

# Medication Safety: Anticoagulation Management

Carla S. Huber, ARNP MS  
Community Anticoagulation Therapy (CAT)  
Clinic  
Cedar Rapids, IA 52401  
515-558-4046  
[chuber@pcofiowa.com](mailto:chuber@pcofiowa.com)  
[www.crhealthcarealliance.org](http://www.crhealthcarealliance.org)



Working Together for Patient Safety.

September 10, 2008

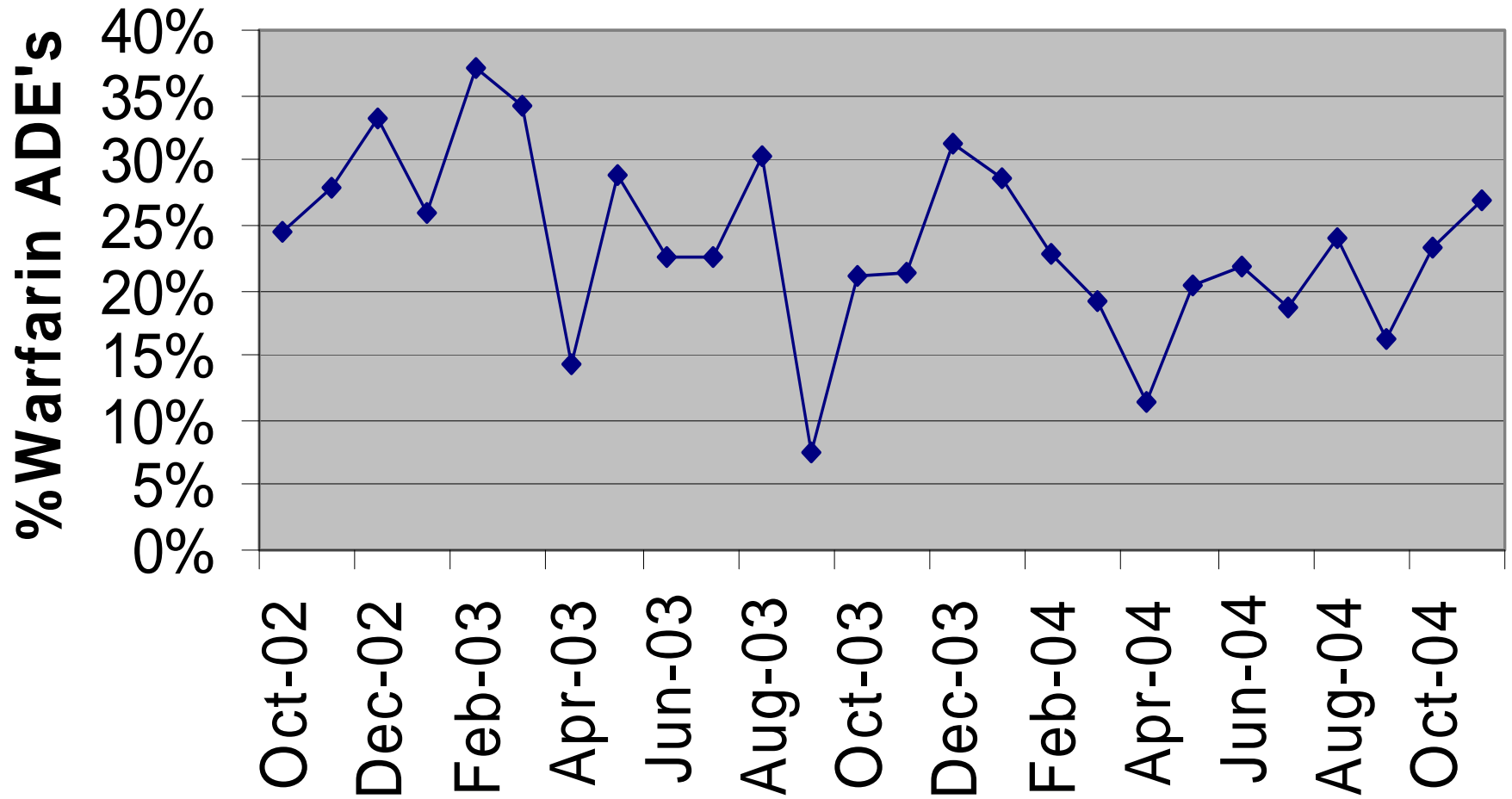
# Objectives

- Identify the challenges and barriers to implementing medication safety tools
- Explain the importance of utilizing evidence-based guidelines for managing warfarin therapy
- Explain the importance of education for patients taking warfarin
- List the advantages of a dedicated anticoagulation clinic

# PIPS Grant

- Specific Aims
  - Education and training in principles of ISO 9001 quality management systems
  - Establish the anticoagulation clinic
  - Determine other uses of ISO framework within the healthcare community

# % Warfarin of All ADE's 04/02 through 11/04



# National Quality Forum (2004)

- Safe Practices:
  - #1 - Creation of a healthcare culture of safety
  - #18 – Utilization of dedicated anti-thrombotic services that facilitate coordinated care management

# Medication Statistics

- 60% of older Americans use five or more different medications per week
- 20% of older Americans take 10 different medications per week
- Americans older than 65 have more than 175,000 emergency room visits/year for adverse drug events

Source CDC

# Medication Statistics

- In the US age >65 comprise 15% of population and buy 30% of all prescription drugs and 40% of OTC meds [http://www.webmd.com/content/article/6/1680\\_51638.htm](http://www.webmd.com/content/article/6/1680_51638.htm) retrieved 1/22/07
- Up to 60% of all medications prescribed are taken incorrectly or not at all
- 90% of elderly patients make some medication errors
- 35% of the elderly make potentially serious errors <http://www.itaa.org/isee/events/presentations> retrieved 1/12/07

# Anticoagulation Clinics

- Dedicated service to manage patients on anticoagulation medications
- Use evidence based guidelines to make dosing decisions
- Specially trained nurses, pharmacists
- Decrease complications of anticoagulants and decrease ER visits and hospital admissions
- Pts. are in INR range greater percent of the time
- Improve physician and staff efficiency



# Why dedicated anticoagulation clinics?

- Use of evidence-based guidelines – American College of Chest Physicians
- Improved outcomes
  - Increased time in INR range
  - Decreased bleeding and clotting events
  - Decreased hospitalizations related to anticoagulation events

# Patient Safety Goal

- Joint Commission 2009 National Patient Safety Goal #3:
  - Improve the safety of using medications
  - Anticoagulation therapy, 3.05.01
    - Reduce the likelihood of patient harm associated with the use of anticoagulation therapy

# Policies and Procedures

- The organization needs to identify and determine which additional procedures need to be documented to create consistent processes.
- Physicians' Clinic of Iowa currently has over 400 documented policies and procedures.
- The Community Anticoagulation Therapy Clinic (CAT Clinic) currently has over 70 documented policies and procedures.

Note the:

Format and color

Document number

Purpose

Procedure or flowchart

Definition

DOCUMENT-TITLE	NUMBER	REV
Patient-Flow-in-Anticoagulation-Clinic	3032CATC	2

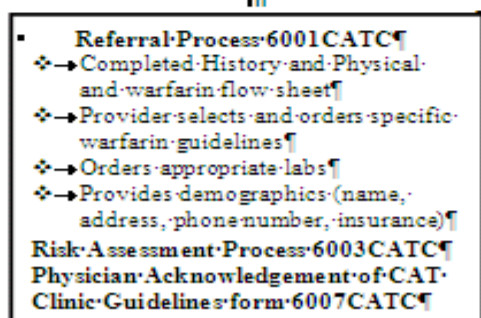
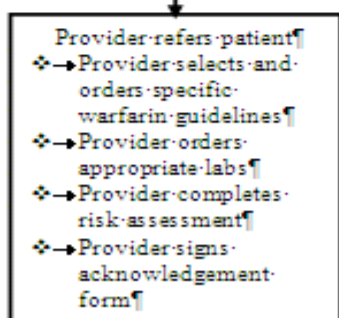
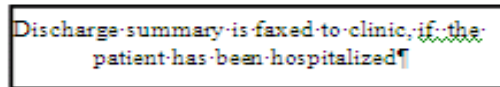
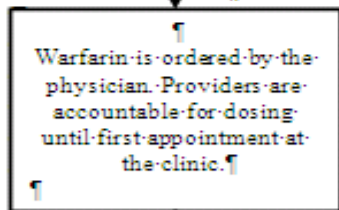
PURPOSE: (outline the intent or objective of the document)

Used to identify Patient-Flow-Process/Procedures in the Community-Anticoagulation-Therapy-Clinic (CATC).

DEFINITIONS AND ACRONYMS: (provide clear understanding to words, abbreviations that may be ambiguous)

The Community-Anticoagulation-Therapy-Clinic provides centralized care to patients receiving warfarin therapy.

PROCEDURE/FLOWCHART: (describe the steps in which work objectives are achieved; include statements, to the extent necessary, that explain the why, what, when, where, who and how)



Clinic-3032CATC

Community

Anticoagulation

Therapy

Clinic

Page 4 of 4

Patient notified of results and short assessment of any changes completed



Encounter and next lab date entered into Warfarin Patient Management System



Visit reports sent to referring physician via e-mail or fax

RECORDS (results or evidence of work performed)

Patient Agreement (4502CAT C), Warfarin Guidelines (6511CAT C or 6512CAT C or 6502CAT C), Warfarin Error Reporting Form (3034CAT C), and patient record file.



REVISION HISTORY

Reva	Description of Change	Approval	Date
0	Initial document	J. Levett, MD	12/16/05
1	Changed protocol to guidelines	J. Levett, MD	2/24/06
2	Moved risk assessment to referral form, removed compliance score, added Knowledge Assessment, added documentation in Warfarin Patient Management System, added report sent to referring physician via e-mail or fax	J. Levett, MD	8/25/06

Community  
 Anticoagulation  
 Therapy  
 Clinic

DOCUMENT-TITLE	NUMBER	DATE
<b>Master-List</b>	<b>3002CATC</b>	<b>7/05/07</b>

Document-Title	Number	Approval-Date	Revision
<b>Administration</b>	<b>1000</b>		
<b>Accounting</b>	<b>1500</b>		
<b>Human-Resources</b>	<b>2000</b>		
Job-Description-Process	2001CATC	12/16/05	0
Training-Competency-Process	2002CATC	12/16/05	0
Training-Competency-Template	2003CATC	12/16/05	0
Nursing-Training-Competency-Record	2004CATC	2/24/06	1
Clerical-Training-Competency-Record	2005CATC	12/16/05	0
<b>Quality-Improvements</b>	<b>2500</b>		
<b>Quality-System</b>	<b>3000</b>		
Document-Numbering-Procedure	3001CATC	12/16/05	0
Master-List	3002CATC	See-Above	0
Control-of-Documents	3003CATC	12/16/05	0
Document-Template-Form	3004CATC	12/16/05	0
Document-Approval-Process	3005CATC	12/16/05	0
Document-Request-Approval-Form	3006CATC	12/16/05	0
Customer-Comment-Process	3008CATC	12/16/05	0
Comment-Form	3009CATC	12/16/05	0
Control-of-Records	3010CATC	12/16/05	0
External-Document-Master-List	3014CATC	08/15/06	0
Internal-Audit-Procedure	3016CATC	12/16/05	0
Internal-Audit-Attributes	3017CATC	12/16/05	0
Internal-Audit-Schedule	3018CATC	12/16/05	0
Internal-Audit-Plan-Form	3019CATC	12/16/05	0
Internal-Audit-Checklist	3020CATC	12/16/05	0
Internal-Audit-Opening-Meeting-Agenda-Checklist	3021CATC	12/16/05	0
Internal-Audit-Closing-Meeting-Agenda-Checklist	3022CATC	12/16/05	0
Internal-Audit-Attendance-Log	3023CATC	12/16/05	0
Nonconformance-Form	3024CATC	12/16/05	0
Internal-Audit-Report-Form	3025CATC	12/16/05	0

# Flow of current clinic processes

- Completed a process flow of current (2005) anticoag clinic processes
- Lots of variation – several nurses providing information about dose changes to patients
- Little use of evidence-based guidelines
- Waiting for lab results
- Pt. satisfaction low
- Pt. education 15 minutes

# Community Anticoagulation Therapy (CAT) Clinic

- Provide patient education 60-90 minutes and ongoing
- Patients go to lab of their choice, POC testing, home INR monitor
- INRs faxed to CAT Clinic or provided via web
- Pt. notified of results same day and dosing decision made based on guidelines
- Referring physician notified of all results and changes in warfarin therapy



# ACCP Guidelines

- Why use guidelines to manage anticoagulation?
  - To reduce gaps in knowledge
  - To reduce safety issues surrounding anticoagulation
  - Both of the above promote standardization in the practice of managing patients taking warfarin

# Guidelines

- Maintenance Therapy
  - Make small changes to warfarin – increase or decrease dose 5-15%, if INR between 1.0 and 5.0
  - Calculate the weekly dose and adjust according to the total weekly dose. If patient taking 5mg/day=35mg/week. If dose increased or decreased by 10% = 3.5mg/week
  - Check INR every 4 weeks at a minimum
- Give the warfarin time to work- may take 48 hours to see a change in INR

# What affects how warfarin works?

- Other medications – antibiotics, herbs, aspirin products, chemotherapy, NSAIDs, amiodarone (decrease warfarin by as much as 30%)
- Diet – amount of vitamin K in foods
- Alcohol – warfarin is synthesized in the liver
- Exercise
- Stress

# What does all of this mean?

- Each time the patient has an INR (especially if elevated or low), ask about changes in medication, OTCs, alcohol, diet, stress, missed/extra doses
- Each face-to-face or telephone visit is a great opportunity to reinforce (anticipatory guidance)
- If dose is changed, ask pt. to repeat instructions; clarify dose vs. pill size (5mg = 1 pill)

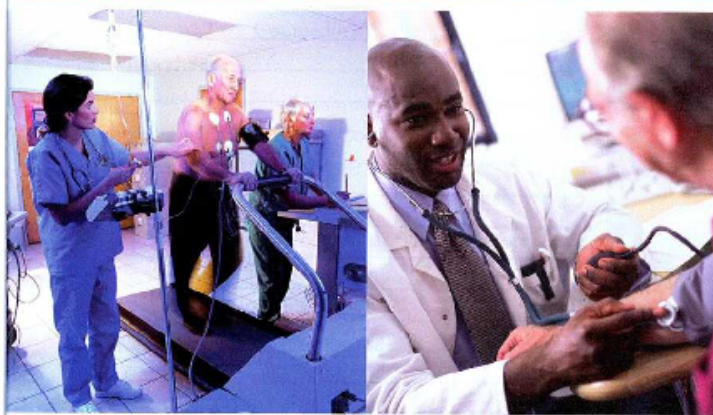
# What does all of this mean?

- It takes time to educate – more than a 10 or 15 minute office visit

# Education and Communication

- Educate, Educate, Educate
- Health Literacy – 50% of adult population reads below 8<sup>th</sup> grade level
- Joint Commission National Patient Safety Goal #13 - *Encourage patients' active involvement in their own care as a patient safety strategy.*
- Find patient friendly materials such as “Your Guide to Coumadin<sup>®</sup>/Warfarin Therapy” at [www.ahrq.gov/consumer/coumadin.pdf](http://www.ahrq.gov/consumer/coumadin.pdf)
- Teach back – ask “Just so I know I explained things correctly, can you tell me 3 signs of bleeding that you need to report to your Dr.”

# Your Guide to Coumadin®/Warfarin Therapy



Agency for Healthcare Research and Quality  
Advancing Excellence in Health Care • [www.ahrq.gov](http://www.ahrq.gov)

[www.ahrq.gov/consumer/coumadin.pdf](http://www.ahrq.gov/consumer/coumadin.pdf)

# Medical Record

- CAT Clinic utilizes a web-based electronic medical record [www.inrpro.com](http://www.inrpro.com)
- Automatic list of patients due for INRs
- Warfarin log – easy to read
  - Control Chart
  - Next apt. date
  - Sent to referring physician
- Reports at the click of a button



Testing Site MWCLP

Patient's Name: [Redacted]

Phone Number: [Redacted]

Physicians Name: [Redacted]

Diagnosis: NUT R

1 MR 2-3

Tablet Size

-10mg

Date	Return Appointment	FT, Ratio, INR	Physician Orders	Notified Pt. Initials
11/05/05		11.9 1.11 10.5	10.5 mg 10 SSIT	Brian
3-28-05	received 3-30-05	15.4 1.72 12.5	10mg QD 6D	Brian/KS
4-11-05		20.6 3.10 10	rev 6 days	J. SR / LAM
4-28-05		15.9 1.83 12.5	REV 12.5 QD 1 WK	Brian/KS
5-10-05		18.5 2.4 15	15mg QD 1 WK	Brian/KS
5-10-05		31.5 6.8 40	HOLD RE 15-13-05	Brian/LW
5-13-05		18.7 2.5 10	REV 5-18-05	Brian/KS
5-23-05		12.8 1.2 15	15mg QD 1 WK	Brian/SK
5-31-05		26.0 4.67 40	HOLD RE 6-2-05	Brian/SK
6-17-05		14.2 1.9 10	10mg QD 1 WK	Brian/KS
7-22-05		19.7 2.7 10	10mg QD 1 WK	Brian/KS
8/10/05		11.3 1.9 10	10mg QD 1 WK	Brian/KS
9-13-05		12.0 1.0	10mg QD 1 WK	Brian/KS
9-27-05		15.3 1.7 10	10mg QD 1 WK	Brian/KS
10-12-05		23.8 3.9	10mg all days x 1 wk	Brian/KS
10/20/05		16.4 1.9	no. a. - this - 10mg	UMPSS
11/11/05		15.3 1.7	10mg QD x 1 wk	Brian/KS
12-24-05		22.5 3.5	10mg QD 1 WK	Brian/SK
1-13-06			told pt to do prattime	
1-19-06		17.8 2.2	15mg RE 15mg QD 1 WK	Brian/SK
2-21-06		26.1 4.5	10mg QD 1 WK	Brian/SK
2-24-06		13.7 1.3		
3-7-06		15.3 1.6	10mg QD 1 WK	Brian/SK
3-22-06		15.5 1.6	15mg all days x 10mg M, W, F	Brian/SK
4/12/06		14.2 1.4	15mg QD 1 WK	Brian/KS
4-21-06		22.2 3.3	15mg QD 1 WK	Brian/KS
5-9-06		13.8 1.3	15mg QD 1 WK	Brian/KS
5-26-06		21.7 3.2	10mg 3 THS 15mg M, W, F 1 WK	Brian/KS



**Cedar Rapids  
Healthcare  
Alliance**

Working Together for Patient Safety

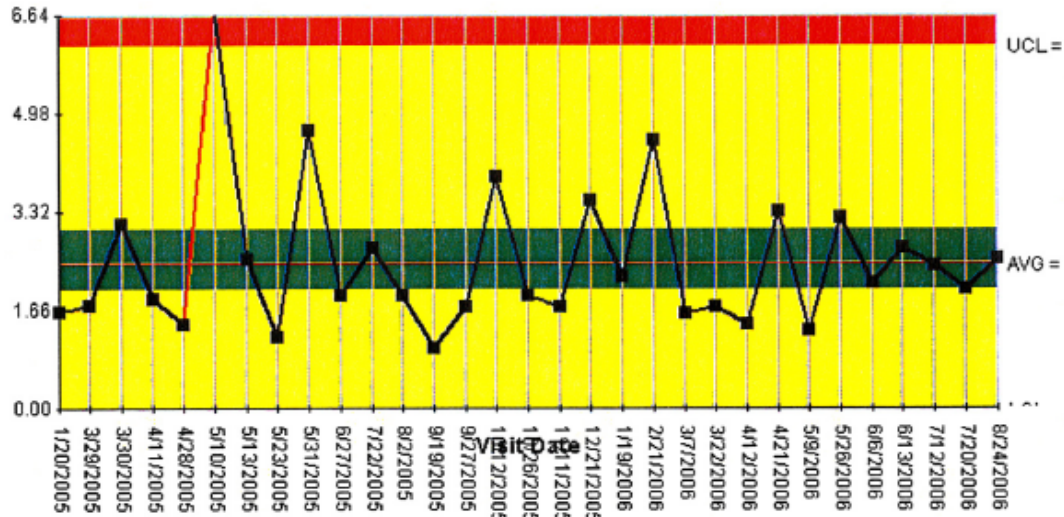
Office: 319.558.4046

Fax: 319.558.4049

Community Anticoagulation Therapy (CAT) Clinic  
Patient INR History

<a href="#">1/19/2006</a>	Prior Visit	2.2	flag	0		
<a href="#">2/21/2006</a>	Prior Visit	4.5	flag	0		
<a href="#">3/7/2006</a>	Prior Visit	1.6	flag	0		
<a href="#">3/22/2006</a>	Prior Visit	1.7	flag	0		
<a href="#">4/12/2006</a>	Prior Visit	1.4	flag	0		
<a href="#">4/21/2006</a>	Prior Visit	3.3	flag	0		
<a href="#">5/9/2006</a>	Prior Visit	1.3	flag	0		
<a href="#">5/28/2006</a>	Prior Visit	3.2	flag	0		
<a href="#">6/8/2006 5:04:57 PM</a>	Scheduled Visit	2.1	flag	0	Warfarin	Pt. reports no changes to diet or signs of bleeding. He did go to Dr. today re: head going numb and red leg. Dr. prescribed Levaquin for 10 days for cellulitis of leg. Pt. verbalized understanding to continue warfarin 85 mg/week and to recheck protime/INR on 5/9/06 due to Levaquin.
<a href="#">6/13/2006 4:39:05 PM</a>	Scheduled Visit	2.7	flag	0	Warfarin	Left a message on cell phone to continue warfarin 85 mg/week and recheck protime/INR in one month. 6/13/06 at 4:58 PM received phone call from pt. He reports 3 more days of Levaquin and lower leg is still swollen and sore. Verbalized understanding to remain on warfarin 85 mg/week and recheck protime/INR in one month. Reluctant to call Dr. Justice to report increased swelling and pain in leg.
<a href="#">7/12/2006 10:58:25 AM</a>	Scheduled Visit	2.4	flag	0	Warfarin	7/11/06 at 4:30, pt. reports redness and swelling of left lower leg. He reports he is on his way to St. Luke's ER. 7/12/06 at 9:48 AM pt. reports visit to ER included checking for DVTs. He reports the ER physician diagnosed cellulitis in both lower legs. Prescribed Levaquin, Doxycycline, and lasix. Verbalizes understanding to continue warfarin 85 mg/week and recheck protime/INR on 7/21/06.
<a href="#">7/20/2006 6:31:21 PM</a>	Scheduled Visit	2	flag	0	Warfarin	Pt. denies changes to diet or signs of bleeding or clotting. Continues on Doxycycline. Verbalizes understanding to continue warfarin 85mg/week and recheck protime/INR in one month.
<a href="#">8/24/2006 8:24:23 PM</a>	Scheduled Visit	2.5	flag	0	Warfarin	8/25/06 at 1:26 PM, pt. verbalizes understanding to continue warfarin 85mg/week and recheck protime/INR in one month.

INR Results for [REDACTED] [451.19 Deep Vein Thrombosis, DVT]



Green area denotes recommended patient INR range [2 - 3]  
 Yellow area denotes readings that are outside of INR range, but within individuals' typical INR range of readings  
 Red area denotes readings that are outside of individuals' typical INR range of readings

Average INR (calculated) = 2.45  
 Std Dev INR = 1.23  
 Upper Control Limit (UCL)\* = 6.14  
 Lower Control Limit (LCL)\* = 0  
 \* based on 3 standard deviations

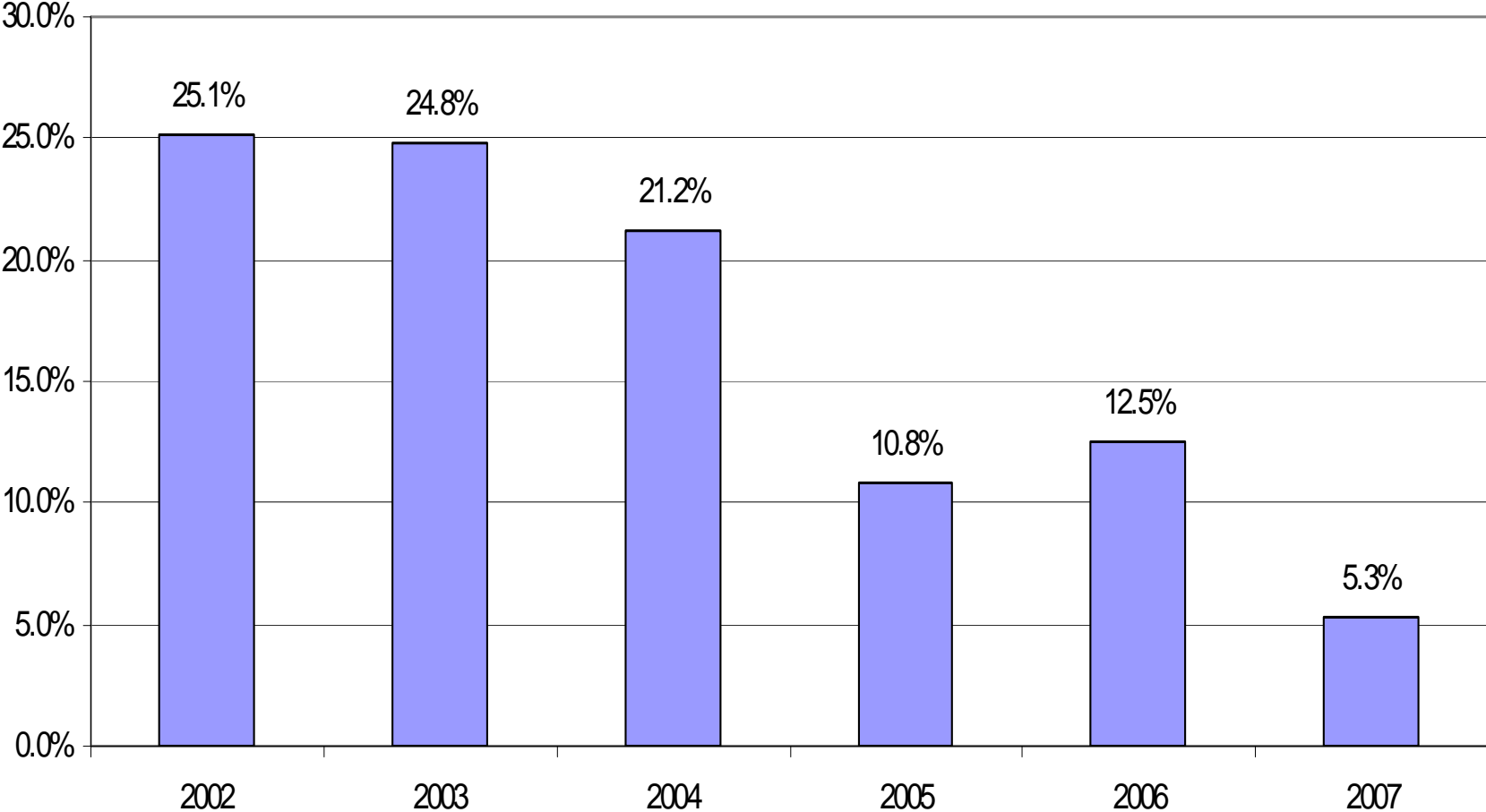
Percent Within Range (Green Area) = 25.81% [8/31]  
 Percent Above Range (Yellow and Red Area) = 25.81%  
 Percent Below Range (Yellow and Red Area) = 48.39%

Total Dosage Amount per week (last change) = 85 mg

Dosage Change History

Date	SUN	MON	TUE	WED	THU	FRI	SAT	Total
5/31/2006 <a href="#">[delete]</a>	10	15	10	15	10	15	10	85
2/21/2006 <a href="#">[delete]</a>	10	10	10	10	10	10	10	70
1/19/2006 <a href="#">[delete]</a>	15	15	15	15	15	15	15	105
12/21/2005 <a href="#">[delete]</a>	10	10	10	10	10	10	10	70
10/12/2005 <a href="#">[delete]</a>	10	15	10	0	10	15	10	70

Percent of total inpatient ADEs related to warfarin (St. Luke's)



Start Date: <input type="text"/> (mm/dd/yyyy)	All Primary Diagnosis <input type="text"/>
End Date: <input type="text"/> (mm/dd/yyyy)	All Secondary Diagnosis <input type="text"/>
Patient Age >= <input type="text"/> and < <input type="text"/>	All Referring Physicians <input type="text"/>
All Visits <input type="text"/>	All Labs <input type="text"/>
Active Patients Only <input type="text"/>	All Physician Groups <input type="text"/>
All Patient Genders <input type="text"/>	All Pharmacies <input type="text"/>
All Patients <input type="text"/>	All Physicians Reviewing INR data <input type="text"/>
All Data Entered by Users <input type="text"/>	

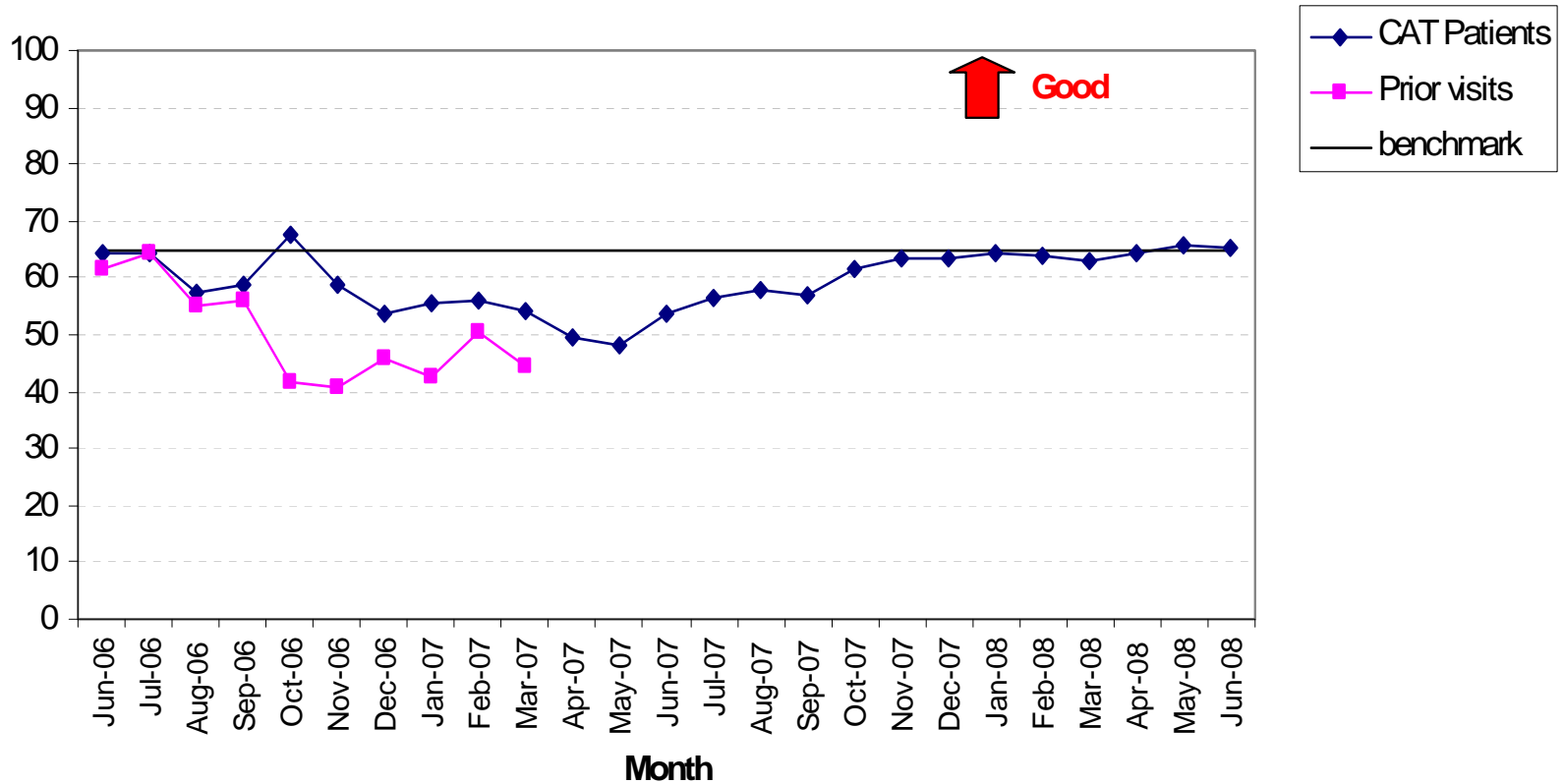
**Preferred Methods for Calculating Therapeutic Time in Range**  
 Displays calculations using following three methods: Traditional [% visits in range], [Rosendaal](#) [% days in range], and [Cross Section](#) [last visit in range]

Expand INR range  on high and low end  
(ex: expanding 0.15 changes 2-3 range to 1.85 and 3.15)

Ignore first  days after first test result

<p><b>Multiple Patient Visits within the Month</b></p> <p align="center"><input type="button" value="Run Report"/></p>	<p><b>Patient Visit Activity by Hour</b></p> <p>Activity: <input type="text" value="-- Select One --"/></p> <p align="center"><input type="button" value="Run Report"/></p>
<p><b>Quantity of Visits per Day</b></p> <p align="center"><input type="button" value="Run Report"/></p>	<p><b>Percent Breakdown of Patient Age</b></p> <p align="center"><input type="button" value="Run Report"/></p>
<p><b>Percent Breakdown for Poor INR Readings</b></p> <p align="center"><input type="button" value="Run Report"/></p>	<p><b>Percent Breakdown of Primary Diagnosis</b></p> <p align="center"><input type="button" value="Run Report"/></p>
<p><b>High and Low 'Out of Range' Breakdown (Traditional Method)</b></p> <p align="center"><input type="button" value="Run Report"/></p>	<p><b>Patient Priority for Improvement (Most Out of Range Visits)</b></p> <p align="center"><input type="button" value="Run Report"/></p>
<p><b>Patient Response Time reports</b></p> <p align="center"><input type="button" value="Run Report"/></p>	<p><b>Patient Referrals</b>        Number of patients referred by medical contact</p> <p align="center"><input type="button" value="Run Report"/></p>
<p><b>Average <a href="#">CAT Scores</a> by Patient</b></p> <p align="center"><input type="button" value="Run Report"/></p>	<p><b>Average Pre/Post Test Scores by Patient</b></p> <p align="center"><input type="button" value="Run Report"/></p>
<p><b>Missed Visits by Patient</b>        Number of Days Late: <input type="text" value="2"/></p> <p align="center"><input type="button" value="Run Report"/></p>	<p><b>Dose Changes per 100 Days of Patient Therapy</b>  <small>Entering Start Date in filter above is Recommended</small></p> <p align="center"><input type="button" value="Run Report"/></p>
<p><b>% Physicians Contacted per Visit</b></p> <p align="center"><input type="button" value="Run Report"/></p>	<p><b>Complications Requiring Hospital Admissions</b></p> <p align="center"><input type="button" value="Run Report"/></p>

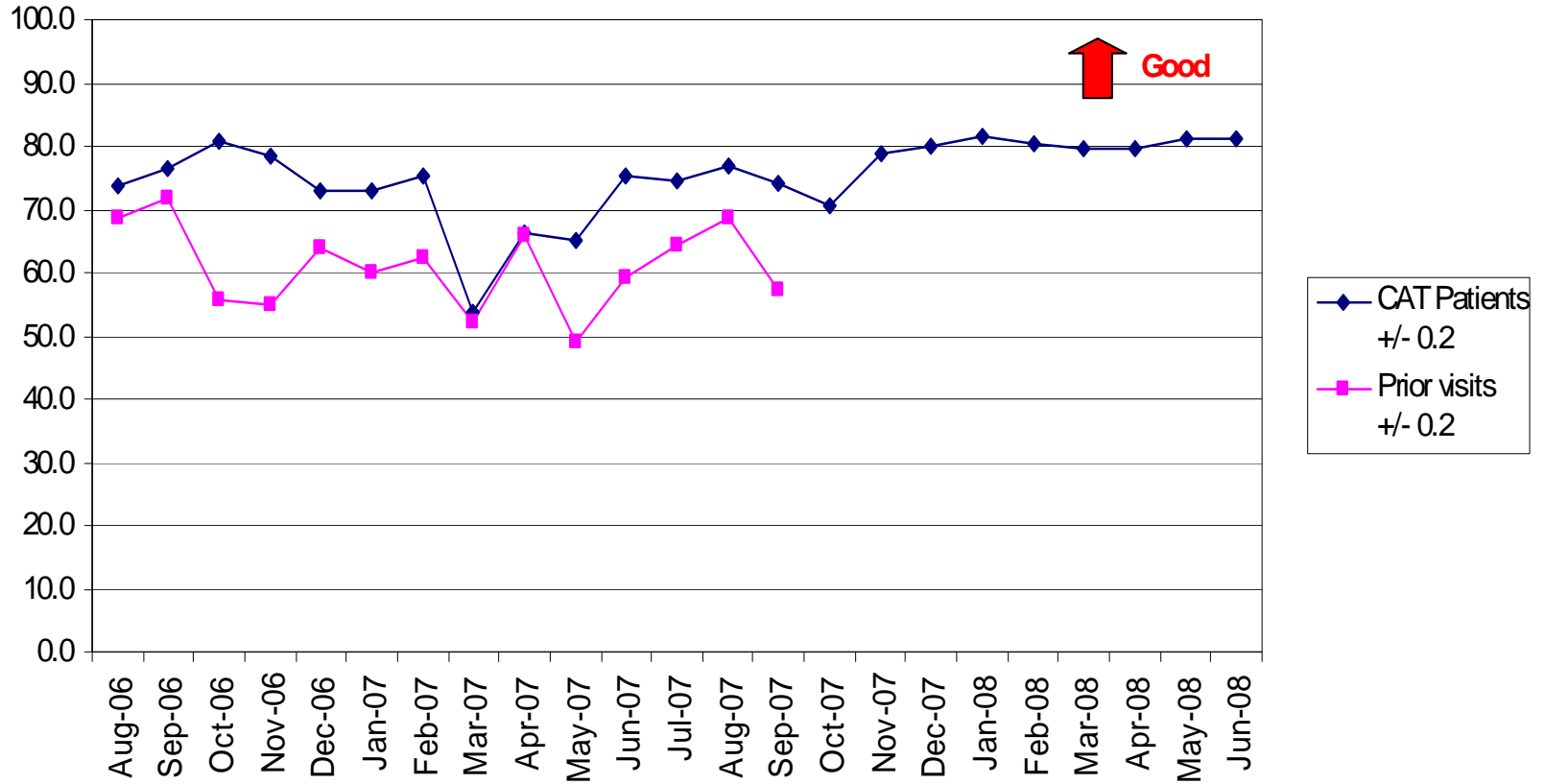
## Percent of Time Patients in INR Range Rosendaal



Median % of Time in INR Range (CAT Clinic) = 59%

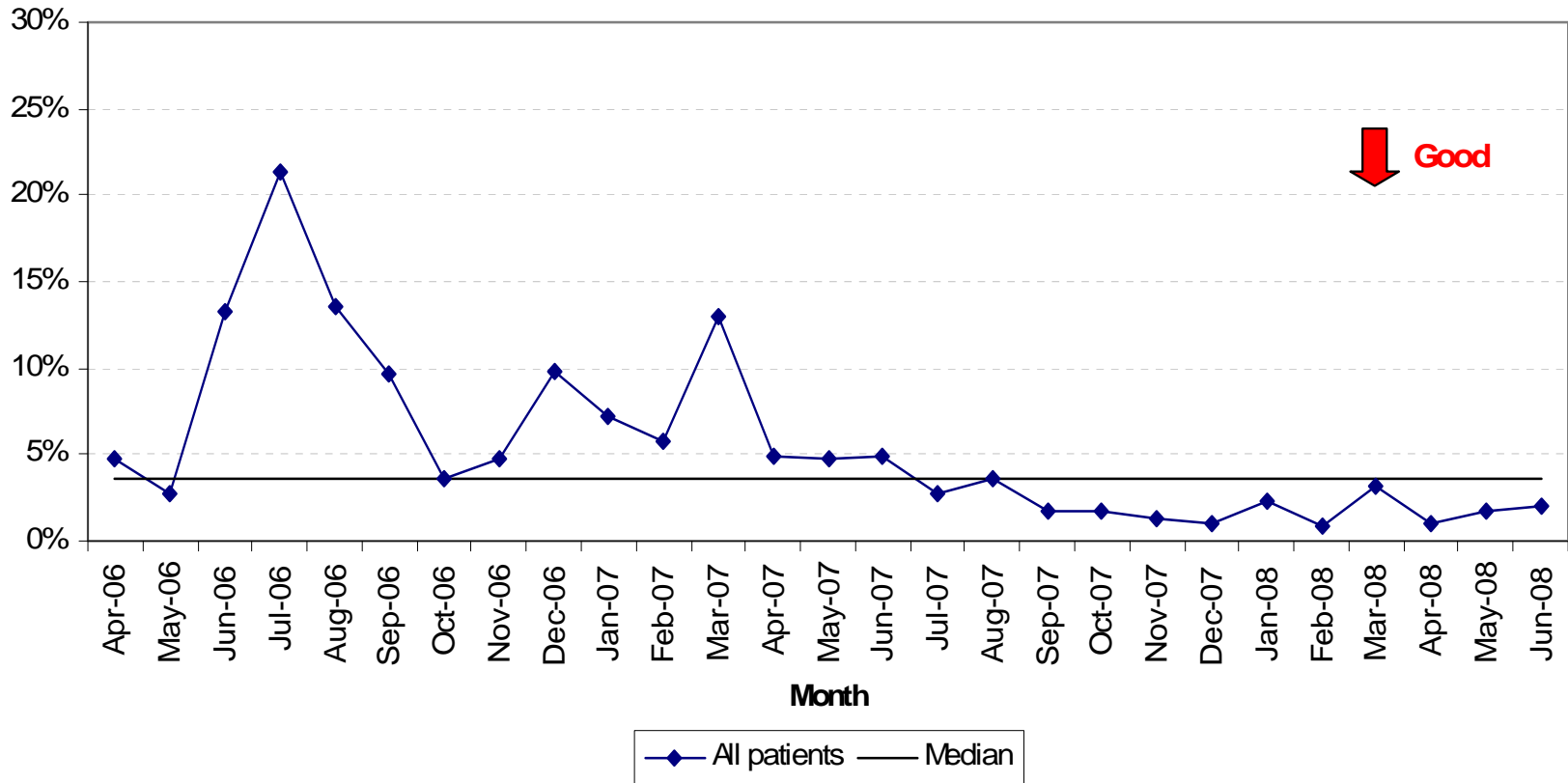
Benchmark - JCAHO, Journal of Quality and Safety, Vol. 29 (12), 2003 and AC Forum 2007.

### Percent of Time Patients in INR Range +/- 0.2



CAT Clinic patients in tighter range

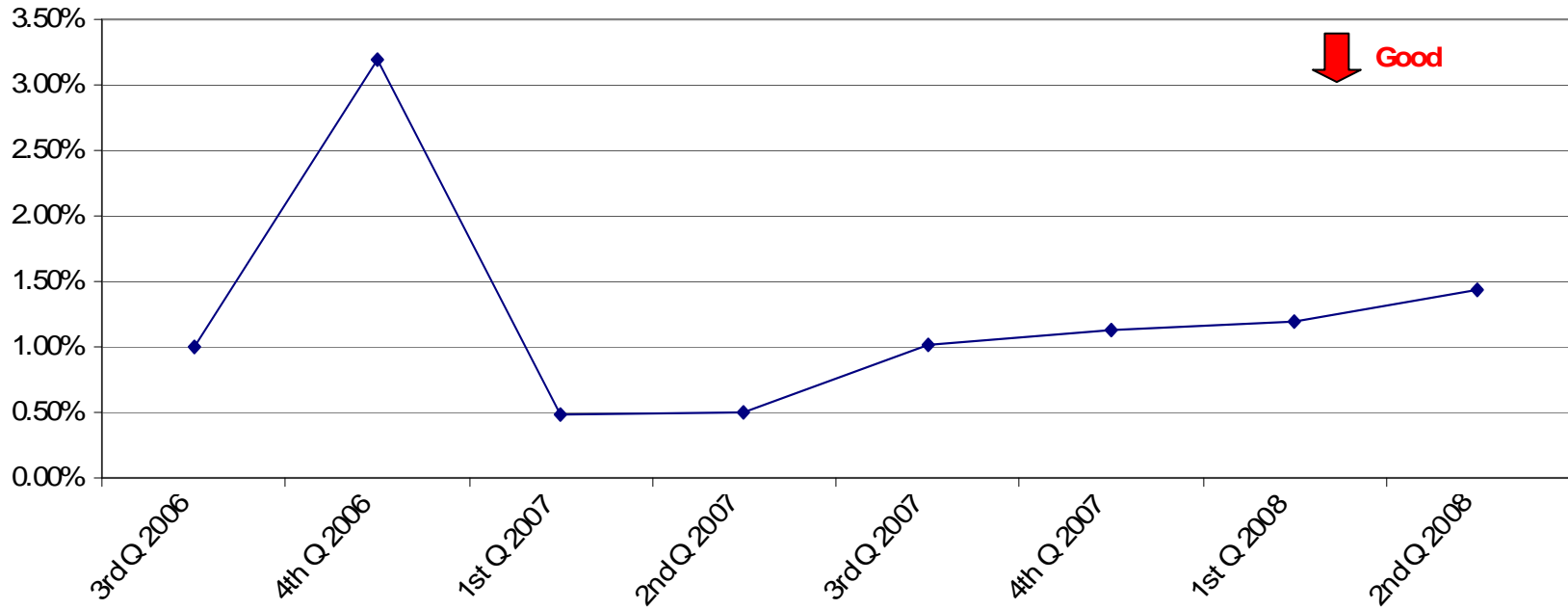
## Physician Contacts



This graph shows a decrease in the number of physician contacts (the number of times the CAT Clinic nurse needs to contact the referring physician). This number should decrease as patients are in INR range a greater percent of the time.



### %of INRs > 5

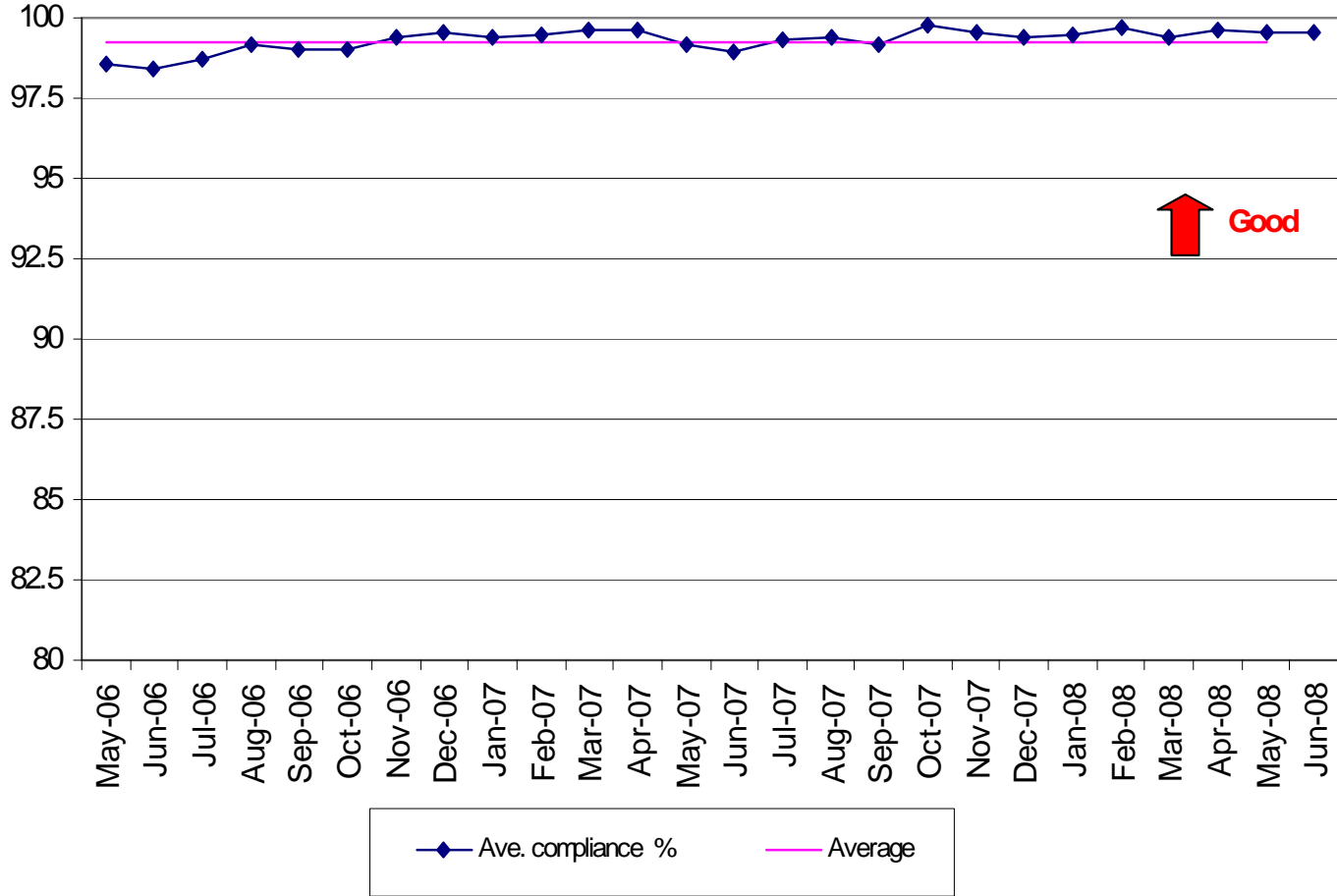


The graph shows the percent of INRs greater than 5. There have been two associated major bleeds in 2007 (GI bleeding, requiring hospitalizations, one pt. taking NSAID, another pt. taking ASA and started on Amiodarone) with the INRs greater than 5.

Benchmark 7%, Chiquette, Amato, Bussey, 1999.

<b>Warfarin Compliance Assessment Scale - #6515CATC</b>		
	<b>Points</b>	<b>Patient Score</b>
<b>Missed doses (not prescribed)</b>		
• → Missed one dose in a week	<b>1</b>	
• → Missed two doses in one week	<b>2</b>	
• → Missed 3 or more doses	<b>3</b>	
	<b>0</b>	
<b>Additional doses (not prescribed)</b>		
• → Took 1 extra dose	<b>1</b>	
• → Took 2 extra doses	<b>2</b>	
• → Took 3 or more doses	<b>3</b>	
	<b>Points</b>	<b>Patient Score</b>
<b>Diet: How has your diet changed over the past week?</b>		
• → Ate 1 – 2 <b>more</b> servings than usual of Vitamin K foods	<b>1</b>	
• → Ate 3 – 4 <b>more</b> servings than usual of Vitamin K foods	<b>2</b>	
• → Ate 4 or <b>more</b> servings than usual of Vitamin K foods	<b>3</b>	
	<b>0</b>	
• → Ate 1 – 2 <b>less</b> servings than usual of Vitamin K foods	<b>1</b>	
• → Ate 3 – 4 <b>less</b> servings than usual of Vitamin K foods	<b>2</b>	
• → Ate 4 or <b>less</b> servings than usual of Vitamin K foods	<b>3</b>	
	<b>0</b>	
<b>Alcohol consumption</b>		
• → Drank the usual amount of alcohol in the past week	<b>0</b>	
• → Drank more than your usual amount of alcohol this past week	<b>1</b>	
• → Binged (drank excessive amounts) of alcohol 1 or more times this past week	<b>2</b>	
	<b>0</b>	
<b>Medications</b>		
• → Started or stopped an antibiotic in the past week	<b>Yes--1</b> <b>No--0</b>	
• → Started or stopped an herbal supplement in the past week	<b>Yes--1</b> <b>No--0</b>	
• → Started or stopped an aspirin-containing product or an NSAID in the past week	<b>Yes--1</b> <b>No--0</b>	
• → Started or stopped <u>amiodarone</u> or another medication this week	<b>Yes--1</b> <b>No--0</b>	
<b>Total Score</b>		
<i>Compliance Assessment Scale created by CAT Clinic 2006</i>		

# Average Compliance Score



# Toolkit Items

- ISO Executive and Staff Training Modules
- INRPro Database – [www.inrpro.com](http://www.inrpro.com)
- Organized Document System – 70 documents
- Compliance Assessment Scale
- Patient Education – *Your Guide to Coumadin<sup>®</sup>/Warfarin Therapy*
- Staff Education Modules

# Summary

- Identify the challenges and barriers to implementing medication safety tools
- Explain the importance of utilizing evidence-based guidelines for managing warfarin therapy
- Explain the importance of education for patients taking warfarin
- List the advantages of dedicated anticoagulation clinics

# References

- [www.crhealthcarealliance.org](http://www.crhealthcarealliance.org) Cedar Rapids Healthcare Alliance
- [www.chest.org](http://www.chest.org) Most recent anticoagulation management guidelines
- My Guide to Warfarin Therapy  
[www.crhealthcarealliance.org](http://www.crhealthcarealliance.org)
- Your Guide to Coumadin<sup>®</sup>/Warfarin Therapy  
[www.ahrq.gov/consumer/coumadin.pdf](http://www.ahrq.gov/consumer/coumadin.pdf)
- [www.inrpro.com](http://www.inrpro.com)



Carla S. Huber, ARNP MS

CAT Clinic

600 7<sup>th</sup> Street SE

Cedar Rapids, IA 52401

319-558-4046

[chuber@pcofiowa.com](mailto:chuber@pcofiowa.com)

[www.crhealthcarealliance.org](http://www.crhealthcarealliance.org)