A decorative border on the left side of the slide features a vertical stack of images: a pair of golden keys, a blue clock face, a white pill, and a coin with the letter 'E'. The background of the slide is a light blue gradient with a faint, large clock face visible in the bottom right corner.

Improving Anticoagulation Control Without Increasing the Frequency of Clinic Visits in an Anticoagulation Clinic

PC Ho, SY Lin, MF Leung, CM Chu




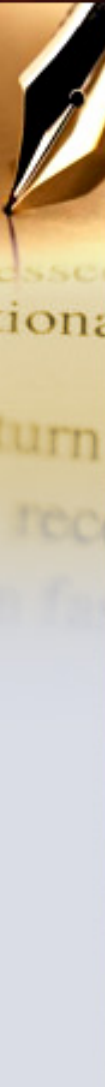

Department of Medicine and Geriatrics, United Christian Hospital

Presented by Dr Ho Ping Cheong

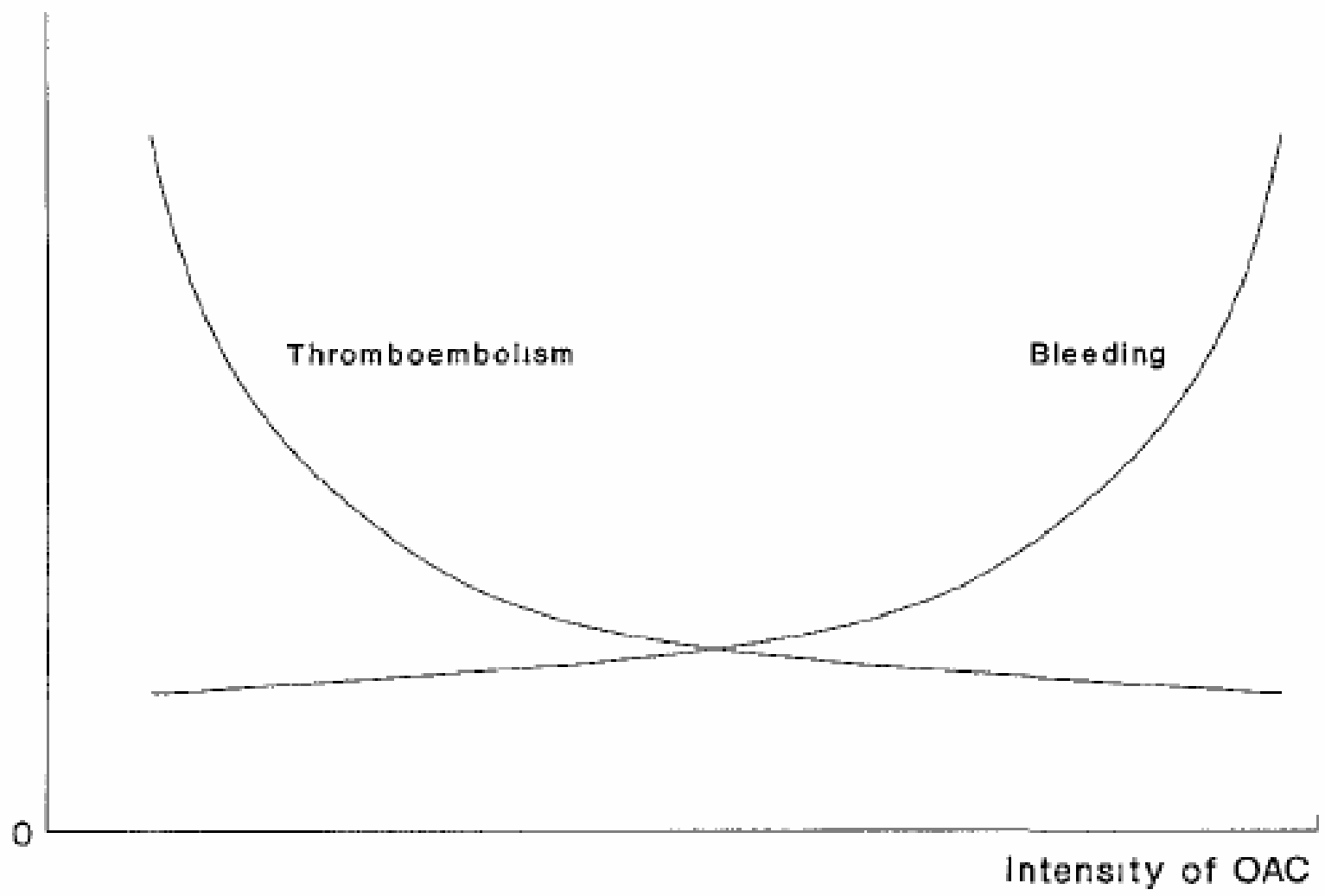


Background

Warfarin

-  Vitamin K antagonist
 -  Widely used in a variety of clinical setting
 -  Use of warfarin requires close monitoring and dose adjustment because of its narrow therapeutic range.
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Incidence rates



Introduction

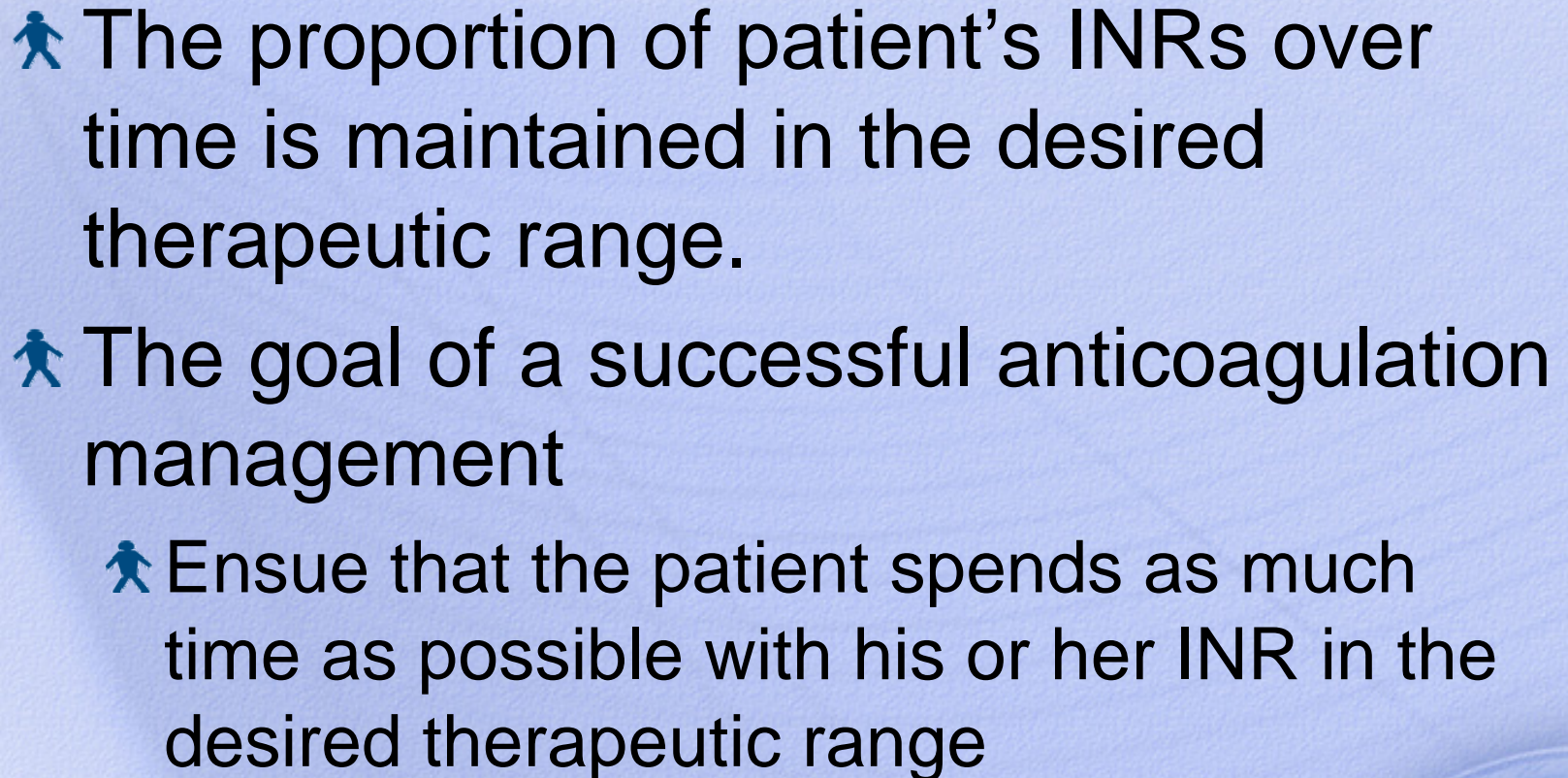
Optimal therapeutic range of INR

Indications	Target INR range
Deep vein thrombosis	2-3
Pulmonary embolism	
Atrial Fibrillation	
CRHD	
Prosthetic heart valves	2.5-3.5



Introduction

What is anticoagulation control?

- ✚ The proportion of patient's INRs over time is maintained in the desired therapeutic range.
 - ✚ The goal of a successful anticoagulation management
 - ✚ Ensure that the patient spends as much time as possible with his or her INR in the desired therapeutic range
- 

Introduction

Why anticoagulation control important?

- ✚ Poor quality of anticoagulation control
 - ✚ Associated with high % of hemorrhagic and thromboembolic complication
- ✚ A meta-analysis demonstrated that good anticoagulation control could result in almost 50% reduction of anticoagulant associated adverse events.

Oake N, Fergusson DA, Forster AJ, Walraven CV. Frequency of adverse events in patients with poor anticoagulation: a meta-analysis. CMAJ 2007;176(11):589-594



Introduction

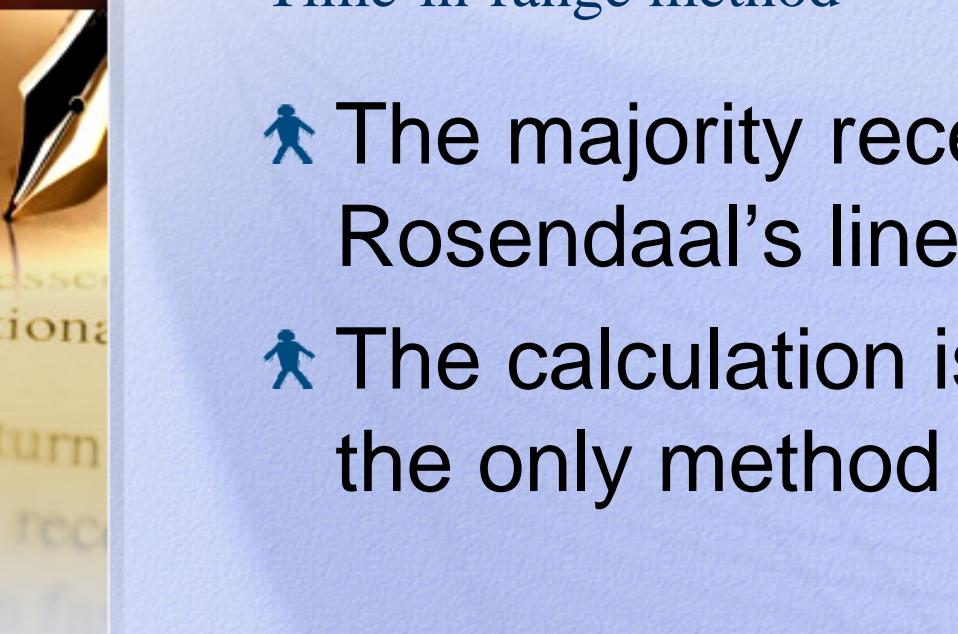

Methods to measure anticoagulation control

- 🚶 % of patient's time in the therapeutic range
- 🚶 % of INR tests in the range
- 🚶 Point prevalence method (least use, not used in this study)



Introduction

Time-in-range method

- ✚ The majority recent studies utilize Rosendaal's liner interpolation method.
 - ✚ The calculation is complicated but it is the only method that incorporates time.
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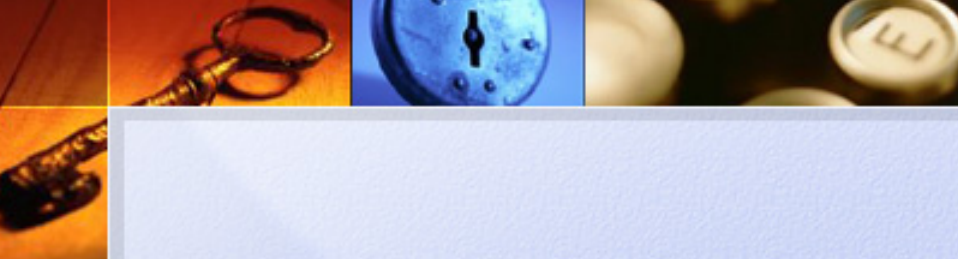
Appendix. Calculation of percentage of individual patient time and International Normalized Ratio (INR) tests in the therapeutic range.

Step 1. Four INRs and the corresponding dates for these measurements are shown for one of the patients from the study. Time is divided between two measures in halves and allocated the first half to the INR value of the first, and the second half to the INR value of the second measurement. Total time elapsed over all INR monitoring is determined.

Date	<u>23/12/06</u>	<u>22/01/07</u>	<u>02/03/07</u>	<u>26/03/07</u>
INR	1.2	2.6	2.4	2.2
Times allocated to specific INR (days)	↔ 15	↔↔↔ 15 19.5	↔↔↔↔ 19.5 12	↔ 12
Total time elapsed (days)	←	————— 93	—————	→

Step 2. Allocation of individual time in different INRs.

INR	Days
1.2	15
2.6	34.5 (15+19.5)
2.4	31.5 (19.5+12)
2.2	12



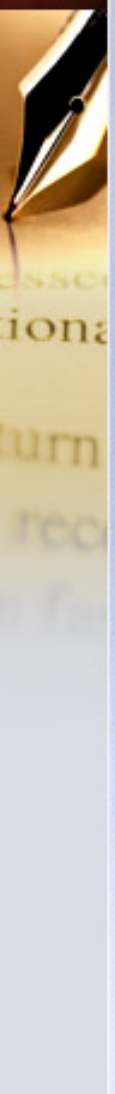

Step 3. For a desired therapeutic INR range 1.5-2.5, INR 1.2 is as regarded as below range, INR 2.6 as above range and INR 2.4 and 2.2 within range.

Percentage time below range	$15/93 \times 100\% = 16.0\%$
Percentage time above range	$34.5/93 \times 100\% = 37.0\%$
Percentage time in range	$100\% - 16\% - 37\% = 47.0\%$ or $(31.5 + 12)/93 \times 100\% = 47.0\%$
Percentage of <u>INRs</u> below range	$1/4 \times 100\% = 25.0\%$
Percentage of <u>INRs</u> above range	$1/4 \times 100\% = 25.0\%$
Percentage of <u>INRs</u> in range	$2/4 \times 100\% = 50.0\%$



Introduction


Test-in-range method

- ✚ It is simple to calculate.
 - ✚ The % of test in range method is affected by the frequency of INR measurements.
 - ✚ If an INR is out of range, which frequently occurs when therapy is interrupted for procedures, more INR measurements will be required and would increase the out of range percentage.
 - ✚ This method was commonly used in the old days before time in range method was widely utilized.
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Introduction

Anticoagulation clinic in UCH

- 🚶 Established in 2001
 - 🚶 Provide coordinated management to patients on long term anticoagulant therapy.
 - 🚶 Staffed by a haematologist, a geriatrician and 2-3 physician trainees of the department.
 - 🚶 One session of the clinic per week at where about 80 patients will be seen.
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Introduction

An audit of our anticoagulation clinic

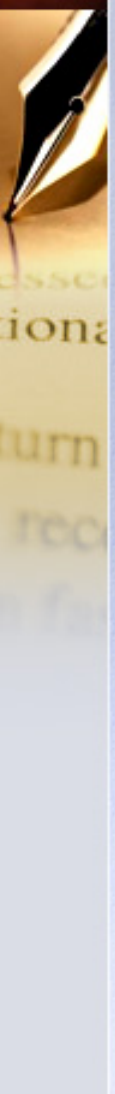

- 🚶 200 patients following up in our anticoagulation clinic during July 2005 to March 2007
- 🚶 The quality of anticoagulation control and major complication rate in the clinic is comparable to published studies.
- 🚶 The mean time interval between INR tests are 5.31 ± 1.20 weeks and the mean time interval of clinic visits were 9.0 ± 2.20 weeks, indicating that patients usually had one additional INR test between clinic visits.

Ho PC et al. An audit on the quality of warfarin therapy management in an anticoagulation clinic. Poster presentation. 2008 HA Convention.



Introduction

Anticoagulation clinic in UCH

- ✚ In the past, only one INR test was arranged before the patient following up in the clinic and there was no interim INR test in between clinic visits.
 - ✚ The current practice of our anticoagulation clinic is that patients are usually followed up every 6 to 12 weeks if they are stable on warfarin treatment.
 - ✚ INR test is performed a few days before clinic follow up visit. An additional interim INR test will usually be arranged if there is a long follow interval between two visits. .
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Introduction

Anticoagulation clinic in UCH

- 🚶 Interim INR tests will be screened by physicians in the warfarin clinic
- 🚶 If the INR value significantly deviates from the pre-defined target range, a telephone consultation will be provided by doctor or nurse in the clinic.
- 🚶 Repeating INR test, modification of warfarin dosage, early follow up or urgent admission will be arranged if necessary.

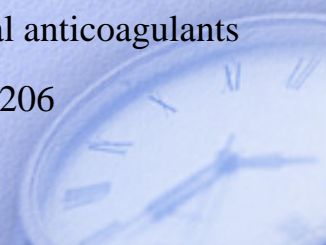


Introduction

Frequency of INR monitoring

- 🚶 More frequent INR testing results in higher time in therapeutic range and fewer adverse events.
- 🚶 A recent large study of patients with chronic atrial fibrillation looked at over 250,000 INRs and found a greater time-in-range as the testing interval decreased from every 5 weeks to every 3 weeks.

Shalev V et al. The interval between prothrombin time tests and the quality of oral anticoagulants treatment in patients with chronic atrial fibrillation. *Thromb. Res.* 2007.120. 201-206



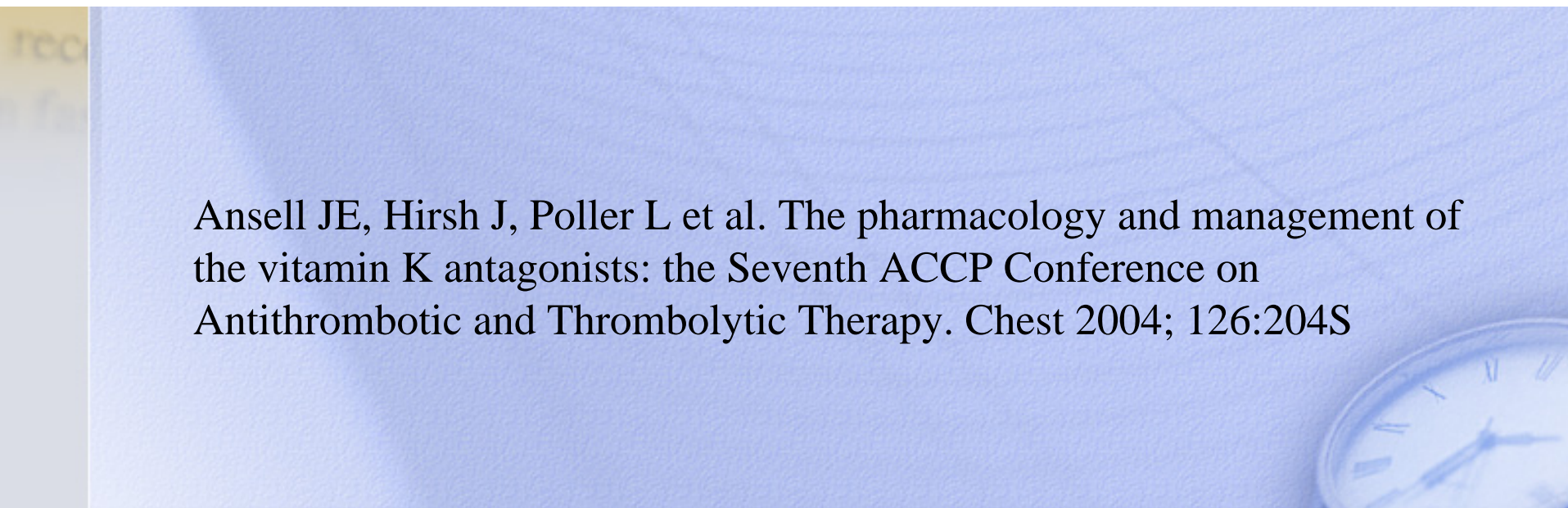


Background

Frequency of INR tests

2.1.3.2. For patients who are receiving a stable dose of oral anticoagulants, we suggest monitoring at an interval of no longer than every 4 weeks (**Grade 2C**).

Ansell JE, Hirsh J, Poller L et al. The pharmacology and management of the vitamin K antagonists: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004; 126:204S





Introduction



Frequency of INR monitoring

- ✚ Since September 2006, there was a new initiative in our anticoagulation clinic to have INR checking not more than 4 weeks apart in every patient receiving warfarin.
- ✚ This initiative may increase the frequency of patient visits and the workload of an already very busy anticoagulation clinic.



Objectives

 To evaluate

-  The feasibility of applying the initiative of 4 weekly INR testing
-  Its effect on anticoagulation control and frequency of clinic visits



Methods

Patients

- 🚶 Medical records of 218 patients on warfarin therapy
- 🚶 Following up the anticoagulation clinic during the July to September 2005 were reviewed.
- 🚶 Patients who were still receiving warfarin therapy at the end of March 2007 were recruited for analysis.



Methods



Outcome measures

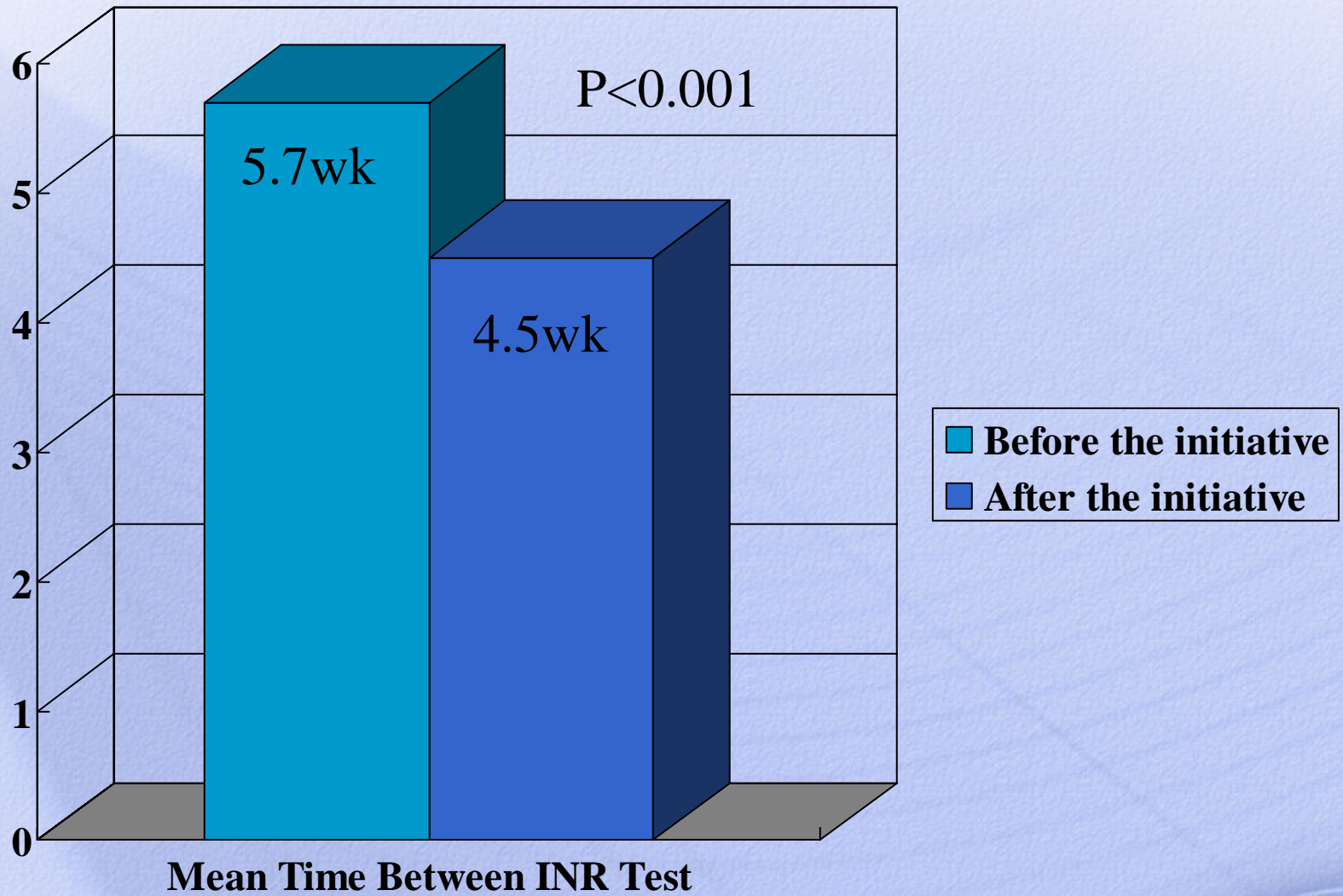
1. Anticoagulation control as reflected by percentage of patient-time and INR-tests in range
2. Clinic visits intervals before (7/05 to 8/05) and after (12/06 to 3/07) implementing the 4-weekly INR testing recommendation since September 2006.



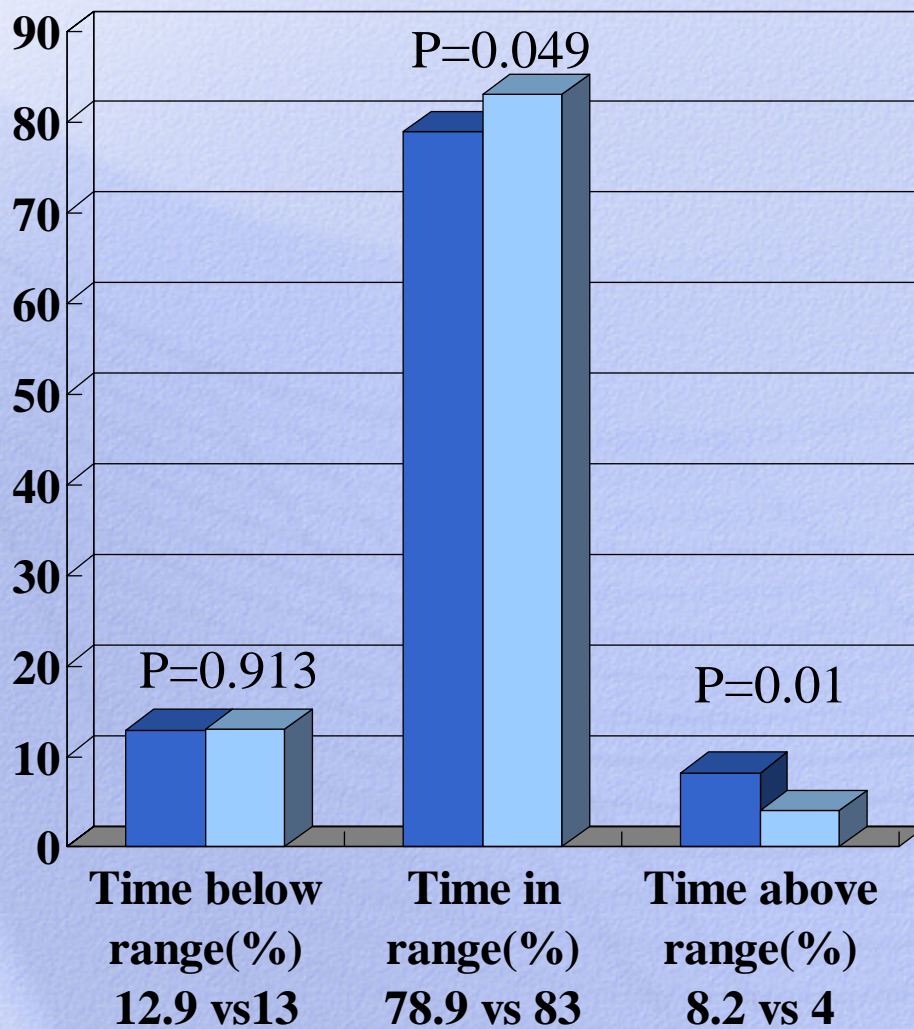
Methods

Outcome measures

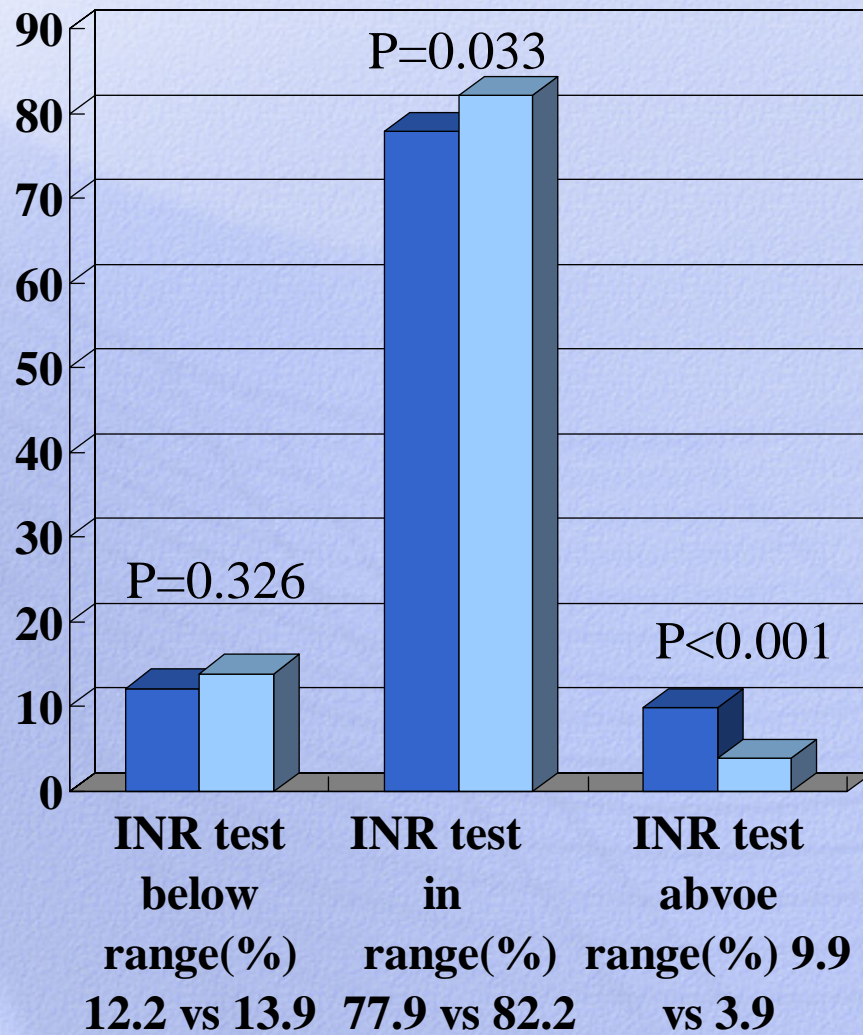
- ❖ Comparison did not include September to November 2006 because within this period, a proportion of the INR tests were arranged before September 2006 in the clinic.
 - ❖ These 3 months was regarded as wash-out period.
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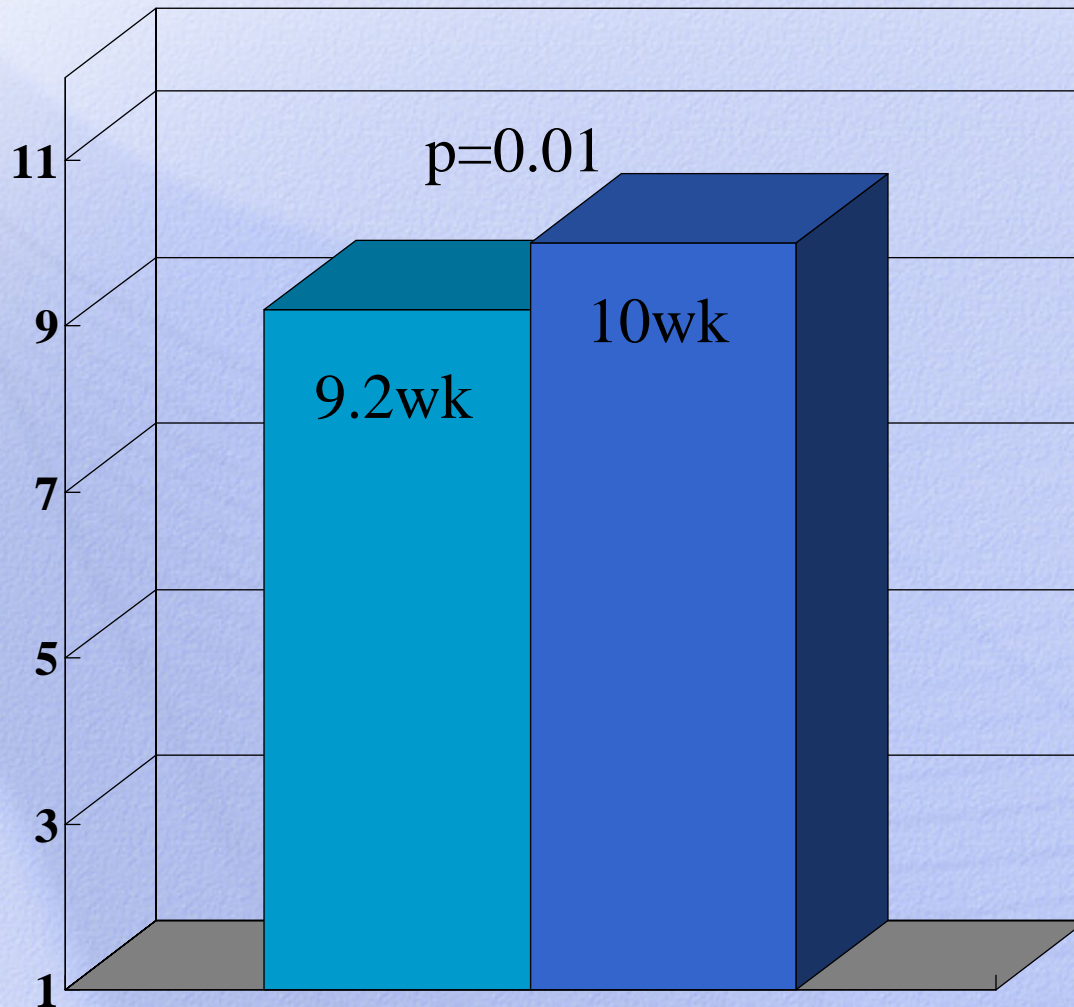
143 patients were recruited for analysis.



■ Before the initiative
■ After the initiative



■ Before the initiative
■ After the initiative





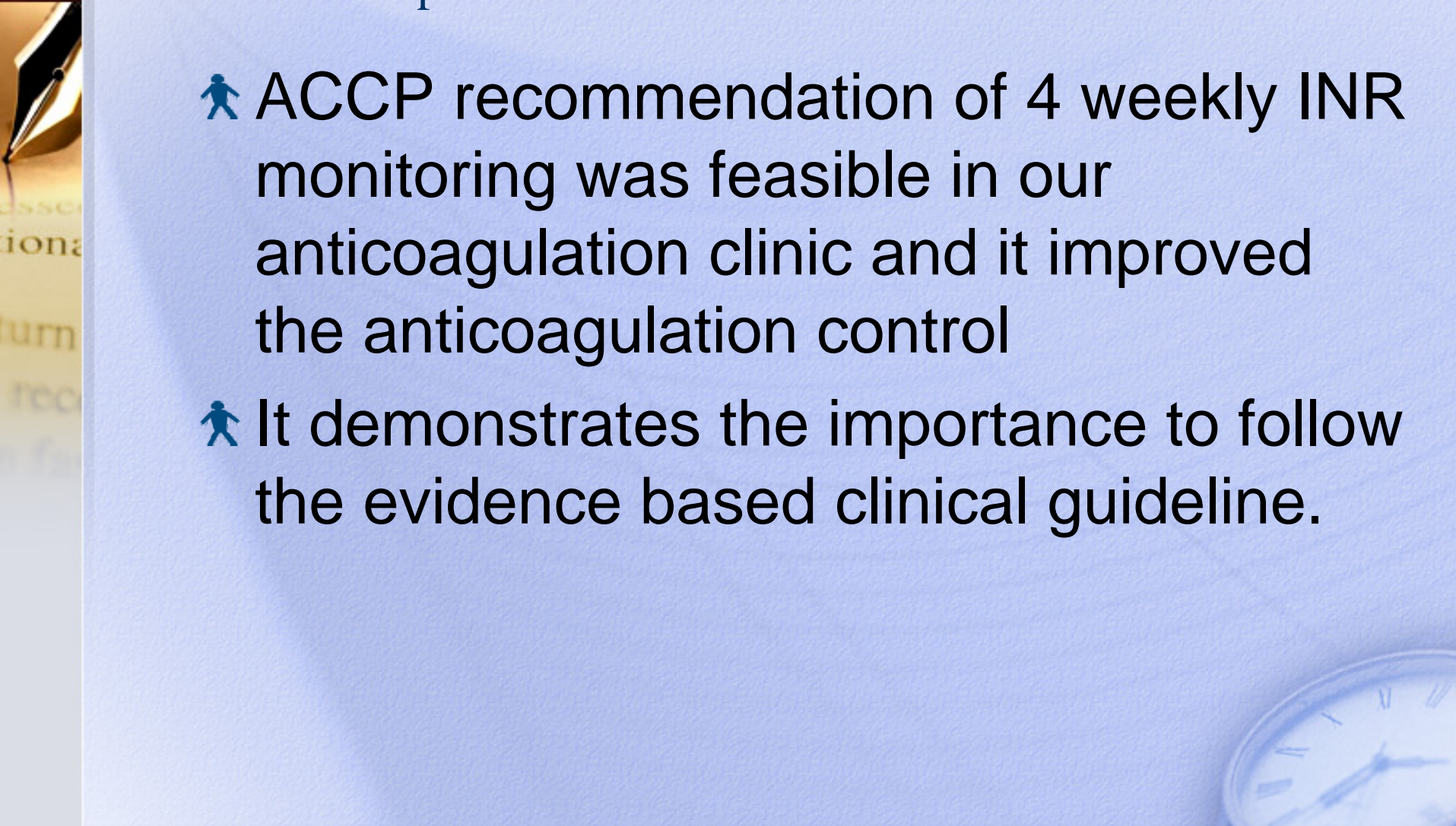
Mean time between clinic visits

■ **Before the initiative**
■ **After the initiative**



Discussion

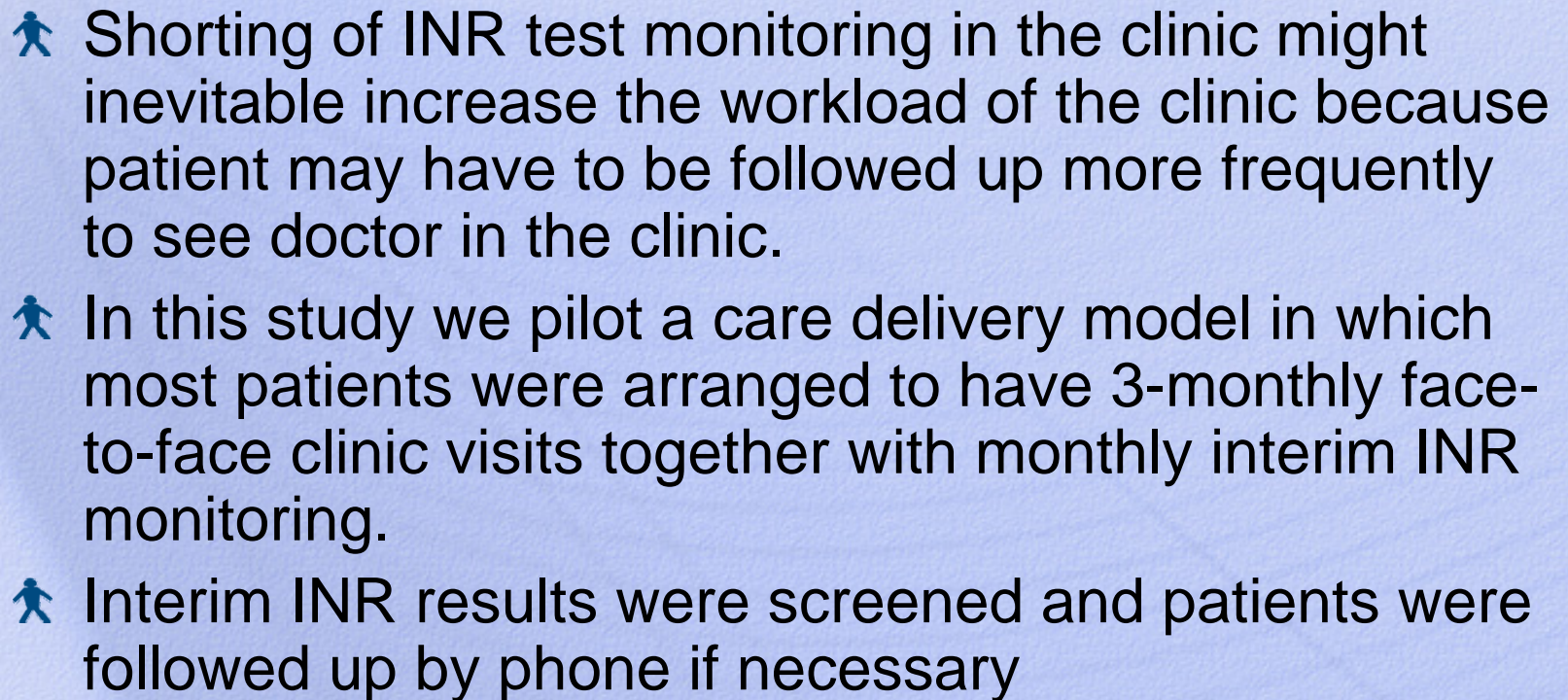
Clinical implication -1

-  ACCP recommendation of 4 weekly INR monitoring was feasible in our anticoagulation clinic and it improved the anticoagulation control
 -  It demonstrates the importance to follow the evidence based clinical guideline.
- 



Discussion

Clinical implication - 2

- ✚ Shorting of INR test monitoring in the clinic might inevitable increase the workload of the clinic because patient may have to be followed up more frequently to see doctor in the clinic.
 - ✚ In this study we pilot a care delivery model in which most patients were arranged to have 3-monthly face-to-face clinic visits together with monthly interim INR monitoring.
 - ✚ Interim INR results were screened and patients were followed up by phone if necessary
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Discussion

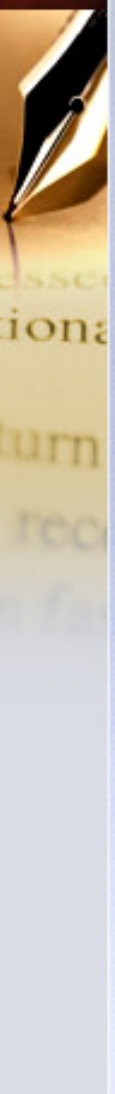

Clinical implication - 2

- ✚ After implementing the 4 weekly INR checking initiative in our clinic, the frequency of clinic visits did not increase.
- ✚ On the contrary, it prolonged from 9.2 weeks to 10.2 weeks.
- ✚ The reason may be that after initiating the 4-weekly INR checking initiative, doctors were more comfortable to arranged longer face-to-face clinic follow up interval and more interim INR tests were arranged between clinic visits
- ✚ Therefore, our current care delivery model on anticoagulation management is potentially cost effective.




Discussion

Limitations

- ✚ For the assessment of the effect on anticoagulation control after increased INR test monitoring frequency, same patient in different periods were used for comparison.
 - ✚ The period before the initiative (14 months) is significantly longer than the period after the initiative (4 months).
 - ✚ The difference from improving anticoagulation control can be due to the significantly different in duration of the 2 periods and patient's knowledge and compliance about warfarin treatment improved at time goes on.
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Conclusion


- 🚶 In compliance with the ACCP guideline, implementing 4-weekly INR testing was feasible at our anticoagulation clinic.
 - 🚶 Implementing this recommendation significantly improved anticoagulation control without increasing clinic follow up frequencies. Our current anticoagulation management care delivery model is potentially cost effective.
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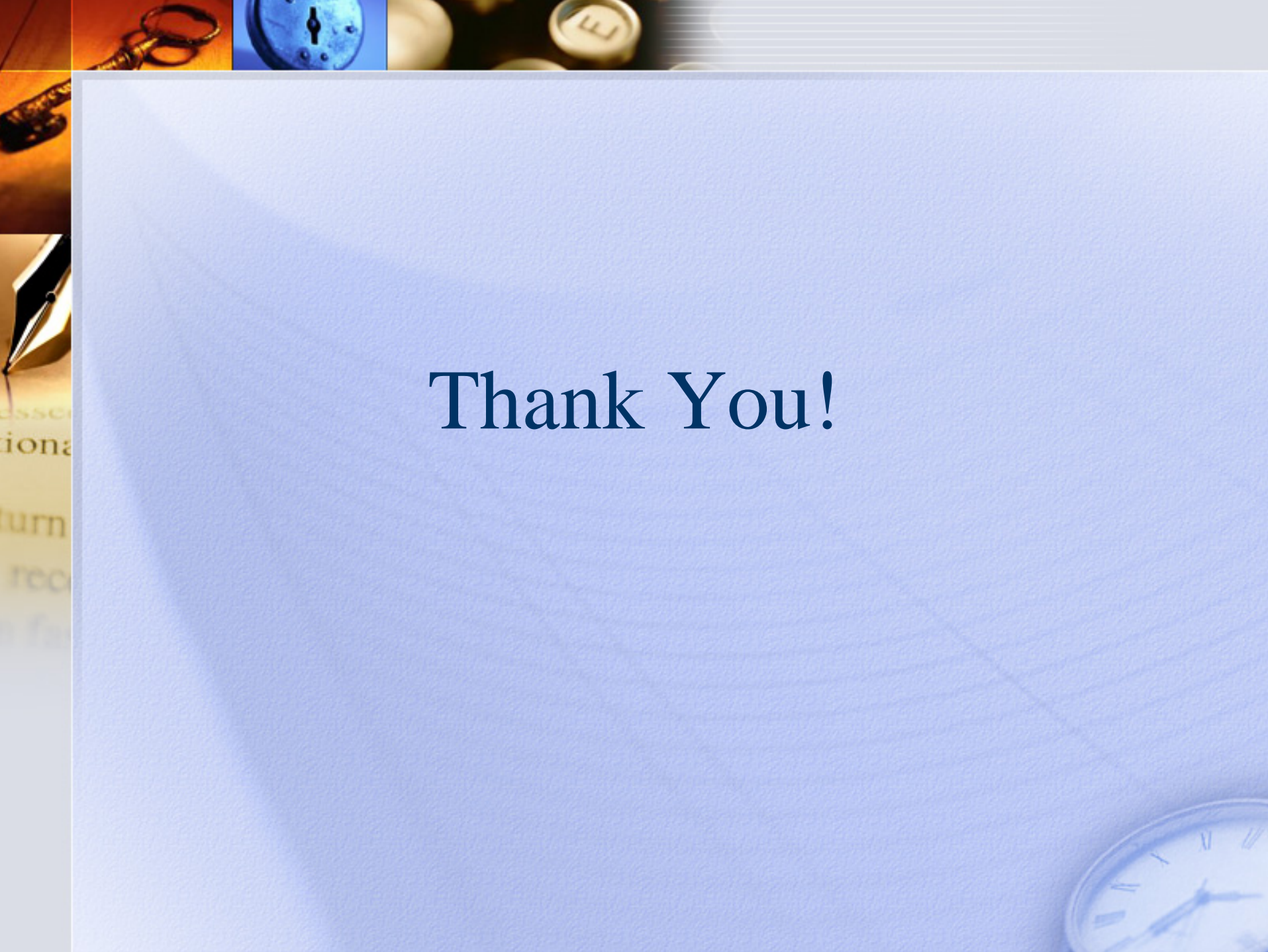


Acknowledgements



 We wish to thank all staff working for our anticoagulation clinic and staff working in the Medical Record Office.





Thank You!