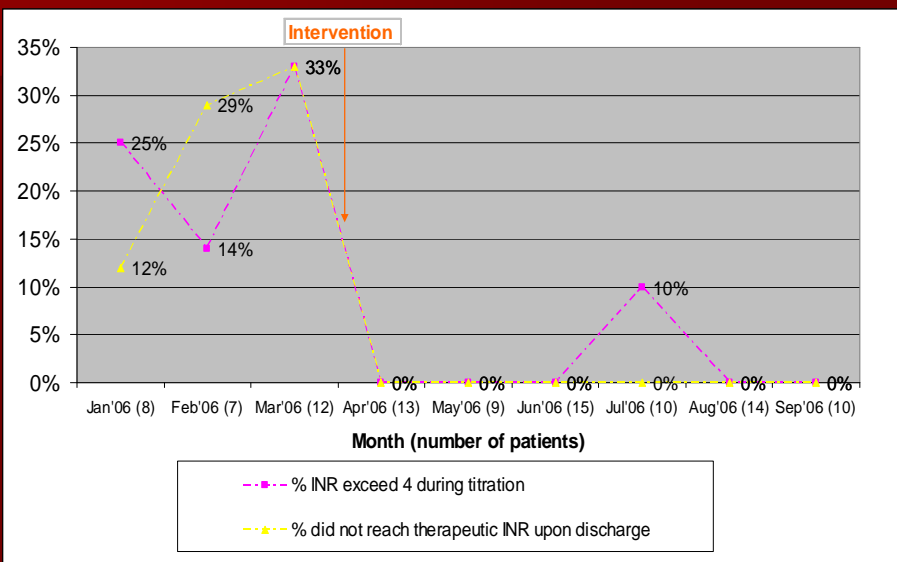
Warfarin Initiation



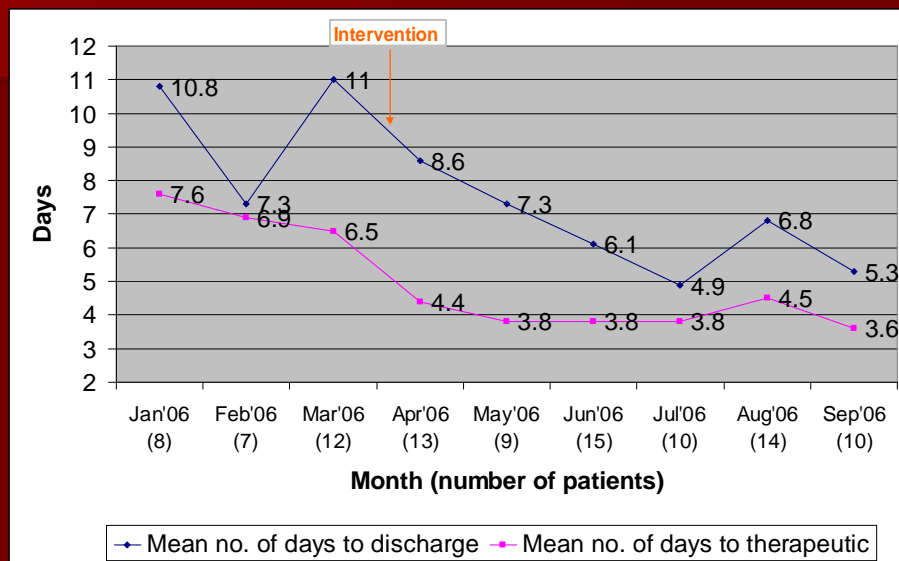
- WARFARIN GUIDELINES FOR DVT/PE
- 1. Warfarin may be started on the first day of heparin therapy except in massive DVT or PE when it should be started after signs of response to heparin are evident.
- 2. Baseline PT/PTT/INR should be measured before heparin is commenced, then on the 3rd and 4th day of warfarin therapy, then every other day until stabilised, then twice weekly.
- 3. 5mg should be given for the 1st two days in the evening except in the elderly (>75 yo), patients with CCF, liver disease, thyrotoxicosis, prolonged hospitalisation with poor nutrition or high risk of bleeding, where 3mg should be used.
- 4. From the 3rd day of warfarin therapy, the dose is adjusted according to the INR (see table below). The dose adjustment schedule should be taken as a guide only.



Supra- & Sub-therapeutic INR



Time to therapeutic & discharge



Outcomes (first 6 months)

1. Clinical

- Improve process
 - Reduce mean no. days to therapeutic from 7 to 4 days (less 3 days)
 - Reduce mean no. of days to discharge (ALOS) from 9.7 to 6.5 days (save 3.2 days)
- Improve Patient Safety
 - Reduce in-patient overanticoagulation (INR>4) from 24% to 1.7%
 - Reduce subtherapeutic INR discharge from 25% to 0%

2. Cost Saving

- Cost of a one-day stay for diagnosis of DVT is S\$345
- 150 patients newly admitted for DVT in TTSH each year
- Anticipated cost avoidance S\$165,600 per year
- Cost of a pharmacist S\$61,440 per year
- For every \$1 spent, \$2.7 is saved

3. Better Patient Care

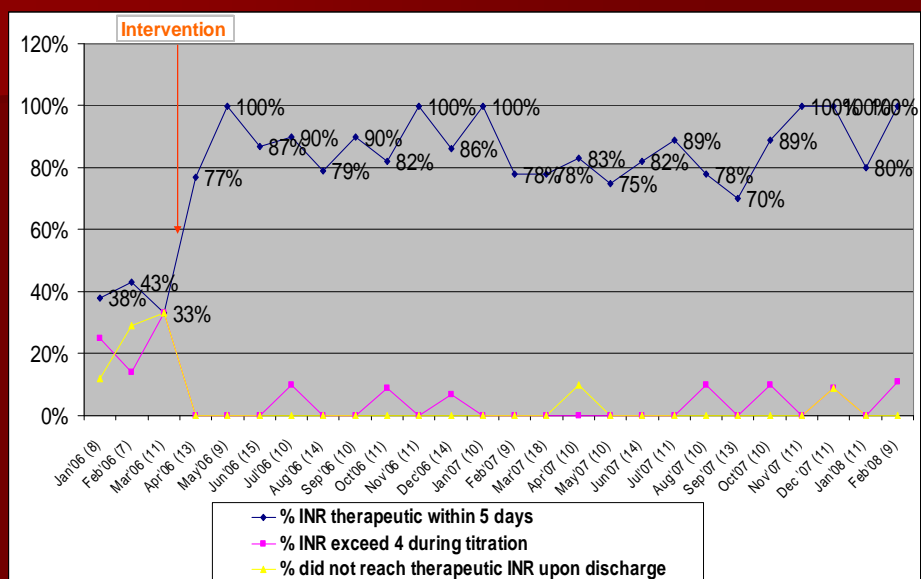
- Inpatient Counselling
- Continuity of Care from in-patient to out-patient ACC Service

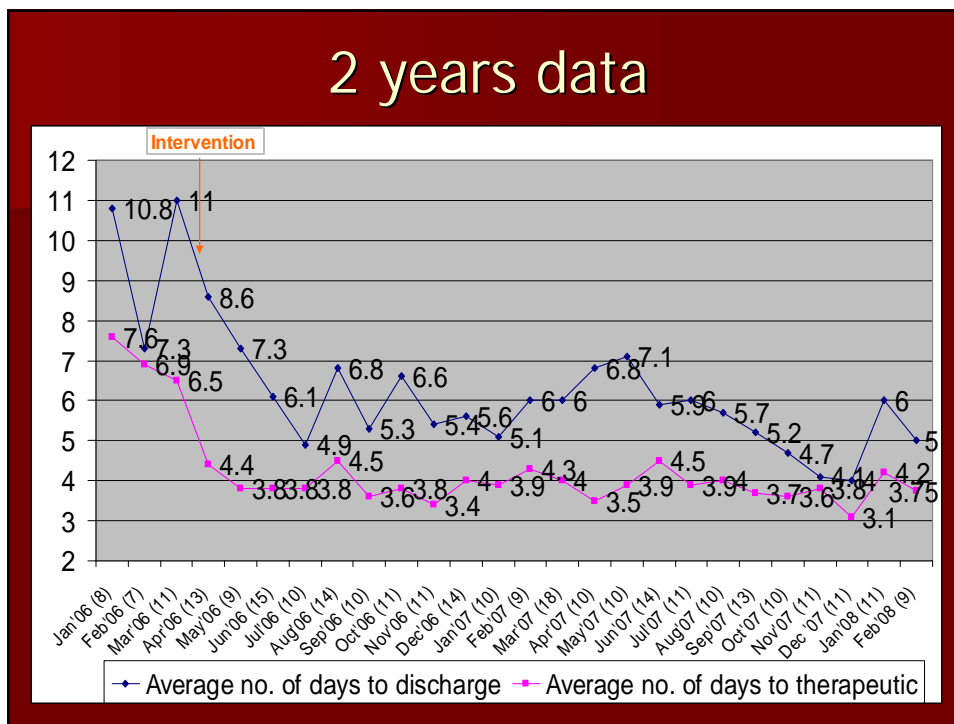


Faster, Cheaper and Safer



2 years data





Conclusion

- Inpatient Anticoagulation Service
 - Reduce warfarin titration time
 - Shorten length of hospital stay
 - Reduce supra- & sub-therapeutic INR and the need to treat the complications
 - Reduce cost
 - Improve coordination and transition of care between in- & out-patient ACC
- Implemented as hospital wide service
- Spread to other hospitals



Acknowledgements



Pharmaceutical Society of Singapore



Tan Tock Seng Hospital