

Interventions unrelated to anticoagulation in a pharmacist-managed anticoagulation clinic

Michael D. Hicho, Pharm.D., BCPS,
Emergency Department, Louis Stokes
Cleveland VA Medical Center, Cleveland,
OH.

Amy Rybarczyk, Pharm.D., BCPS,
Internal Medicine, Akron General Medical
Center, Akron, OH.

Melanie Boros, Pharm.D., BCPS,
Internal Medicine, Akron General Medical
Center, Akron, OH.

Purpose. Results of a study to determine the number of interventions unrelated to anticoagulation made in a pharmacist-managed anticoagulation clinic are presented.

Methods. A retrospective, single-center cohort was conducted in a hospital-affiliated outpatient pharmacist-managed anticoagulation clinic. Patients were ≥ 18 years old and attended at least one face-to-face appointment between January 1, 2012, and November 30, 2013. The primary outcome was the number of interventions made outside of an anticoagulation clinic's primary purpose. Interventions were classified based on predetermined criteria. Results of selected interventions were determined along with the association between patient factors and having an intervention. Descriptive statistics and relative risk were used, when appropriate.

Results. A total of 268 patients were included, and 5846 pharmacist encounters were reviewed. Investigators identified 2222 interventions. Patients having >10 medications were 17% more likely to have an intervention compared with those having <5 medications. Patients attending at least two primary care visits within one year prior to their first appointment with a pharmacist were 12% more likely to have an intervention compared with those attending fewer than two appointments.

Conclusion. Pharmacists in an anticoagulation clinic made a substantial number of interventions unrelated to anticoagulation therapy, with most clinic patients having at least one such intervention made on their behalf. The majority of these interventions were related to medication reconciliation. The total number of medications being taken and the number of physician visits were significantly associated with an intervention taking place.

Am J Health-Syst Pharm. 2016; 73(suppl 3):S80-7

Despite new anticoagulation medications being brought to market, warfarin maintains a vital role in today's anticoagulation therapy. The continued use of warfarin results in the ongoing need for healthcare professionals skilled in anticoagulation management. Patients are currently referred to pharmacist-managed anticoagulation clinics as a mode of anticoagulation therapy management. Pharmacists have frequent interaction, weekly or more at times, with patients in this setting, allowing them to identify health-related problems and to make interventions outside of anticoagulation management.

Multiple studies have been published investigating outcomes directly related to anticoagulation therapy managed by pharmacists. Patients who participated in a pharmacist-managed anticoagulation clinic had improved anticoagulation control or a greater time within the target range for the International Normalized Ratio (INR) when compared with usual care managed by a physician.¹⁻³ Pharmacists also have decreased time to followup in response to an INR value outside the target range.³⁻⁵ Saokaew and colleagues⁶ conducted a systematic review and meta-analysis investigating the effects

Address correspondence to Dr. Hicho
(michael.hicho@gmail.com).

DOI 10.2146/ajhp150381

of pharmacist-participated warfarin therapy management, which was shown to significantly reduce bleeding events by 50% when compared to usual care. Additional studies also showed a decrease in hemorrhages as well as thromboembolic events.⁷⁻⁹ Anticoagulation clinics managed by pharmacists resulted in decreased hospital admissions related to warfarin^{1,7,8,10-12} as well as decreased hospital length of stay.^{7,8,11-13} Pharmacist-managed anticoagulation clinics also increase patients' knowledge and adherence to therapy,^{14,15} decrease drug interactions,¹⁶ and increase or have positive patient and physician satisfaction.¹⁷⁻¹⁹ Overall, patients participating in pharmacist-managed anticoagulation clinics had improved outcomes related to anticoagulation management and adverse effects.

Although there is considerable literature describing the benefits of anticoagulation therapy management and its related outcomes for patients in pharmacist-managed anticoagulation clinics, literature gaps remain. Little to no data have been collected and published that investigates interventions pharmacists make outside of an anticoagulation clinic's primary purpose. Pharmacists have an opportunity to identify problems and make interventions in clinics beyond those directly related to the primary disease that concerns the clinic. If overlooked, these problems could negatively impact the patient's health and increase healthcare costs. Consistent interaction with a pharmacist can serve as a gateway to identify healthcare problems and to receive appropriate healthcare when necessary. Research describing the impact of pharmacists in a pharmacist-managed anticoagulation clinic on patients' overall health is necessary to quantify services pharmacists provide and promote pharmacists as providers.

This study aimed to determine the number of interventions unrelated to anticoagulation made in a pharmacist-managed anticoagulation clinic, the results of selected in-

terventions, and the association of patient factors with the occurrence of an intervention.

Methods

A retrospective, single-center, cohort study was completed at an outpatient pharmacist-managed ambulatory anticoagulation clinic, which collaborates with the internal medicine practice at a 511 adult-bed community teaching hospital. At the time of this study, three pharmacists and seven postgraduate year 1 pharmacy residents rotated through the anticoagulation clinic. One pharmacist and one or two pharmacy residents staffed the clinic at a time, and appointments were scheduled during four half-days per week. The primary mode of conducting anticoagulation appointments was face-to-face, with a small fraction of patients managed via telephone encounters based on patient-specific need. Thirty physicians referred patients to the clinic for anticoagulation management during the study period.

Active patients between January 1, 2012, and November 30, 2013, were identified using the clinic's Microsoft Access database (Microsoft Corporation, Redmond, WA). Clinic pharmacists used this database to track patients, follow-up times, and quality measures. All patients at least 18 years old and attending at least one face-to-face appointment were included for data collection. All face-to-face patient encounters with a pharmacist documented in the electronic medical record (EMR) during the study period were analyzed for the presence of interventions unrelated to anticoagulation based on criteria developed for this study. Interventions unrelated to anticoagulation were defined as any action taken by a pharmacist regarding a patient's health management that was not related to that patient's anticoagulation management in any way. These interventions may fall outside of an anticoagulation clinic's protocols but were done for issues not re-



Michael D. Hicho, Pharm.D., BCPS, is currently a clinical pharmacy specialist in the Emergency Department at the Louis Stokes Cleveland VA Medical Center. He received his doctor of pharmacy degree from the University of Toledo in 2013. Following graduation, Dr. Hicho completed an ASHP-accredited pharmacy practice residency at Akron General Medical Center as well as the teaching certificate program at Northeast Ohio Medical University. His current interests include emergency medicine, pain management, and teaching through both precepting and academics.

lated to the patient's anticoagulation management. A standardized template is used to document patient encounters, and it is clinic practice to document interventions unrelated to anticoagulation following the anticoagulation management plan.

Interventions unrelated to anticoagulation were classified according to the criteria described in detail in the appendix. These criteria were developed by the investigators to be used for purposes of this study and were classified into 6 major categories and 33 subcategories. For 17 of these 33 subcategories, the result of the pharmacist intervention was determined and categorized as described in the appendix. Interventions for which measurable results were not possible were not included in this analysis. Predetermined patient factors were collected for all patients and analyzed for association

with the occurrence of an intervention. Patient factors included age, number of medications, number of health problems, number of physician visits, physician referral source, and insurance status. Age, number of medications, and physician referral source were recorded as the value at the time of the first appointment with a pharmacist in the anticoagulation clinic within the study timeframe. The number of medications included all prescription medications, nonprescription medications, vitamins, and herbal supplements documented in the patient's EMR. The number of health problems and insurance status were recorded as the value at the time of data collection. Only chronic health problems documented in the patient's EMR problem list were counted. Acute illnesses were excluded, and duplicate entries were counted only once. Physician visits were counted and recorded as any primary care visit within one year prior to seeing a pharmacist in the anticoagulation clinic. It was only possible to count physician visits for patients referred by internal medicine physicians because of medical record access.

A waiver of informed consent was requested because of the study's retrospective design and minimal risk to included subjects. This study was approved by the institutional review board at the investigators' institution.

Primary outcomes included the total number of interventions unrelated to anticoagulation along with the total number and percentage of interventions made in each major category of the study criteria. In addition, the total number and percentage of patients having at least one intervention and the percentages of patients having 0, 1–3, 4–6, 7–9, 10–12, 13–15, and >15 interventions were determined. The total number and percentage of each result for selected interventions performed by pharmacists were included in the secondary outcomes. In addition, the association of patient factors with the occurrence of an intervention was calculated.

Descriptive statistics were used for all outcomes. Relative risk (RR) was calculated describing patient factor association with the occurrence of an intervention. Patient factors are described and compared as follows: age of ≥ 60 years relative to < 60 years, > 10 medications and 5–10 medications relative to < 5 medications, at least five health problems relative to fewer than five health problems, at least two physician visits relative to fewer than two physician visits, internal medicine physician referral relative to noninternal medicine referral, and insured patients relative to uninsured patients. Statistics were calculated using Microsoft Excel for Mac 2011 (version 14.4.5, Microsoft Corporation).

Results

A total of 270 patients were identified and screened for inclusion in the study. After screening, 268 patients were included for analysis and identification of interventions unrelated to anticoagulation. Two patients were excluded because they were < 18 years old during the study period. A total of 5846 patient encounters during the study period were reviewed. Patient characteristics are described in Table 1. The mean age of patients active in the anticoagulation clinic was 58.2 years. Patients had a mean of 10.3 medications and 10.0 health problems, suggesting that patients active in the anticoagulation clinic had a significant burden of medical illness. Patients attended a mean of 2.1 primary care visits within 1 year prior to seeing a pharmacist in the anticoagulation clinic.

A total of 2222 interventions unrelated to anticoagulation during the study period were identified. Among the included 268 patients, 252 had at least 1 intervention unrelated to anticoagulation. The number of interventions per patient is described as follows: 73.1% (196) of patients had ≥ 4 interventions, 32.5% (87) of patients had ≥ 10 interventions, and 13.8% (37) of patients had > 15 interventions. The total number and percentage of interventions made in each major study criterion category along with those in each subcategory are shown in Table 2. The largest proportion of interventions made, 1591 interventions (71.6%), was classified under "reconcile medications." The second and third highest proportions of interventions were classified under "promote continuity of care" and "health assessment and triage" and made up 252 interventions (11.3%) and 206 interventions (9.3%), respectively. Of the interventions classified under "promote continuity of care," pharmacists identified pertinent medical information and ensured that the patient's physician was notified 112 times. Interventions performed by

Table 1. Patient Characteristics

Characteristic	Value (n = 268)
Mean age (range; yr)	58.2 (23–89)
Mean no. medications (range)	10.3 (1–31)
Mean no. health problems (range)	10.0 (1–29)
Mean no. physician visits (range)	2.1 (0–8)
No. (%) with internal medicine referrals	159 (59)
Insurance status no. (%) ^a	
Public insurance	149 (56)
Private insurance	80 (30)
Uninsured	39 (15)

^aPercentages rounded to nearest whole number.

Table 2. Pharmacist Interventions Unrelated to Anticoagulation (n = 2222)

Intervention	No. (%) Interventions ^a
Promote continuity of care	252 (11.3)
Pharmacist obtains patient's medical records	5 (0.2)
Pharmacist facilitates medication refills	44 (2.0)
Pharmacist educates patient about appropriate follow-up with another healthcare provider	30 (1.4)
Pharmacist schedules appointment with another healthcare provider	10 (0.5)
Pharmacist facilitates obtaining primary care physician	10 (0.5)
Pharmacist alerts physician of pertinent medical information	112 (5.0)
Pharmacist ensures patient is seen upon physician request	5 (0.2)
Other	36 (1.6)
Health assessment and triage	206 (9.3)
Pharmacist counsels patient on appropriate self-management of symptoms not involving a medication recommendation	78 (3.5)
Pharmacist refers patient to primary care physician for follow-up treatment for acute complaint	58 (2.6)
Pharmacist refers patient to physician for immediate treatment for acute complaint	37 (1.7)
Pharmacist refers patient to emergency department for emergent treatment for acute complaint	30 (1.4)
Other	3 (0.1)
Acquire necessary diagnostics	16 (0.7)
Pharmacist orders labs, radiology, etc.	5 (0.2)
Pharmacist consults physician resulting in labs, radiology, etc., being placed	10 (0.5)
Other	1 (<0.1)
Reconcile medications	1591 (71.6)
Pharmacist identifies medication discrepancy and uses patient interview or documentation to clarify	1425 (64.1)
Pharmacist identifies medication discrepancy and contacts dispensing pharmacy to clarify	43 (1.9)
Pharmacist identifies medication discrepancy and contacts prescribing physician to clarify	118 (5.3)
Pharmacist identifies medication discrepancy that requires physician to review entire medication list	4 (0.2)
Other	1 (<0.1)
Modify therapy	27 (1.2)
Pharmacist recommends medication change because of drug interaction	5 (0.2)
Pharmacist recommends dose change because of inappropriate medication dosing	5 (0.2)
Pharmacist recommends medication change because of contraindication	0
Pharmacist recommends medication change because of adverse drug reaction	1 (<0.1)
Pharmacist recommends medication change because of cost	2 (0.1)
Pharmacist recommends medication change because of lack of efficacy	1 (<0.1)
Pharmacist recommends stop duplication of therapy	3 (0.1)
Pharmacist recommends stop therapy with no indication	4 (0.2)
Other	6 (0.3)
Drug information and counseling	130 (5.9)
Pharmacist counsels patient on medication	58 (2.6)
Pharmacist counsels patient on appropriate nonprescription medication for self-treatment of acute complaint	32 (1.4)
Other	40 (1.8)

^aPercentages are correct to the nearest tenth.

Table 3. Intervention Results Within Intervention Categories

Intervention Result	No. (%) Results ^a
Promote continuity of care (n = 112)	
Patient received additional treatment as a result of the intervention	50 (45)
Patient received no additional treatment as a result of the intervention	49 (44)
Undetermined	13 (12)
Health assessment and triage (n = 125)	
Patient received additional treatment as a result of the intervention	69 (55)
Patient received no additional treatment as a result of the intervention	36 (29)
Undetermined	20 (16)
Acquire necessary diagnostics (n = 15)	
Diagnostics ordered found to be within normal limits	12 (80)
Diagnostics ordered found to be abnormal	2 (13)
Undetermined	1 (7)
Reconcile medications (n = 1586) ^b	
Patient taking medication correctly	1407 (89)
Patient taking medication incorrectly	107 (7)
Patient accuracy undetermined	74 (5)
Information correct on medication list	98 (6)
Information incorrect on medication list	1419 (90)
Medication list accuracy undetermined	71 (5)
Modify therapy (n = 21)	
Pharmacist recommendation accepted by physician	14 (67)
Pharmacist recommendation not accepted by physician	6 (29)
Undetermined	1 (5)

^aPercentages rounded to nearest whole number.^bPatients had one result for the correctness of taking medication and one result for the correctness of the medication list.

a pharmacist in the “health assessment and triage” category included 58 patients advised to follow up with their primary physician, 37 patients seen by a physician in the anticoagulation clinic immediately, and 30 patients referred to the emergency department. The remaining 7.8% of interventions were classified under “acquire necessary diagnostics,” “modify therapy,” and “drug information and counseling.”

For the subcategories of criteria for which an intervention result was determined, the number and percentages of each result are

shown in Table 3. These specific intervention results are reported combining the total number of interventions under each major criterion category. Interventions classified under “promote continuity of care” and “health assessment and triage” resulted in 44.6% and 55.2% of patients, respectively, receiving additional treatment. These treatments ranged from the addition of medications to hospital admission. For interventions performed under “reconcile medications,” the accuracy of whether patients were taking their medication correctly along

with the accuracy of the medication list was determined. Patients were taking a medication correctly for 88.7% of interventions, while 6.7% of these interventions consisted of the patient taking a medication incorrectly. The remaining 4.6% of intervention results were undetermined. This represents 107 instances when pharmacists intervened on patients taking their medication incorrectly and an additional 74 instances where a patient could potentially be taking his or her medications incorrectly. When looking at the anticoagulation clinic’s medication list accuracy, the medication list was incorrect for 89.4% of interventions. These inaccuracies could range from an obsolete antibiotic course to an inaccuracy with a serious risk of health consequences, such as an incorrect antiarrhythmic agent dose. The significance of medication list inaccuracies was not determined. Interventions in which the pharmacist facilitated acquiring diagnostics primarily consisted of orders for laboratory studies. The results of the diagnostics were found to be abnormal in 13.3% of interventions. Of the interventions in which a pharmacist recommended modification of a patient’s drug therapy, 66.7% of recommendations were accepted.

Two of the six evaluated patient factors were found to be associated with an increased likelihood of having an intervention. Patients with >10 medications had an increased likelihood of having an intervention relative to patients with <5 medications (RR, 1.17; 95% confidence interval [CI], 1.02–1.33), and patients seeing a primary physician at least two times one year prior to their first appointment with a pharmacist in the clinic had an increased likelihood of having an intervention relative to patients seeing a primary physician fewer than two times (RR, 1.12; 95% CI, 1.03–1.22). A statistically significant difference in the likelihood of having an intervention was not

found for other patient factors including 5–10 medications, number of health problems, referring physician, insurance status, and age. All results describing the association of patient factors with having an intervention are shown in Table 4.

Discussion

This study's unique approach to analyzing the patient benefits of participating in a pharmacist-managed anticoagulation clinic gave insight into the various services pharmacists are able to provide patients who participate in such clinics.

In addition to improving anticoagulation management, pharmacists can contribute to the overall care of a patient. The substantial number of interventions unrelated to anticoagulation promotes pharmacists being recognized as providers. A large proportion of interventions were related to medication reconciliation and clarifying medication discrepancies. Furthermore, a large proportion of discrepancies were related to inaccuracies in the medication list. The medication list used by the anticoagulation clinic is not only used by the pharmacists but is also used by internal medicine physicians and for medication reconciliation upon hospital admission. Although pharmacists corrected many inaccuracies in the medication list, they also educated a large number of patients who were taking their medication incorrectly. The high number of medication discrepancies identified emphasizes the importance of conducting medication reconciliation as a standard of care at all ambulatory care visits. It also supports the creation of and participation in pharmacist-managed transition-of-care clinics. Pharmacist involvement in clarifying medication discrepancies and improving patient adherence may reduce the risk of medication-related errors. The interventions identified under "promote continuity of care" and "health assessment and triage"

Table 4. Relative Risk (RR) of Having an Intervention (*n* = 268)

Patient-Specific Factor	No. (%) Pts With Factor	RR (95% Confidence Interval)
Age \geq 65 yr	85 (31.7)	0.98 (0.92–1.05)
No. medications		
5–10	109 (40.7)	1.08 (0.94–1.24)
>10	119 (44.4)	1.17 (1.02–1.33)
\geq 5 Health problems	227 (84.7)	1.08 (0.96–1.22)
\geq 2 Physician visits ^a	85 (35.3)	1.12 (1.03–1.22)
Internal medicine referral	159 (59.3)	0.99 (0.93–1.05)
Insured	229 (85.4)	0.99 (0.91–1.07)

^aNumber of physician visits could only be determined for internal medicine referral patients (*n* = 159).

truly reflect the impact a pharmacist can make on patient care. These interventions included a total of 458 instances where a pharmacist identified a health-related problem and facilitated the patient receiving appropriate care. Without a pharmacist being an integral part of the patient's healthcare team, these 458 instances may have gone unnoticed or care may have been delayed. These data support regular involvement of a pharmacist in patient care and demonstrate that interaction with a pharmacist can provide benefits beyond the primary purpose of a pharmacist-managed outpatient clinic. The information obtained from this study supports the contributions pharmacists make to patient care. It promotes the expansion of pharmacist-managed clinics and making them an integral part of the standard of patient care.

Because recognizing pharmacists as providers and having patients regularly participate in pharmacist-managed clinics would involve reimbursement for pharmacist services, knowledge of the type of patients who may benefit would be helpful. This study found a patient's number of medications and number of physician visits one year prior to seeing a pharmacist to be significantly associated with the likelihood of having an intervention. Both of these patient

factors suggest that these patients were in poorer health than other patients and may have an increased benefit from seeing a pharmacist regularly. Other patient factors were not found to be significant, but it is possible that not enough patients were included to find a difference for the other patient factors analyzed.

Because it was a retrospective cohort, this study inherently had limitations based on documentation. A combination of 10 pharmacy residents and pharmacists rotating through the anticoagulation clinic may introduce multiple styles of practice and documentation practices. In addition, interventions unrelated to anticoagulation must be deemed important by the pharmacist for them to be documented in the EMR. However, a standardized template reduces variance in encounter notes, and it is the anticoagulation clinic's practice to document interventions outside of anticoagulation management in a specific location of the template. This study was also limited in that its criteria were developed by the investigators for purposes of this study and have not been validated. A literature search was completed to identify a validated tool applicable to identifying interventions for this study; however, an appropriate tool was not found. Because no research has looked at interventions outside

of a clinic's primary purpose, it was necessary to develop the study criteria. Further research conducted to validate the study criteria should help develop a simple tool to track interventions pharmacists make outside of a clinic's primary purpose. Assigning significance levels to interventions made, especially medication discrepancies, would have added further insight into the impact of pharmacists in this healthcare setting. However, investigators did not identify a tool to objectively collect significance data. It might be beneficial to include additional factors to analyze for an association with having an intervention. More specifically, looking at the association of interventions relative to the time of hospital discharge or duration of warfarin therapy would be useful. This would provide insight into the benefit of pharmacist-managed transition-of-care clinics by isolating a time in patients' healthcare where multiple changes are likely to occur. Finally, interventions were identified only in patients who attended face-to-face appointments with a pharmacist. Because a number of pharmacist clinics conduct appointments via telephone, future studies comparing pharmacist interventions between these modes of patient encounters may be beneficial.

Conclusion

Pharmacists in an anticoagulation clinic made 2222 interventions unrelated to anticoagulation therapy, with most clinic patients having at least one such intervention made on their behalf. The total number of medications being taken and the number of physician visits were significantly associated with an intervention taking place.

Disclosures

The authors have declared no potential conflicts of interest.

Previous affiliations

At the time of writing, Dr. Hicho was at the

Pharmacy Department, Akron General Medical Center, Akron, OH.

References

1. Garton L, Crosby JF. A retrospective assessment comparing pharmacist-managed anticoagulation clinic with physician management using international normalized ratio stability. *J Thromb Thrombolysis*. 2011; 32:426-30.
2. Macik BG. The future of anticoagulation clinics. *J Thromb Thrombolysis*. 2003; 16:55-9.
3. Burns N. Evaluation of warfarin dosing by pharmacists for elderly medical in-patients. *Pharm World Sci*. 2004; 26:232-7.
4. Jackson SL, Peterson GM, Vial JH, Jupe DM. Improving the outcomes of anticoagulation: an evaluation of home follow-up of warfarin initiation. *J Intern Med*. 2004; 256:137-44.
5. Poon IO, Lal L, Brown EN, Braun UK. The impact of pharmacist-managed oral anticoagulation therapy in older veterans. *J Clin Pharm Ther*. 2007; 32:21-9.
6. Saokaew S, Permsuwan U, Chaiyakunapruk N et al. Effectiveness of pharmacist-participated warfarin therapy management: a systematic review and meta-analysis. *J Thromb Haemost*. 2010; 8:2418-27.
7. Wilt VM, Gums JG, Ahmed OI, Moore LM. Outcomes analysis of a pharmacist managed anticoagulation service. *Pharmacotherapy*. 1995; 15:732-9.
8. Chiquette E, Amato MG, Bussey HI. Comparison of an anticoagulation clinic with usual medical care: anticoagulation control, patient outcomes, and health care costs. *Arch Intern Med*. 1998; 158:1641-7.
9. Bussey HI, Rospond RM, Quandt CM, Clark GM. The safety and effectiveness of long term warfarin therapy in an anticoagulation clinic. *Pharmacotherapy*. 1989; 9:214-9.
10. Lee YP, Schommer JC. Effect of a pharmacist-managed anticoagulation clinic on warfarin-related hospital readmissions. *Am J Health-Syst Pharm*. 1996; 53:1580-3.
11. Witt DM, Lyons E, Beall DG et al. A controlled retrospective evaluation of a clinical pharmacy anticoagulation service. *Pharmacotherapy*. 1996; 16:514. Abstract.
12. Garabedian-Ruffalo SM, Gray DR, Sax MJ, Ruffalo RL. Retrospective evaluation of a pharmacist-managed warfarin anticoagulation clinic. *Am J Hosp Pharm*. 1985; 42:304-8.
13. Biscup-Horn PJ, Streiff MB, Ulbrich TR et al. Impact of an inpatient anticoagulation management service on clinical outcomes. *Ann Pharmacother*. 2008; 42:777-82.
14. Krittathanmakul S, Silapachote P, Pongwecharak J, Wongsatit U. Effects of pharmacist counseling on outpatients receiving warfarin at Songklanagarind hospital. *Songkla Med J*. 2006; 24:93-9.
15. Munjamroon Y, Suttajit S, Tammarat T et al. Clinical outcomes of warfarin monitoring in outpatients at Nakhon Phanom Hospital. *J Sci Technol MSU*. 2007; 26:38-46.
16. Mattaya S, Anusornsangiam W, Kanjanasilp J, Klangsang J. Outcome of pharmaceutical care in anticoagulation clinic at Roi-Et hospital, Roi-Et province, Northeastern Thailand. *J Sci Technol MSU*. 2008; 27:59-67.
17. Zed PJ, Filiatrault L. Clinical outcomes and patient satisfaction of a pharmacist-managed, emergency department-based outpatient treatment program for venous thromboembolic disease. *CJEM*. 2008; 10:10-7.
18. Lodwick AD, Sajbel TA. Patient and physician satisfaction with a pharmacist-managed anticoagulation clinic: implications for managed care organizations. *Manag Care*. 2000; 9:47-50.
19. Lewis SM, Krone BA. Patient survey of a pharmacist managed anticoagulation clinic. *Manag Care Interface*. 1997; 10:66-70.

Appendix—Criteria for pharmacist interventions and results

- I. Promote continuity of care
 - A. Pharmacist obtains patient's medical records (pharmacist identifies need and obtains consent from patient to obtain medical records from outside facility); intervention result not evaluated.
 - B. Pharmacist facilitates medication refill (pharmacist contacts prescriber or prescriber's representative for prescription refill); intervention result not evaluated.
 - C. Pharmacist educates patient about appropriate follow-up with another healthcare provider (education documented that patient was informed about appropriate follow-up); intervention result not evaluated.
 - D. Pharmacist schedules appointment with another healthcare

provider (appointment not for acute complaint scheduled with another healthcare provider); intervention result not evaluated.

E. Pharmacist facilitates obtaining primary care physician (pharmacist contacts appropriate staff and appointment scheduled for primary care physician services); intervention result not evaluated.

F. Pharmacist alerts physician of pertinent medical information (communication of medical information with physician documented as separate note or within note of pharmacist encounter, but no therapy recommendation is made). Intervention result:
 1. Patient receives treatment
 2. Patient receives no treatment
 3. Undetermined

G. Pharmacist ensures patient is seen upon physician request (documentation patient was seen by physician as well as pharmacist during appointment); intervention result not evaluated.

H. Other (additional intervention applicable to criteria); intervention result not evaluated.

II. Health assessment and triage

A. Pharmacist counsels patient on appropriate self-management of symptoms not involving a drug recommendation (documented that pharmacist provided education, but no medication recommendation was made); intervention result not evaluated.

B. Pharmacist refers patient to primary care physician for follow-up treatment for acute complaint (patient is referred to primary physician for treatment; if same-day appointment is made, categorized as immediate treatment). Intervention result:
 1. Patient receives treatment
 2. Patient receives no treatment
 3. Undetermined

C. Pharmacist refers patient to physician for immediate treatment for acute complaint (patient is seen in office same day for treatment); intervention result: (see B, above).

D. Pharmacist refers patient to emergency department for emergent treatment for acute complaint (patient is referred to the emergency department); intervention result: (see B, above).

E. Other (additional intervention applicable to criteria); intervention result not evaluated.

III. Acquire necessary diagnostics

A. Pharmacist orders labs, radiology, etc. (order placed by pharmacist). Intervention result:
 1. Diagnostic results found to be within normal limits
 2. Diagnostic results found to be abnormal
 3. Undetermined

B. Pharmacist consults physician, resulting in labs, radiology, etc., being placed (order placed by physician). Intervention result: (see A, above).

C. Other (additional intervention applicable to criteria); intervention result not evaluated.

IV. Reconcile medications

A. Pharmacist identifies medication discrepancy and uses patient interview or documentation to clarify (no other healthcare provider is required to make clarification; one intervention per medication).
 1. Intervention result related to patient:
 a. Patient taking medication correctly
 b. Patient taking medication incorrectly
 c. Undetermined
 2. Intervention result related to medication list:
 a. Medication list correct
 b. Medication list incorrect
 c. Undetermined

B. Pharmacist identifies medication discrepancy and contacts dispensing pharmacy to clarify (dispensing pharmacist contacted; if prescribing physician also contacted, categorized as contacted prescribing physician; one intervention per medication); intervention result: (see A, above).

C. Pharmacist identifies medication discrepancy and contacts prescribing physician to clarify (prescribing physician or other healthcare provider not including pharmacists contacted; one intervention per medication); intervention result: (see A, above).

D. Pharmacist identifies medication discrepancy that requires physician to review entire medication list (accurate medication list is indecipherable, requiring total review by physician); intervention not evaluated.

E. Other (additional intervention applicable to criteria); intervention result not evaluated.

V. Modify therapy

A. Pharmacist recommends medication change because of drug interaction (recommendation documented). Intervention result:
 1. Recommendation accepted by physician
 2. Recommendation not accepted by physician
 3. Undetermined

B. Pharmacist recommends dose change because of inappropriate medication dosing (recommendation documented); intervention result: (see A, above).

C. Pharmacist recommends medication change because of contraindication (recommendation documented); intervention result: (see A, above).

D. Pharmacist recommends medication change because of adverse drug reaction (recommendation documented); intervention result: (see A, above).

E. Pharmacist recommends medication because of cost (recommendation documented); intervention result: (see A, above).

F. Pharmacist recommends medication change because of lack of efficacy (recommendation documented); intervention result: (see A, above).

G. Pharmacist recommends to stop duplication of therapy (recommendation documented); intervention result: (see A, above).

H. Pharmacist recommends to stop therapy with no indication (recommendation documented); intervention result: (see A, above).

I. Other (additional intervention applicable to criteria); intervention result not evaluated.

VI. Drug information and counseling

A. Pharmacist counsels patient on medication (counseling done regarding existing medication and not a new treatment recommendation); intervention result not evaluated.

B. Pharmacist counsels patient on appropriate nonprescription medication for self-treatment of acute complaint (treatment recommendation made by pharmacist for nonprescription medication and does not include any prescription medications); intervention result not evaluated.

C. Other (additional intervention applicable to criteria); intervention result not evaluated.