A Pilot Study of Process and Outcome Assessment in Antibiotic Therapy

A. Lane Ilersich, John P. Rovers and Thomas R. Einarson

ABSTRACT

A quality assurance survey of cefazolin therapy was conducted by pharmacists using process-related and outcome-related assessments. The purpose of this survey was to study the possibility of having pharmacists review and categorize the appropriateness and success of antibiotic therapy. During a three week period, 168 orders for cefazolin were identified and 67 prophylactic and medical therapies were selected and submitted for possible pharmacist review. Thirty-seven therapies were reviewed by staff pharmacists who scored each therapy for the acceptability of risk of adverse drug effect, the cost-effectiveness, and the overall appropriateness. An evaluation form was used, but explicit utilization criteria were not provided. The average scores (±SD) on a 10 centimeter visual analog scale were 9.1 (±0.71), 8.7 (±1.21), and 8.8. ±0.79) respectively. Twenty-six (70%) of these therapies were monitored to resolution, and 24 (65%) were successful in achieving the therapeutic goal. No adverse effects were noted. The average estimated times to complete the initial review and follow-up review were 10.1 (±5.60) and 3.5 (±2.29) minutes respectively, less than the 19.5 minutes estimated using the Canadian Hospital Pharmacy Workload Measurement System. This survey demonstrated that pharmacists can provide both process-related and outcome-related QA data.

Key Words:

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RÉSUMÉ

Des pharmaciens ont effectué un sondage en utilisant les procédures et les résultats d'une évaluation sur l'assurance de la qualité de l'utilisation de la céfazoline. Le but du sondage était d'évaluer la possibilité que les pharmaciens puissent réviser et évaluer le bien-fondé et le succès des traitements antibiotiques. Durant une période de 3 semaines nous avons révisé 168 prescriptions de céfazoline et 67 de ces traitements prophylactiques et médicaux furent choisis et soumis à la révision possible d'un pharmacien. Des pharmaciens auront révisé 37 traitements qui furent évalués en ce qui concerne l'acceptabilité du risque et des effets secondaires du médicament, l'efficacité économique et le bien-fondé en général. Un formulaire d'évaluation fut utilisé, toutefois des critères spécifiques ne furent pas fournis. Sur une échelle analogue visuelle de 10 centimètre, les moyennes des pointages (±SD) étaient respectivement 9,1 (±0,71); 8,7 (±1,21); et 8,8 (±0,79). Vingt six (70 p.c.) de ces thérapies furent évaluées jusqu'à la fin et vingt quatre (65 p.c.) auront atteint avec succès leur but thérapeutique. Aucun effet secondaire fut noté. En moyenne, les périodes de temps utilisées pour compléter les révisions initiales et les suivis étaient de 10,1 minutes (±5,60) et 3,5 minutes (±2,29) respectivement, donc moins que l'estimation prévue de 19,5 minutes du Système de mesure de la charge de travail de la pharmacie d'hôpital au Canada. Ce sondage a prouvé que les pharmaciens sont en mesure de fournir les données sur l'assurance de la qualité des procédures et des résultats.

Mots clés: *assurance de la qualité, céfazoline, revue de l'utilisation des médicaments*

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INTRODUCTION

This article describes the development and pilot test of a novel method of pharmacy quality assurance (QA). A need was recognized for clinical pharmacy QA to incorporate patient outcomes as indicators of the quality of care. Pharmacists regularly assess the quality of prescribing during the course of their drug therapy monitoring activities. This assessment may occur during the dispensing of the drug or it may occur during the clinical review of a patient's therapy. In the latter case, the pharmacist is in a position to assess the appropriateness and/or success of the therapy. If pharmacists' assessments could be recorded, and if these records could be collated, the pharmacy department could thereby maintain an ongoing determination of observed drug therapy effectiveness. The collection and collation of all assessments would provide a broad database from which the quality of drug therapy could be measured and summarized. It was, therefore, desirable to develop and test a standard form on which pharmacists would record their assessments. Due to the recognized constraints on pharmacists' time, the method also had to be simple, straightforward, and efficient.

This project was designed to investigate the practical implications of a proposed method of recording the quality of cefazolin therapy. This trial was used to indicate if the required documentation could be reasonably requested of the staff pharmacist's clinical routine, and if the process could be successfully employed in documenting the quality of drug therapy. Towards these goals, the objectives of this project were:

1) to determine if the proposed method would record the pharmacists' assessments of the appropriateness of antibiotic therapy,
2) to determine if the proposed method would record the pharmacists' assessments of the outcome of antibiotic therapy, and
3) to determine if the estimated workload associated with the proposed method would exceed that predicted by the standardized workload measurement system.[1]

BACKGROUND

Several recent developments in the evaluation of hospital care have promoted the development of new QA methods. In the late 1980s, hospital accreditation bodies promoted the use of outcome indicators in the monitoring of quality patient care.[2-5] This focus on patient benefit was recently repeated by the Ontario Ministry of Health when it advocated the development of innovative QA programs.[6] The American Society of Hospital Pharmacists also recognized that the effective administration of clinical pharmacy services would increasingly require that quality pharmacy care be demonstrated in terms of patient outcomes.[7] The precise form with which this care would be demonstrated has not yet been established.

In the past, QA programs in hospital pharmacy have concentrated on the technical aspects of drug distribution. Clinical pharmacy QA programs have typically not included assessments of the patient's status as indicators of quality. Some studies have evaluated the impact of pharmacist services by measuring patient outcomes, but the hospital pharmacy literature has not yet described a comprehensive QA program that measures and monitors the structures, processes and outcomes of clinical pharmacy services.

Drug utilization reviews (DURs) have been a very popular component of QA programs due to the cost analysis that they may provide. DURs provide a concise, structured format for quality review and they have become an accepted method of measuring the quality of drug therapy. From the point of view of the pharmacy department's QA, DURs provide an insufficient method of quality assessment because they provide a limited amount of information on the overall quality of drug-related patient care. A typical Ontario hospital has approximately 600 items listed in its formulary but performs an average of only 2.2 DURs per year.[8] The type of information provided by each DUR is limited by design to the single drug or group of related agents addressed in the objective criteria. A DUR program requires repeated surveys to determine the impact of interventions, and follow-up evaluations are seldom performed.[9] Finally, DURs have been limited to process reviews, that is, the criteria for appropriateness represent the *process* of care. Adherence of a therapy to specific criteria may not sufficiently indicate the overall quality of pharmacy care. The individual circumstances of drug utilization and the actual benefits achieved in a particular case may be overlooked. The inclusion of outcome indicators in DURs is rare.[9,10] In summary, DURs alone can not be expected to demonstrate the quality of care provided by clinical pharmacy. Therefore, a new approach is needed to demonstrate the impact of pharmacy services on quality of care.

The argument for documenting pharmacist decisions has been made by several authors.[11-14] Many pharmacy departments, unfortunately, do not require this documentation from their pharmacists.

As a result, pharmacy departments can not provide their institutions with specific data on the observed rate of clinical cure, the incidence of drug-induced toxicity, or the number of patients discharged on effective maintenance therapy. Such statistics demonstrate the success of drug therapy, and could be used to support formulary policies, pharmacokinetic programs, and formal DURs.

When monitoring drug therapy, pharmacists make decisions about the appropriateness of therapies they review, but these decisions may be recorded only when there is a need to intervene, or if there is an adverse event to report. Departments may have forms specifically designed for these activities, but not for regular assessments. A great deal of information may be lost by this omission. Gregoire and Tremblay[15] suggested that clinical pharmacists' subjective assessments of appropriateness may be as applicable in DURs as expert panel assessments. The use of this judgement in a QA program has support in health accounting where successful QA programs are often those which are internally motivated programs conducted by those persons closest to the patient's bedside, and which are comprehensive in their potential to detect problems in patient care.[16] A successful clinical pharmacy QA program would likely be one conducted by those pharmacists who are responsible for pharmacy care. A comprehensive program requires that pharmacists document the appropriateness with which drug therapy is employed (i.e., an assessment of process) and the success which it achieves for the patient (i.e., an assessment of outcome).

Finally, the development of a new QA system for clinical pharmacy needs to be practical. While a documentation system can be developed empirically, it must stand the test of practicality — can pharmacists complete the form(s) required as part of their clinical activities. Workload measurement[1] has established standard times for completing a chart review and documenting concerns. If this is the principle activity a pharmacist pursues in making a therapeutic assessment and recording their decisions, the new form of documentation should take a similar amount of time. Witte and colleagues in a report of a pharmacist-initiated concurrent DUR, use similar numbers: the initial assessment required nine minutes while the follow-up took three minutes.[17] Pharmacist activities associated with a clinical QA program should not exceed these time requirements if it is to be considered practical for daily use.

METHODS

This project was undertaken at The Wellesley Hospital, a 480-bed tertiary care teaching hospital in Toronto. The pharmacy department has a complement of seven full time equivalent (FTE) clinical pharmacists, which at the time of this study consisted of eight different individuals. The pharmacists were all baccalaureate-degree pharmacists with at least one year of clinical experience and with a maximum of three years of seniority. With management approval, the study was described at a clinical staff meeting and all pharmacists were given the option to participate. Cefazolin was selected for study due to the frequency with which all pharmacists encountered its use. The staff was not specifically updated on the guidelines for the use of this agent.

The data collection forms were designed in consultation with the Manager of Clinical Pharmacy Services and the investigator's Research Advisory Committee. The forms were modified according to pharmacists' suggestions and then tested by three staff pharmacists and a preliminary sample of eight therapies. The final forms were circulated to all clinical pharmacists.

The first data collection form (Appendix I) was used to record process measures. It was organized so that the pharmacist first identified the goal of therapy. The therapeutic goal was defined as the reasonable expectation for the outcome of therapy for that patient at the time of assessment. The three possible goals were clinical cure, palliation of the signs and symptoms, or prevention of an infectious disease. In the latter case, pharmacists were asked to record the length of therapy. Next, the pharmacist recorded any concomitant antibiotic therapy and, considering the patient's regimen, rated the acceptability of the dose, frequency, route and microbiology of each. Finally, the pharmacist scored the entire regimen as to 1) the acceptability of the risk of adverse drug reactions in the patient, with respect to similarly effective alternative therapies, 2) the acceptability of the cost-effectiveness of the ordered therapy, with respect to other alternatives, and 3) the overall appropriateness of drug therapy. Visual analog scales were provided to allow the pharmacists to record their degree of concern for each parameter. Pharmacists were not required to restrict their judgements to categorical appropriate/inappropriate labels. Each scale consisted of a ten centimetre line labeled *unacceptable* or *inappropriate* at the zero (0) end and *acceptable* or *appropriate* at the ten (10) end. This design was also considered for

the purposes of determining inter-pharmacist variation. This variation was not determined in the pilot test because only one pharmacist evaluated each patient.

Overall appropriateness was defined for the pharmacists in general terms as the expectation that the ordered regimen would achieve its stated goal in a reasonable length of time, with minimal side effects and minimal cost. Unlike a traditional DUR, explicit evaluation criteria were not provided. It was assumed that the therapeutic judgement under examination was already being performed on a regular basis. Thus, pharmacists utilized implicit criteria as in the Gregoire and Tremblay study.[15]

The second form (Appendix II) was designed for follow-up evaluation where the pharmacists would record their assessments of the patients' outcomes. These assessments were made when the antibiotic therapy was discontinued. Pharmacists described the success of drug therapy by answering "yes" or "no" to four outcome-related statements:

1) Therapeutic goal has been achieved.
2) Patient status has improved.
3) No adverse effects were encountered.
4) All antibiotic therapy has been discontinued.

In case the pharmacist could not evaluate the success of a course of therapy, the form provided three possible scenarios to describe such cases:

1. Drug therapy was not administered as prescribed. (e.g., patient refusal)
2. The patient's underlying medical condition(s) changed.
3. Therapy with the prescribed drug was adopted for an alternative therapeutic goal.

The second form also asked pharmacists to describe any interventions they had made and any adverse effects that were noted.

Finally, each form requested the pharmacist to estimate the time required to complete that respective form. This estimation would provide an indicator of the time requirement associated with the assessments. The average time was calculated and compared to the standard time required for a chart review as reported in the Canadian Hospital Pharmacy Workload Measurement System (WMS).[1] The expected time requirement for each form was the equivalent of one drug therapy monitoring episode in WMS, that is, 9.8 minutes. Each therapy was expected to require two chart reviews for a total of 19.6 minutes.

To address the possibility that pharmacists may not follow the same decision path in determining the quality of each regimen, a standard approach was advocated. To ensure the thorough review of each patient, the pharmacists were provided with a standard approach in the form of a pocket guide. The pocket guide consisted of a checklist designed to direct pharmacists in assessing the patient's medical status from a pharmacotherapy point of view. The format was based on the Pharmacist Workup of Drug Therapy proposed by Strand et al.[14,18] Consideration of the requisite patient information was expected of the pharmacist. The time required to transcribe this information from the patient chart was considered excessive and not essential for the study, and therefore further patient information was not required to be added to the forms.

The investigator reviewed the daily printout of new intravenous admixture orders and identified all orders for cefazolin. Single dose preoperative courses and renewed courses (reauthorized therapies) were excluded. The excluded orders were recorded to document the overall incidence of cefazolin use. All therapies were recorded in a personal computer database. The program selected therapies according to the inclusion criteria and printed data collection forms to include the ordered regimen, the patient's name, age, and ward location.

Each form was left for the pharmacist responsible for the selected patient's ward. Completion of the forms was optional. To decline, they could check a box on Form I provided for that purpose. Pharmacists were instructed to monitor these patients and to return the completed forms either when the therapy was discontinued and/or when the patient was discharged.

RESULTS

Eight pharmacists representing the entire seven FTE complement of the department participated in the 16-day review. The investigator identified a total of 168 patient therapies for cefazolin. When renewed therapies and preoperative courses were excluded, 66 therapies remained and were submitted to the pharmacists for possible review. Thirty-seven documentation forms were completed, achieving a response rate of 57%. While no pharmacists declined to participate, not all forms were completed. The results are summarized in Table I.

The goal of therapy for a majority (78%) of reviewed cases was prophylactic therapy. In seven cases therapy was directed at a clinical cure, and only one palliative course of therapy was identified. On the three process scores, the acceptability of the risk of adverse drug reactions had the highest average score (±SD) - 9.1 (±0.71). The acceptability of each therapy's cost effectiveness scored

Table I: Summary of Survey Results

PRELIMINARY STATISTICS	Number	
Therapies identified	168	
Therapies selected for review	67	
Therapies actually reviewed:	37	55%
GOALS OF THERAPY		%
Therapies whose goal was Clinical Cure:	7	19%
Therapies whose goal was Palliation:	1	3%
Therapies whose goal was Prevention of Infection:	29	78%
PROCESS MEASURES	Score	SD
Overall Appropriateness of therapy (0 = Inappropriate, 10 = Appropriate):	8.77	0.79
i) Cost-effectiveness of therapy (0 = Unacceptable, 10 = Acceptable):	8.67	1.21
ii) Acceptability of ADR Risk (0 = Unacceptable, 10 = Acceptable):	9.08	0.71
OUTCOME MEASURES	Number	%
Outcomes documented	26	70%
Number of therapies achieving therapeutic goal.	24	65%
Number of therapies achieving improved patient status.	23	62%
Number of therapies with no ADRs.	26	70%
Number of patients requiring further antibiotic therapy (po).	10	27%
Therapies lost to follow up	11/37	30%
WORKLOAD		SD
Time required to complete Form 1 (minutes)	10.1	5.60
Time required to complete Form 2 (minutes)	3.5	2.29

only slightly lower at 8.7 (±1.21). The overall appropriateness score was 8.8 (±0.79).

The outcome assessments described the success of therapy. As indicated in Table I, only 55% of therapies were monitored, and only 70% of those were monitored to completion. Eleven therapies were not followed up. No negative outcomes were noted, but four prophylactic courses were classified as indeterminate. This category was not provided on the form but it was added by the pharmacist(s) who completed the assessment. No adverse effects were noted for any of the therapies monitored. Although there was space provided on the outcome assessment form, pharmacist interventions were not documented in this survey.

Therapies whose goal was clinical cure were infrequent, representing only seven of the 37 (18.9%) courses in this survey. Of these seven, one was lost to follow-up due to an early discharge, while the remaining six were noted to have achieved their therapeutic goal and improved the patient's status. Only two of the six were discharged on oral antibiotic therapy.

Pharmacists estimated the time required to review each patient therapy and to complete the form. The average reported time for the appropriateness assessment was 10.1 minutes (range 2 to 30 minutes) while the outcome assessment averaged 3.5 minutes (range 0.5 to 10 minutes). The median estimated times were 10 minutes and 5 minutes, respectively. The estimated average total time of 13.6 minutes was less than the total expected from WMS, and it agrees closely with the nine minutes for chart review plus three minutes for consultation that Witte and colleagues reported in a similar study.[17]

DISCUSSION

The survey provided process *and* outcome data on antibiotic therapy. The method has the potential to allow comparisons of success rates between inappropriate and appropriate therapy. The outcome assessments were restricted to four clinical situations, and may need to be expanded to include an indeterminate category. Also, the forms could be expanded to include more detailed appropriateness-related data facilitating the follow-up in trends. In its present form, the results could be analyzed to identify any correlation between the acceptability of the dose, frequency, route, or microbiology and the overall appropriateness scores, but a formal DUR would be required to identify what specific aspects of a drug's utilization are associated with its inappropriate use.

The scores obtained in this survey suggested that the cefazolin therapies reviewed indicate high quality care. It may be expected that therapies involving cefazolin were judged highly appropriate given the low incidence of adverse effect associated with cefazolin, the primary use of it being for prophylaxis and the relative economy of this agent. By selecting a familiar agent, and by selecting therapies that were post-operative and/or medical in nature, the potential for variation in the scores may have been very low. The accuracy of the information obtained was assumed. Verification of the method's ability to retrieve accurate QA data has been deferred to a subsequent study.

These data were provided by hospital pharmacists with no advanced training in antibiotic ther-

apy management. Similar results may not be obtained in different practice settings or among pharmacists with varied backgrounds. The study assumed that the level of judgement required may be reasonably expected from every pharmacist working in the department. In other words, any advanced expertise in antibiotic therapy was not considered a prerequisite for accurately identifying the quality of antibiotic therapy. This assumption was a requirement if the method was going to be usable by each and every staff pharmacist assigned to drug therapy monitoring. As an assumption, it remains to be tested.

Another limitation of the method may have been the failure to ensure that all therapeutic alternatives were considered. While the pocket guide was provided to assist the assessment of all pertinent patient information, a similar guide for all available antibiotics was not provided. For example, pharmacists were not asked specifically to consider oral forms of therapy. Future surveys will request that the pharmacist identify all possible alternatives before rating the existing therapy. Depending on the type of therapy selected for review, infusion volumes, infusion rates, and the length of therapy may be added to the rating. The instrument was designed for general use, and could have been better adapted for intravenous antibiotic therapy.

To evaluate the practicality of using the data collection forms, one must weigh the method's cost against the benefit of the information obtained. The results of this study suggest that this method of documentation requires no additional time to complete and may actually reduce the time required. Because the times were estimated, this observation can not be confirmed. It was noted that the time documented during this study represented time already devoted to drug therapy monitoring. The response rate (55%), while acceptable for a voluntary exercise, may suggest that pharmacists were not always able, or available, to complete the forms without compromising their other clinical activities. On the benefit side, a survey of cefazolin use was effected in a very short period of time, and the results provided useful QA data. For example, 29 prophylactic courses were followed, and 11 were discontinued within 24 hours, and 14 within 48 hours. Also, by encouraging pharmacist documentation, each form represented a reportable workload item, and helped document the clinical pharmacist workload. The cost-benefit ratio would appear to favour the employment of the method on a regular basis.

Ultimately, the cost-benefit ratio will depend on the validity of the data obtained. A department may need to consider "certifying" pharmacists for this method of QA in drug therapy monitoring in much the same way as they qualify pharmacists for pharmacokinetic consultations. To do this, a department would need to establish the method's validity for itself. A department needs to assure that when staff pharmacists each evaluate the same group of patients, their assessments would agree with those of an expert panel.

Finally, pharmacist judgement may be the easiest resource to tap in the search for outcome-related QA data. If the method studied herein proves to be valid, this form of documentation would serve multiple purposes; 1) a source of QA data, 2) an indicator of pharmacist participation in patient care, and 3) a source of workload data.

In this study the proposed method was used to record the pharmacists' assessments of the appropriateness of cefazolin therapy during in 37 of 67 selected therapies (55%). Pharmacists assigned these therapies an average appropriateness score of 8.8 on a scale of ten. The method was further employed to record the pharmacists' assessments of the outcome of cefazolin therapy in 26 patients (39%). Twenty-four of these therapies were documented to have achieved their therapeutic goal, and no adverse effects were reported. The estimated workload associated with proposed method was 13.6 minutes and did not exceed that predicted by workload measurement. The results suggest that the method is practical for use during the pharmacist's routine clinical activities. Validation of the method as an accurate measure of the quality of pharmacy care delivered remains to be done.

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Appendix I: Pharmacotherapy Assessment

Form 1 : Pharmacotherapy Assessment

If this form can not be completed, please check here and return. [ ]

A GOAL OF THERAPY

Indicate the most reasonable expection of therapy for this patient at this time.

(Choose one) Comments

1) Clinical Cure [ ] _____
2) Palliation of signs and symptoms [ ] _____
3) Prevent an infectious disease.* [ ] _____

* If therapy is prophylactic, indicate if therapy was d/c'd after 48 hrs, and return the forms.

B Drug Therapy Assessment **Day of therapy:** _____

Assess the patient's antibiotic therapy based on Microbiology Cultures

Identify ALL antibiotics associated with the therapeutic goal, note the most recent changes, and then indicate the acceptability of each according to the dose being administered, the frequency, the route, and its microbiological profile.

Date of Review	Antibiotic (dose, frequency)	Acceptability of each aspect Acceptable: Y N ?	Comments
		a) Dose [ ] [ ] [ ]	
		b) Frequency [ ] [ ] [ ]	
		c) Route [ ] [ ] [ ]	
		d) Microbiological [ ] [ ] [ ]	
		a) Dose [ ] [ ] [ ]	
		b) Frequency [ ] [ ] [ ]	
		c) Route [ ] [ ] [ ]	
		d) Microbiological [ ] [ ] [ ]	
		a) Dose [ ] [ ] [ ]	
		b) Frequency [ ] [ ] [ ]	
		c) Route [ ] [ ] [ ]	
		d) Microbiological [ ] [ ] [ ]	

C Appropriateness Scoring

Identify the alternatives available for this patient, then indicate the relative acceptability of the actual therapy on the analog scales below.

Alternative therapies would be expected to achieve the same therapeutic goal, taking into account all factors about the diagnosed disease and the patient being treated.

I RISK OF ADVERSE EFFECTS

Is the risk of adverse drug effects acceptable with regard to similarly effective alternative therapies?

(Not Acceptable) 0 |——————————| 10 (Acceptable)

Risk of adverse effects includes those effeects that may be anticipated and treated.

II RELATIVE COST EFFECTIVENESS

Is the cost of drug therapy acceptable with regard to similarly effective alternative therapies?

(Not Acceptable) 0 |——————————| 10 (Acceptable)

Cost of drug therapy includes drug, preparartion,administration, monitoring, and other associated costs, including complications.

III OVERALL APPROPRIATENESS

Indicate YOUR assessment of the appropriateness of the drug therapy.

(Not Appropriate) 0 |——————————| 10 (Appropriate)

Overall appropriateness indicates the reasonable expectation that you have that the therapeutic goal will be achieved in a reasonable period of time, for a reasonable cost, and with no adverse drug effects.

Note: if any antibiotic order is changed after you complete this form, reassess the entire therapy on another form.

Estimated time to complete this page: _____min

Proceed to FORM 2 when therapy changes.

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Appendix II

Form 2 : Pharmacist Assessment of Antibiotic Therapy Outcome

Patient: Day of Therapy:_____

Complete this form if antibiotics are discontinued, OR when the goal of therapy has changed.
If discontinued, therapy may be evaluable. If another goal is adopted, therapy may be nonevaluable.

A EVALUABLE THERAPY **Day of therapy:** _____

Therapeutic success: Indicate whether each of the following statements were achieved.

	Y	N
1 Therapeutic Goal has been achieved:	[ ]	[ ]
2 Patient Status has Improved:	[ ]	[ ]
3 NO Adverse Effects were encountered:	[ ]	[ ]
4 All Antibiotic Therapy has been Discontinued:	[ ]	[ ]

Comments

_____
_____
_____
_____

B NONEVALUABLE THERAPY **Day of therapy:** _____

Choose one if you cannot evaluate the success of this therapy

	Y	N
1 Drug therapy was not administered as prescribed. (e.g., patient refusal)	[ ]	[ ]
2 The patient's underlying medical condition(s) changed.	[ ]	[ ]
3 Therapy with the prescribed drug was adopted for an alternative therapeutic goal.	[ ]	[ ]

C PHARMACY INTERVENTIONS

Pharmacy Recommendations to alter therapy:
Number Made [___] Number Accepted [___]
Description (optional)

_____
_____
_____
_____

D ADVERSE DRUG REACTIONS and SIDE EFFECTS

Adverse effects due to drug therapy:
Number suspected [___] Number observed [___] Number managed/treated [___]
Description (optional)

_____
_____
_____
_____
_____

Estimated time to complete this page: _____min

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