Goal Attainment Scaling in the Provision of Pharmaceutical Care to Hospitalized Patients with Cardiovascular Disease: A Pilot Study

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ABSTRACT

Objectives: To explore the ability of goal attainment scaling to facilitate pharmaceutical care, as measured by the identification of patients' priorities and the achievement of outcomes that were important to them. The specific objectives were to determine the level of agreement between patients and pharmacists in the identification of medical problems and in the prioritization of problems linked to drug therapy and to determine the proportion of goals achieved relative to the expected level at follow-up.

Methods: The study was a prospective case series involving a convenience sample of patients admitted to St. Joseph's Hospital, Hamilton, Ontario, with unstable angina. For each patient, 2 pharmacists and the patient independently generated a list of medical problems; the pharmacists' assessments were based on information in the medical record or an interview. Patients selected the 3 to 5 medical problems associated with drug therapy that they felt were most important, and the pharmacists did the same. The patient and one of the pharmacists completed goal attainment scaling forms together and arranged 2 follow-up times. At each follow-up, goal attainment scores were calculated. Data were analyzed quantitatively and qualitatively.

Results: Fifteen patients participated in the study. The pharmacists identified more medical problems than the patients did ($p = 0.004$ for pharmacist 1, $p = 0.005$ for pharmacist 2). Agreement between patients and pharmacists in terms of problem identification was low (kappa = 0.21 for pharmacist 1, kappa = 0.11 for pharmacist 2). The pharmacists ranked fewer than 50% of patients' top-ranked drug-related medical problems within their own top 5 selections. Mean scores (± standard deviation) for goal attainment scaling were 50.2 ± 0.3 and 50.4 ± 0.5 at the first and second follow-up times ($p = 0.26$) (maximum possible score = 80). The proportions of goals for which achievement was at or above the expected level at the 2 follow-up times were 70% and 74%, respectively.

Conclusions: The goal attainment scaling process facilitated pharmaceutical care by helping to identify patients' priorities and by providing a systematic method for measuring and achieving outcomes that were important to the patients.

Key words: goal attainment scaling, pharmaceutical care, patient outcomes

RÉSUMÉ

Objectifs : Étudier la capacité de pondérer l'atteinte des objectifs pour faciliter les soins pharmaceutiques, en mesurant l'identification des priorités des patients et l'atteinte des résultats thérapeutiques qui étaient importaient aux yeux des patients. Les objectifs précis étaient de déterminer, d'une part, le degré de concordance entre les problèmes médicaux identifiés par les patients et par les pharmaciens et la priorité accordée aux problèmes pharmacothérapeutiques par ces mêmes personnes, et d'autre part, de déterminer aux visites de suivi la proportion des objectifs qui ont été atteints relativement au degré de concordance attendu.

Méthodes : Étude prospective d'une série de cas issus d'un échantillon de convenance de patients souffrant d'angine instable, admis au St. Joseph's Hospital de Hamilton, en Ontario. Pour chacun des patients, deux pharmaciens et le patient dressaient chacun de leur côté une liste des problèmes médicaux connus ; l'évaluation des pharmaciens était fondée sur les renseignements contenus dans le dossier médical et obtenus à l'entrevue. Les patients choisissaient de trois à cinq problèmes médicaux associés à un traitement médicamenteux, qu'ils jugeaient importants, et les pharmaciens faisaient de même. Le patient et un des deux pharmaciens complétaient ensemble les formulaires de pondération de l'atteinte des objectifs et ménageaient deux visites de suivi. À chacune des visites de suivi, on calculait les cotes. On a ensuite procédé à l'analyse quantitative et qualitative des données.

Résultats : Quinze patients ont participé à l'étude. Les pharmaciens ont identifié un plus grand nombre de problèmes médicaux que ne l'ont fait les patients ($p = 0,004$ pour le pharmacien 1 et $p = 0,005$ pour le pharmacien 2). Le niveau de concordance entre les patients et les pharmaciens en termes d'identification des problèmes était bas (kappa = 0,21 pour le pharmacien 1, kappa = 0,11 pour le pharmacien 2). Les pharmaciens ont classé parmi les cinq problèmes médicaux associés à un médicament qu'ils jugeaient importants, moins de 50 % de ces mêmes problèmes que les patients jugeaient comme prioritaires. Les cotes moyennes pour la pondération de l'atteinte des objectifs (± l'écart type) étaient de 50,2 ± 0,3 et de 50,4 ± 0,5 à la première et à la seconde visite de suivi, respectivement ($p = 0,26$) (cote maximal possible = 80). La proportion des objectifs qui ont été atteints au-delà des attentes aux deux visites de suivi étaient de 70 % et de 74 %, respectivement.

Conclusions : La méthode de pondération de l'atteinte des objectifs a facilité les soins pharmaceutiques, en permettant d'aider à identifier les priorités des patients et en servant de méthode systématique pour mesurer et atteindre les résultats thérapeutiques qui étaient importants pour les patients.

Mots clés : pondération de l'atteinte des objectifs, soins pharmaceutiques, résultats thérapeutiques

INTRODUCTION

Current pharmacy practice advocates the use of the pharmaceutical care model. Pharmaceutical care is defined as "the responsible provision of drug therapy for the purposes of achieving definite outcomes that improve a patient's quality of life".[1] Outcomes are broadly categorized as cure of a disease, reduction or elimination of symptoms, slowing or arresting of disease processes, and prevention of diseases or symptoms.[2] The goals of therapy relate to achieving these outcomes, and success is measured through surrogate endpoints or the outcomes themselves.

Pharmaceutical care requires that pharmacists take responsibility for systematically identifying, preventing, and resolving a patient's drug-related problems.[1,3] Active involvement on the part of physicians, nurses, other health care professionals, and patients is required if pharmaceutical care is to be complete and effective.[4] In particular, the patient must serve as an equal and active participant in the delivery of pharmaceutical care. Several practice functions are required for the successful and complete provision of pharmaceutical care.[3] These interrelated practice functions can be consolidated into 3 overall functions: initiating therapy, monitoring therapy, and managing or correcting therapy.[2] The pharmacist has a role in each of these functions.

Implementation of pharmaceutical care can be challenging for pharmacists for several reasons, including discomfort with the process, time restrictions, resistance from other health care professionals, and lack of practical tools. The pharmacy literature provides examples of methods to help identify and prioritize drug-related problems.[5] Furthermore, many pharmacists develop their own tools (such as data collection forms) for this purpose. Less information is available about the creation and implementation of pharmacy care plans, which are necessary for the resolution of drug-related problems. Thus, tools to assist pharmacists in the development of pharmacy care plans are required.

Goal attainment scaling is a goal-oriented method used to evaluate health outcomes. It involves developing scaled, patient-specific descriptions of potential outcomes (goals). These goals are based on problems identified by patients or health care professionals. The level of goal attainment is assessed quantitatively at a specified follow-up time. The assessment assumes that appropriate therapeutic interventions have occurred.[6,7] Goal attainment scaling promotes the clear identification of patient-specific problem areas and goals and is a method for communicating patient expectations.[7]

Goal attainment scaling has been used in the mental health field for more than 30 years. Other settings in which this method is used include rehabilitation, geriatrics, and nursing. Numerous studies have used variants of goal attainment scaling to help develop patient-specific goals,[8-18] to measure patients' outcomes and monitor their progress in clinical practice,[8,11,12,14,15,17,19-22] and to evaluate programs,[14,16,23-27] as well as for performance appraisal of health care professionals and for quality assurance.[6,28,29] Some of these studies have used exclusively clinician-set goals, whereas others have included the patient in the goal-setting process. The patient involvement in the latter studies is consistent with current health care standards, in which the patient participates in health care decisions.[30]

Goal attainment scaling appears to complement the practice functions of pharmaceutical care. Specifically, it may be a practical tool to facilitate the identification and prioritization of patient-specific drug-related problems. Furthermore, it may assist in the systematic development and implementation of pharmacy care plans that specifically define and monitor the level of goal achievement. Goal attainment scaling may help pharmacists to satisfy professional standards of practice that are not being consistently met at present. Patients may benefit from increased participation in their health care and a more systematic evaluation of their medical problems. The use of goal attainment scaling in pharmacy practice is limited, and its use in pharmaceutical care has not been examined.[6,31] This study was designed to explore the ability of goal attainment scaling to facilitate pharmaceutical care for hospitalized patients with cardiovascular disease, as measured by the identification of patients' priorities and achievement of outcomes that were important to them. The specific objectives of the study were to determine the level of agreement between patients and pharmacists in the identification of medical problems and the prioritization of medical problems linked to drug therapy and to determine the proportion of goals that were achieved at follow-up, relative to the expected level.

METHODS

Study Design

This study was a prospective case series. The study was piloted by a pharmacy resident (C.N., hereafter referred to as pharmacist 1) and 2 patients, to discover and address unanticipated problems with the study protocol. Approval was obtained from the Research Ethics Committee at St. Joseph's Hospital, Hamilton, Ontario.

Patients

The study participants consisted of a convenience sample of patients admitted to the Cardiac Care Unit and the Cardiac Rehabilitation Unit at St. Joseph's Hospital with a primary diagnosis of unstable angina from February to May 2000. Potential participants were identified by pharmacist 1 or the pharmacist in the Cardiac Care Unit (H.C., hereafter referred to as pharmacist 2) and then approached by 1 of these 2 pharmacists for recruitment. Initially, patients were not approached until after they had been in hospital for at least 24 hours (to allow for stabilization of the acute unstable angina episode). However, on the basis of the pilot experience, the inclusion criteria were revised to allow recruitment of patients who had been in hospital for at least 12 hours, provided they did not have ongoing chest pain, New York Heart Association class IV heart failure, or arrhythmias. Patients were excluded if they could not clearly speak or understand English (either personally or through a translator), had severe cognitive impairment as judged by the investigators, or were unwilling to participate. Patients provided written informed consent to participate.

Data Collection

Pharmacist 1 completed a demographic data form for each subject. For each patient, each of the 2 pharmacists independently completed a form listing medical problems on the basis of information in the medical records. The patients independently completed a form identifying medical problems. If the patient had difficulty writing, pharmacist 1 recorded the patient's responses. Standardized patient interview guides created for the study were used for the initial interviews and follow-up appointments.

Goal Attainment Scaling

Goal attainment scaling involves several steps (Table 1).[7] Briefly, patient-specific medical problems, signs, and symptoms are listed, and the most important medical problems identified; a hierarchy of levels of anticipated outcomes for each problem area is developed; and the level of goal attainment for each problem area is assessed at follow-up. A summary score is calculated to describe the overall level of goal attainment.

Standard worksheets were used to facilitate goal attainment scaling in this study. Pharmacist 1 worked together with each subject to complete a goal attainment

Table 1. Steps in Goal Attainment Scaling[7]

1. Identify patient-specific problem areas (usually at least 3).
2. Prioritize the relative importance of problems with a weighting system.
3. Develop several (3 to 5) levels of predicted outcomes for each problem or goal area using indicators that are specific, objective, and observable (the expected outcome is the middle level on the scale).
4. Establish a specific follow-up time to assess the level of goal attainment (the time may be different for each goal).
5. Perform follow-up and score outcome.

scaling form (see Appendix 1, which includes sample goals for a typical patient). From among the medical problems listed on the problem forms (as completed by the patient and both pharmacists), patients were asked to identify 3 to 5 problems linked to drug therapy (i.e., caused by a drug or resolvable with a drug) that they felt were most important. Each problem was weighted, with weight of 1 for unimportant problems and 9 for very important problems. Specific goals were then developed on the basis of these problems. The identified medical problems, signs, and symptoms (hereafter referred to as medical problems linked to drug therapy) and their associated goals were then incorporated into the clinical services provided by pharmacist 2 (such as recommendations to initiate or stop treatment during patient care rounds), and any interventions were recorded. Issues identified but not related to drug therapy were reported to the appropriate health care professional. Pharmacist 1 calculated summary scores (which took into account the problem weighting) based on results obtained at 2 follow-up appointments (see Appendix 1 for the calculation).

Statistical Analysis

Descriptive statistics (means, standard deviations, proportions, and ranges) were used for data related to patient characteristics, types and numbers of medical problems, pharmacist interventions, and feedback. The degree of agreement between patients and pharmacists for the identification and prioritization of medical problems was analyzed with kappa scores. In this case, the kappa coefficient describes the agreement between the patients and each of the 2 pharmacists and corrects for agreement expected to occur by chance alone. A score of less than 0.4 was defined as indicating low agreement, a score between 0.4 and 0.7 moderate agreement, and a score greater than 0.7 high

agreement.[32] Differences in medical problem lists between patients and pharmacists were analyzed with the independent Student's *t*-test. Goal attainment data were analyzed by χ^2 tests and descriptive statistics. Data were analyzed by means of Microsoft Excel,[33] PC Agree,[34] and Arcus[35] computer programs.

RESULTS

Demographic Characteristics

Of 18 patients approached, 15 agreed to participate in the study. Follow-up was completed for all participants except one patient who was unavailable for one of the follow-up appointments and another who refused to participate in the first follow-up. The patients' characteristics are presented in Table 2. Eleven (73%) of the patients were male, and the median age was 76 years (range 55 to 82 years). Six (40%) of the patients had been diagnosed with angina more than 5 years ago, and 6 (40%) had no history of myocardial infarction. The mean number (± standard deviation) of concomitant illnesses (not including angina) per patient was 3.6 ± 1.4 (see Table 2 for the types of concomitant illnesses). The mean number of medications per patient was 10.0 ± 4.5. Cardiovascular medications accounted for 44 (29%) of the 150 medications reported.

Identification and Ranking of Medical Problems

Despite the homogeneity of the study sample (Table 2), a variety of medical problems and indicators of treatment success were identified by the patients and pharmacists. The patients and the 2 pharmacists identified a total of 365 medical problems, either linked to drug therapy or not drug-related. Thirty-three problems (9%) were identified by pharmacist 1 only (mean 2.2 ± 1.2 per patient, median 2, range 0 to 5). Pharmacist 2 uniquely identified 31 medical problems (8% of the total; mean 2.1 ± 1.7 per patient, median 1, range 0 to 8). Thirty problems (8%) were identified only by the patients (mean 2.0 ± 1.5 per patient, median 2, range 0 to 6). The total numbers of problems identified by patients, pharmacist 1, and pharmacist 2 were 88, 136, and 142, respectively. The patients identified a mean of 5.9 ± 2.1 problems. Both pharmacists identified a significantly greater mean number of problems: 9.1 ± 2.1 for pharmacist 1 (*p* = 0.004 compared with patients) and 9.5 ± 2.8 for pharmacist 2 (*p* = 0.005 compared with patients). Figure 1 illustrates the types of medical problems identified. The degree of agreement

Table 2. Baseline Characteristics of 15 Patients Admitted to Hospital for Unstable Angina

Characteristic	No. (and %) of Patients*	
Age (years)		
Mean (and SD)	72.2	(7.47)
Median (and range)	76	(55–82)
Sex		
Female	4	(27)
Male	11	(73)
History of unstable angina		
First episode	3	(20)
Diagnosed within past year	2	(13)
Diagnosed 1 to 5 years ago	1	(7)
Diagnosed >5 years ago	6	(40)
No data	3	(20)
History of myocardial infarction		
None	6	(40)
1 episode	5	(33)
>1 episode	3	(20)
No data	1	(7)
Concomitant illness		
Total no.	54	
Mean (and SD)	3.6	(1.4)
Median (and range)	3	(0–7)
Type of concomitant illness		
Cardiovascular	10	(67)
Gastrointestinal	8	(53)
Respiratory	6	(40)
Psychiatric or neurologic	4	(27)
Endocrine, hematologic, electrolytic	7	(47)
Ocular	2	(13)
Musculoskeletal	4	(27)
Genitourinary	2	(13)
Concomitant medications		
Total no.	150	
Mean (and SD)	10.0	(4.5)
Median (and range)	8	(0–26)
Cardiac medications		
Total no.	44	
Mean (and SD)	1.93	(1.27)
Median (and range)	3	(0–6)
Marital status		
Married	10	(67)
Widowed	3	(20)
Single	2	(13)
Living arrangements		
Lives alone	3	(20)
Lives with family	12	(80)

SD = standard deviation.
*Except where specified otherwise.

between patients and pharmacists in identifying medical problems was low (kappa = 0.21 for patients and pharmacist 1 and 0.11 for patients and pharmacist 2; see Table 3).

In identifying the top 3 to 5 medical problems linked to drug therapy, the patients selected a total of 66 problems (Figure 2). Of these 66 problems, pharmacist 1 ranked 31 (47%) and pharmacist 2 ranked 29 (44%) within their top 5 selections for the patients.
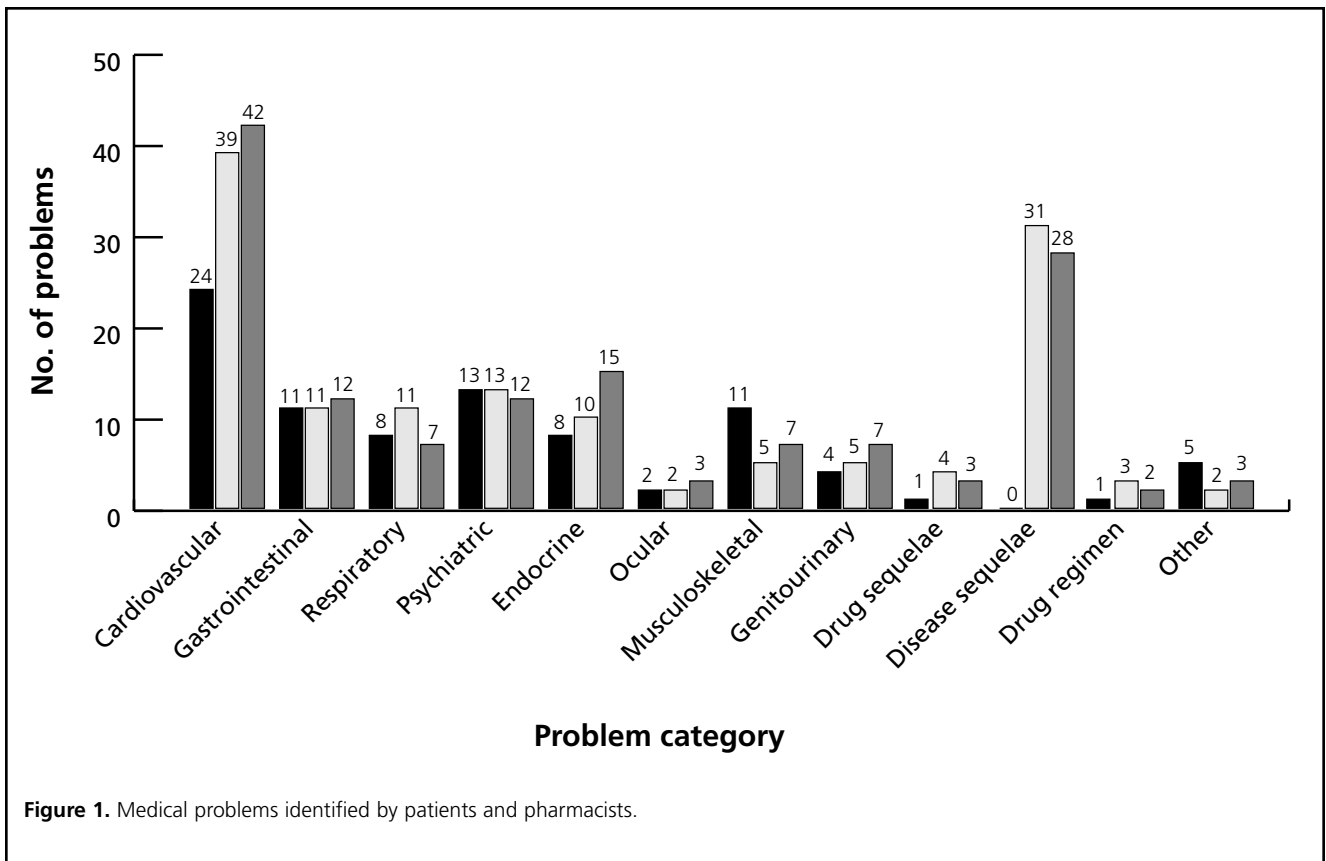
Figure 1. Medical problems identified by patients and pharmacists.

Table 3. Agreement between Patients and Pharmacists on Identification of Medical Problems

Person(s) Identifying the Problem	No. of Problems
For pharmacist 1*	
Patient and pharmacist	46
Patient only	43
Pharmacist only	90
Neither patient nor pharmacist†	31
For pharmacist 2‡	
Patient and pharmacist	54
Patient only	35
Pharmacist only	88
Neither patient nor pharmacist†	33

*Kappa = 0.21.
†This category is based on the inclusion of data from the pharmacist not involved in the comparison.
‡Kappa = 0.11.

The ranking was significantly different between patients and pharmacists (p = 0.0003 for comparison of pharmacist 1 and patients, p = 0.0002 for comparison of pharmacist 2 and patients). Cardiovascular problems and prevention of disease sequelae were the categories of problems most commonly identified.

Forty-seven (71%) of the 66 top-ranked medical problems linked to drug therapy had been initially identified by the patients themselves. The remaining 19 problems (29% of the total; mean 1.3 ± 0.8 per patient) had been initially identified by the pharmacists, not the patients (i.e., these problems were chosen by the patients from the pharmacists' lists). Six of these problems were cardiovascular, 3 were gastrointestinal, 4 were psychiatric or neurological, 1 was in the endocrine/hematology/electrolytes category, and 5 related to the prevention of disease sequelae.

Goal Attainment Scales

A total of 66 goal attainment scales were constructed, one for each top-ranked problem (mean 4.4 ± 0.6 per patient). Eight patients (53%) constructed 5 scales each, 5 patients (33%) constructed 4 scales each, and 2 patients (13%) constructed 3 scales each. The mean goal attainment scaling scores were 50.2 ± 0.3 and 50.4 ± 0.5 at the first and second follow-up times, respectively (p = 0.26) (maximum potential score = 80; see Appendix 1). Goal attainment levels were grouped as expected (numeric value 0), above expected (numeric value 1 or 2), and below expected (numeric value –1 or –2). The overall proportions of goals attained in each of these categories at both follow-up times are reported in Table 4. Seventy percent of the goals were
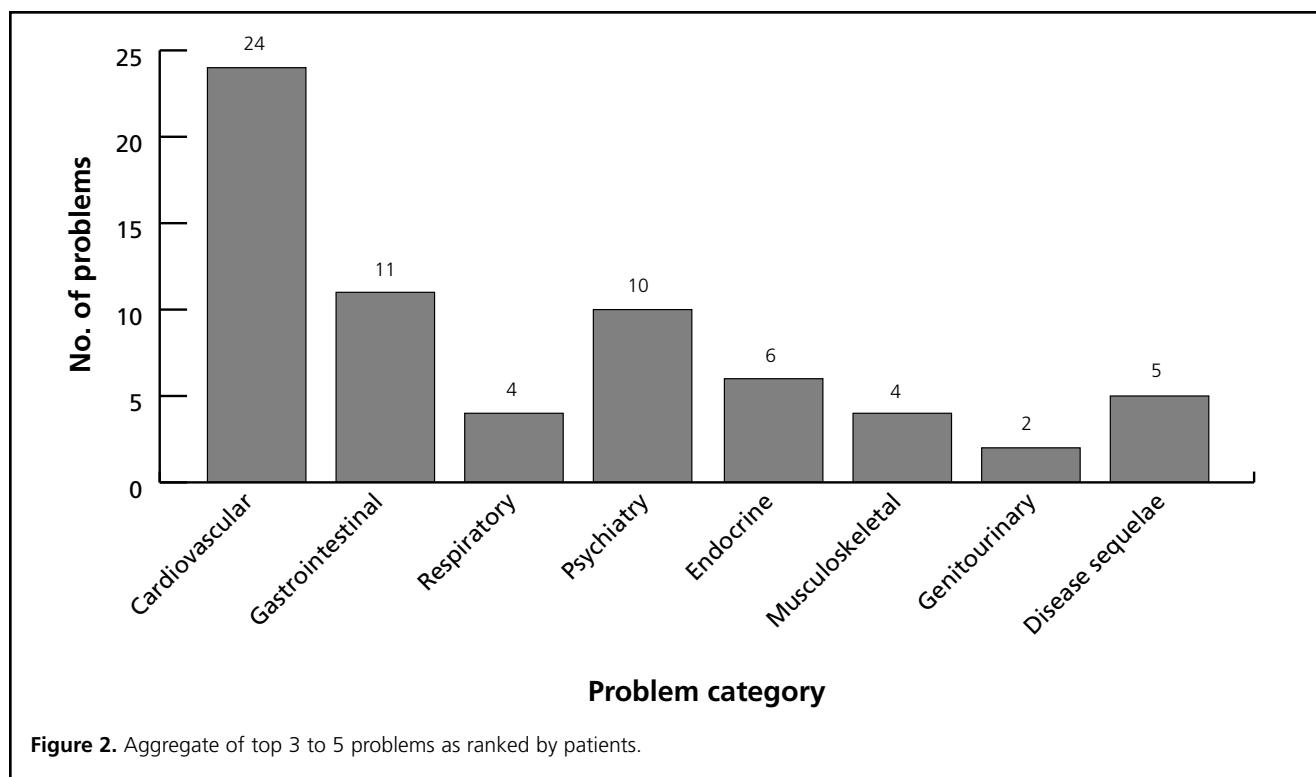
Figure 2. Aggregate of top 3 to 5 problems as ranked by patients.

Table 4. Proportion and Level of Goals Attained

| Follow-up time | Relative Attainment of Goals; No. (and %) of Goals | | |
	Below Expected	Expected	Above Expected
First (*n* = 60)*	18 (30)	17 (28)	25 (42)
Second (*n* = 64)*	17 (27)	10 (16)	37 (58)

*The *n* value represents the total number of goal attainment scales that could be assessed at the follow-up time. Some data were missing because of patients who were not available or refused to participate at follow-up.

attained at or above the expected level at the first follow-up time, and 74% of the goals were attained at these levels at the second follow-up time (Table 4). There were no statistically significant differences between the levels of goal attainment at the first and second follow-up times. The Pearson correlation coefficient between the pharmacists for the first follow-up was 0.57, which indicates that patients' responses were moderately reliable.

DISCUSSION

The results of this study suggest that goal attainment scaling is appropriate for pharmaceutical care. The observed differences between patients and pharmacists emphasize the need to include the patient in the pharmaceutical care process.

The patients and the pharmacists in this study identified a variety of actual and potential medical problems. Cardiovascular problems were identified most frequently, which is understandable, given that the patients were admitted for a cardiac diagnosis. However, medical problems related to many other disease states were also identified, which illustrates the diversity of the patient sample. Pharmacists identified significantly more medical problems than patients, but the problems they listed tended to relate to the prevention of disease sequelae, a reflection of their professional knowledge. Patients did not consider this category of problems in their initial lists. This difference in thinking between patients and pharmacists is supported by the low agreement between patients and pharmacists (as indicated by kappa scores) and might be expected, in view of their different perspectives. Pharmacists seemed more cognizant of the cardiovascular issues important in the setting of unstable angina, whereas the patients were most concerned with the specific symptoms (cardiac and noncardiac) that they were experiencing. Low agreement between patients and health care professionals has been demonstrated in rehabilitation and mental health settings and was attributed to a similar difference in perspectives.[8,16] These results suggest that pharmacists and patients should communicate to one another the rationale for focusing

on specific medical problems, as each party may not inherently recognize the concerns of the other.

Generally, pharmacists and patients identified noncardiovascular medical problems with reasonable similarity. This finding suggests that patient histories are reasonably well documented in medical records. However, 30 (8%) problems were identified only by patients, which suggests that the medical records are not always comprehensive. Obtaining information from both medical records and the patients themselves permitted a comprehensive listing of medical problems for each patient. It is recommended that pharmacists obtain medication histories so that they can have complete information about the medical problems a patient is experiencing.

Pharmacists ranked fewer than half of the patients' top medical problems linked to drug therapy in their own priority rankings. This result reflects the different priorities that pharmacists and patients give to specific medical problems linked to drug therapy. Patients themselves initially identified most (71%) of the problems ranked within their top selections. In the remaining cases, a problem that had been initially identified by one of the pharmacists was included in the top-ranked medical problems linked to drug therapy. These problems were most often related to disease sequelae and cardiovascular problems. Thus, knowledge of problems identified by pharmacists only did not appear to change patients' perspectives of which medical problems were most important to them, except for categories related to the admitting diagnosis of unstable angina. Perhaps when reminded of these issues, patients recognized more clearly the implications of unstable angina. These results illustrate the importance of obtaining the patient's perspective regarding the problem areas on which to focus when developing therapeutic plans. They also suggest that patients may benefit from a pharmacist's perspective when determining their priorities for therapy. Patient priorities were emphasized here, as a patient-centred approach is central to pharmaceutical care.

The mean goal attainment scaling scores of approximately 50 at each follow-up indicate that patients' goals were generally met at the expected level. This suggests that the explicit setting of outcome levels is useful in monitoring and quantifying patients' progress. It also helps pharmacists to gauge the effectiveness of their interventions. Studies with patients in rehabilitation and mental health settings have suggested that patients who are involved in setting goals are more likely to meet or exceed the expected level of goal attainment than those who are not.[12,36]

At both follow-up times, the proportion of goal attainment above the expected level was greater than the proportion at or below the expected level. The negligible difference between the 2 follow-up times in attainment scores and proportion of goals attained at each level may be related to the short period between follow-ups and the setbacks that many patients seemed to experience (such as bypass surgery, addition of a new medication that negatively affected a problem area, or recurrence of chest pain).

Although not widely used in pharmacy practice, the reliability and validity of goal attainment scaling have been tested in numerous other settings.[6,7] Interrater reliability has been established for a variety of patient and clinician or other health care professional dyads (such as nurses, social workers, therapists) for both construction and scoring of the goal attainment form.[8,18,37,38] Most of these studies examined reliability between health care professionals. With careful consideration of scale construction and adequate training, acceptable results may be obtained from a variety of patient populations and goal-setters.[7,15] Validity is more difficult to ascertain, given the conceptual uniqueness of goal attainment scaling (i.e., the individualized nature of the goal-setting process) relative to standard instruments with fixed-item measures, such as the Brief Psychiatric Rating Scale.[7] Despite the discouraging results of early studies,[6,7,16,39] recent studies have reported moderate face, content, and concurrent validity in geriatric and rehabilitation settings.[8,15,18,37,38,40] The construct validity of goal attainment scaling has not been adequately tested.[7] Initial studies have demonstrated the efficiency of this method in detecting clinically important changes in rehabilitation and geriatric patients.[18,38,41]

This study had some limitations. The convenience sampling method, small sample size, and specific focus on patients with unstable angina might all limit the generalizability of the results. The selection bias for motivated patients inherent in convenience sampling could limit the use of goal attainment scaling to similarly motivated populations. A limited number of the problem forms were completed by pharmacist 2 after attending patient care rounds, and information gained during rounds might have increased the number of problems documented on the forms.

In conclusion, goal attainment scaling appeared to facilitate the provision of pharmaceutical care to patients with unstable angina through clear and comprehensive identification of medical problems, prioritization of medical problems linked to drug therapy, and establish-

ment of therapeutic plans (and associated interventions) with specific monitoring features recorded as the hierarchy of goal attainment levels. In view of these preliminary findings, the use of goal attainment scaling in pharmacy practice merits further study in a variety of patient populations under controlled study conditions.

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Appendix 1. Goal Attainment Scale Worksheet for Patients Admitted with Unstable Angina

Patient Name: _____ Date: _____ Completed by: _____

Room Number: _____ ID Number: _____ Time: _____

___

Problem (Goal) Areas for Medical Problems Affected by Drug Therapy
Determine (a) problem (goal) areas for the patient, (b) the expected outcomes for each problem area (as objective and observable as possible), (c) designated follow-up time when the patient will be reassessed to determine the status of the patient for each problem area (level at intake-√; level at follow-up-*).
There should be at least 3 levels filled in for each problem area (one must be the expected level plus one above and one below this level); avoid 2 adjacent blank levels
Place the subjective weight (scale of 1 to 9 — see problem forms) for each problem area (goal) next to the "w" underneath the problem (goal) area section

Attainment/Outcome Levels	Chest pain w = 9	Blood pressure w = 6	Constipation w = 5	Anxiety w = 9	Breathing w = 7
Much less than expected (–2)	>5	>160 or <100	Every 4 or more days	9–10	More than 5 times daily
Somewhat less than expected (–1)	3–5	150–160	Every 3 days	6–8	3–5 times daily
Expected level (program goal) (0)	2	140–159	Every 2 days	4–5	2 times daily
Somewhat better than expected (+1)	1	130–139	Every other day	2–3	Once daily
Much better than expected (+2)	0	<130 and >100	Every day	1	Less than once daily
Follow-up time (dates scheduled)	March 8, 2000 March 21, 2000	March 8, 2000 March 21, 2000	March 8, 2000 March 21, 2000	March 8, 2000 March 21, 2000	March 8, 2000 March 21, 2000
Comments (include time to complete, factors that may affect attainment level, e.g., illness)	No. of episodes of chest pain per day	Average systolic blood pressure reading (mm Hg)	Frequency of bowel movements	Severity of anxiety on a scale of 1 to 10, where 1 = calm and 10 = worst-ever anxiety	No. of times requiring salbutamol inhaler

Sources: Stolee and colleagues,[8] Rockwood and colleagues,[18] and Rockwood and colleagues.[38]
The problems presented here are typical of those seen during the course of the study.

Calculation of score for goal attainment scaling:

$$\text{Score} = 50 + \frac{10 \sum (w_i x_i)}{\sqrt{[0.7 \sum w_i^2 + 0.3 (\sum w_i)^2]}}$$

where w_i = the weight assigned for goal i (ranging from 1 to 9)

x_i = the numeric value for the attainment level of goal i (ranging from –2 to +2)

The maximum possible score is 80 (if the weight for all goals is 9 and all scales score +2).