Criteria Mapping: A Method of Quality Assurance

Mary Law, Brenda Ryan, Elizabeth Townsend, Barbara O’Shea

Key Words: medical audit • medical records • quality assurance, health care

Criteria mapping is a flexible and responsive method of chart audit that allows the simultaneous assessment of both the process and the outcome of care by means of health record abstraction. This method of audit is particularly suited to occupational therapy because it includes branching to reflect the sequential judgments of therapists and does not penalize the clinician for omitting unnecessary procedures. The purpose of this study was to determine the utility and reliability of the criteria mapping process in evaluating the quality of care for a self-care disability in an acute care setting. Three occupational therapists and one independent abstractor evaluated 12 charts twice. Intraobserver reliability calculated with intraclass correlation coefficients was .77 for the therapists and .65 for all observers. Interobserver reliability was .73 for the therapists and .72 for all observers. The criteria map provided comprehensive and relevant information about each chart. This paper discusses the implications of these findings for the ongoing monitoring of the quality of care in occupational therapy.

Mary Law, MSc, OT(C), is Assistant Professor, Departments of Medicine and Clinical Epidemiology and Biostatistics, Faculty of Health Sciences, McMaster University, 1200 Main Street West, Room 2F22, Hamilton, Ontario L8N 3Z5, Canada, and Research Clinician, Occupational Therapy, Chedoke-McMaster Hospitals, McMaster Division.


Elizabeth Townsend, MEd, BSc(Ot), OT(C), is Assistant Professor, School of Occupational Therapy, Faculty of Allied Health Professions, Dalhousie University, Halifax, Nova Scotia, Canada.

Barbara O’Shea, MS, OT(C), is Associate Professor and Director, School of Occupational Therapy, Faculty of Allied Health Professions, Dalhousie University, Halifax, Nova Scotia, Canada.

This article was accepted for publication January 15, 1988.

Occupational therapists, as well as other health professionals, are now mandated to document the quality of care provided in their practice setting. The Joint Commission on Accreditation of Hospitals emphasizes the use of monitoring systems to continuously evaluate the quality of care (Ostrow, 1983). The most appropriate and rigorous method of evaluating the quality of care is often difficult to determine because there are no agreed-upon standards for or definitions of adequate or superior care. Most occupational therapy departments and clinics have quality assurance programs in place; yet these programs vary greatly (Kirchman, 1980; Llorens & Shuster, 1977; McColl & Quinn, 1985; Ostrow, 1983; Saunders, 1984; Shimeld, 1982; Vanagunas, 1979). In this paper, we (a) summarize the literature on quality-of-care assessment using chart audit and (b) describe a study assessing the usefulness and reliability of criteria mapping, a flexible and responsive method of chart audit, to assess and monitor the quality of care of occupational therapy for self-care problems.

Issues in Quality-of-Care Assessment

Quality of care can be defined as “the extent to which clinical acts which do more good than harm are carried out” (McMaster University, 1984, p. 377). Quality is generally defined by three components: structure, process, and outcome (Donabedian, 1986). Structural elements such as buildings, programs, size of staff, and qualifications of staff members have not been shown to be reliable and valid indicators of the quality of care (Donabedian, 1986). The process of care and its outcome are considered to be valid indicators of the quality of care, but there is still controversy about which is more appropriate and whether there is a link between the process and the outcome of care (Tugwell, 1979).

One of the most common ways of assessing the process of care is a chart audit. In a chart audit, the assumption is made that a complete record reflects satisfactory care. The audit method is flexible in that it permits several methodological choices, particularly in relation to criteria selection and format. The selection of criteria for determining high quality of care can be based on a subjective review of each chart or can be made explicitly before the audit. Donabedian (1986) argued that the use of explicit criteria is more reliable and generalizable and less expensive.

The format of the criteria for a chart audit is another important choice that will determine the ultimate usefulness of the audit. The most common format for audits currently uses a linear criteria list. Each audited chart must meet each criterion on the list to receive an adequate quality-of-care rating. The difficulty with this format is that it can lead to the develop-
The American Journal of Occupational Therapy

Criteria Mapping
Kaplan and Greenfield (1978) have described another format for selecting criteria for chart audit called criteria mapping. According to these authors, criteria mapping is a method of assessing quality of care that allows the simultaneous assessment of both process and outcome criteria by means of health record abstraction. It was developed by Greenfield, Lewis, Kaplan, and Davidson (1975) to provide a more flexible evaluation of the quality of care. A criteria map includes branching to reflect sequential judgments of clinicians and does not penalize the clinician for omitting unnecessary procedures. The criteria for chart review are selected on the basis of research evidence of efficacious treatment, guidelines for care, and expert opinion (Chambers, Sibley, Spitzer, & Tugwell, 1981) and are based on minimum adequacy for quality of care.

The components of criteria mapping include the definition of the disability, the relevant characteristics of the patient, and the criteria for the evaluation of the care given. A manual is provided that includes information about scoring methods, definitions of the terms used in each item (including alternative statements), and information about where the items are likely to be found on the medical chart (Kaplan & Greenfield, 1978). Essential criteria for adequate and superior care are predefined, and each episode of care is scored as adequate, questionable, or superior. Scores for each episode indicate the percentage of applicable criteria that are adequate or superior. Overall compliance for single criteria can also be measured.

Although criteria mapping has been used to study quality of care for urinary incontinence (Chambers, Mohide, et al., 1984), diabetes mellitus (Greenfield et al., 1975), and emergency medicine (Kaplan & Greenfield, 1978), to date it has not been used to evaluate occupational therapy care. This paper describes a study in which a criteria map was designed to evaluate the quality of occupational therapy service provided to a person with a disability in self-care.

Study Objectives
The primary purposes of this study were to construct a self-care criteria map and to determine if the criteria mapping approach is useful in assessing the quality of occupational therapy service provided for self-care problems. Topics of interest were the information provided by the map and whether that information could determine which areas of practice were superior and which areas required improvement. The study also evaluated the reliability of the audit process and the agreement between occupational therapists and independent abstractors.

Study Methods
The recommended method of setting the criteria for a criteria map is to use scientific evidence of efficacious intervention outcomes (McMaster University, 1984). For example, there is evidence that occupational therapy intervention that improves bathing ability also improves functional outcome (Shillam, Beeman, & Loshin, 1983). However, for many other self-care problems seen in occupational therapy, evidence of efficacious treatment is not available. In the absence of research evidence, the second, but less accurate, method of setting criteria is to use the consensus of experienced occupational therapists.

Both methods of criteria selection were used for this study. Evidence of important predictors of outcome in self-care disability (Arnetz, 1985; Lehmann, DeLateur, & Fowler, 1975) and evidence of efficacious intervention (Shillam, Beeman, & Loshin, 1983; Smith, Garraway, Smith, & Akhtar, 1982) were assembled. The Klein-Bell ADL (activities of daily living) Scale (Klein & Bell, 1982) was used as the basis for the self-care map because it is specific to occupational therapy and has demonstrated reliability and validity. A panel of expert therapists contributed additional items to the map. The criteria map therefore included a combination of items from the scientific literature, items from the Klein-Bell ADL Scale, and items considered clinically important by an expert panel of occupational therapists. The criteria map was assembled to represent the sequential process or algorithm that a therapist would employ when working with a person with a self-care problem through assessment, intervention, and reassessment or follow-up. Figures 1 and 2 show parts of the finished criteria map.

The audit procedure begins with the first map item. The abstractor determines if the employment situation of the patient was recorded as assessed by the therapist (see Figure 1). If the item meets the criterion, it receives a score of 1. A score of 0 is received if the item was not recorded as assessed.
Figure 1. Criteria map, self-care skills.
findings on each item then determine the action of the abstractor. If a positive score of 1 was received, the abstractor moves to the right and scores whether the patient's employment situation was considered in the occupational therapy plan. When the end of each row is reached, the abstractor moves to the number indicated below that item, in this case, Item 3. If a negative score was received, the abstractor moves directly to the next vertical item, that is, Item 3. In this way, only the information relevant to that patient is abstracted.

Figure 2 shows another part of the criteria map. Beginning at Item 27, the abstractor scores whether the occupational therapist assessed the patient's dressing function. If it was assessed and problems were noted, the abstractor moves to the right-hand column and looks for a documented plan to remediate that problem. If dressing was not assessed or was not a problem, the abstractor looks for the documentation of an assessment of feeding.

This method allows flexibility in the audit process and reflects the fact that patients with self-care disabilities may have different clinical requirements. It prevents a chart from being penalized for information that is not applicable, but requires information regarded as essential. The criteria map acts as a decision tree to eliminate the judgment and scoring of inapplicable criteria.

Scores obtained were summarized to calculate the total percentage of applicable items scored positively for each chart. In addition, the total percentage of positive scores for each item over a series of charts was calculated.

Medical charts from two general hospitals were used to determine the usefulness of the map in assessing the quality of care for self-care problems. The charts were of persons who had recently received occupational therapy in those hospitals and who had a disability in self-care (see Table 1 for the demographic characteristics of the patients whose charts were included in the study). Three occupational therapists not employed by the hospital selected the charts using the disability criteria. These three occupational therapists, along with one independent abstractor, performed the chart audits and attended a half-day training session that included a discussion of the criteria mapping procedure, an explanation of the self-care map, and scoring of a sample chart.

A generalizability study design (Mitchell, 1979) was employed to determine the quality of information provided by the audit and to determine the reliability of the abstraction process. Twelve charts were evaluated twice by three occupational therapists and by one independent abstractor. With this design, in which all observers score each chart twice, it was possible to estimate both interobserver and intrabserver variation. In this case, intrabserver variation was the same as test-retest reliability because the chart did not change.

Results
The standard established for an adequate episode of care was the fulfillment of 60% of the applicable criteria. Health records scoring 60% or greater were classified as adequate, and those scoring below 60% were classified as questionable. In our sample, the scores ranged from 24% to 77%. Scores for individual criteria over the series of charts ranged from 0% to 100%.

The reliability of these ratings for all observers

### Table 1: Patient Demographics

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean age (years)</th>
<th>Mean Hospital Stay (days)</th>
<th>Gender F/M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rheumatoid arthritis/polyarthitis</td>
<td>64.2</td>
<td>39.0</td>
<td>3/3</td>
</tr>
<tr>
<td>Parkinson disease</td>
<td>69.0</td>
<td>36.3</td>
<td>1/2</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>65.0</td>
<td>21.0</td>
<td>1/0</td>
</tr>
<tr>
<td>Inflammatory CNS disease</td>
<td>48.0</td>
<td>24.0</td>
<td>0/1</td>
</tr>
<tr>
<td>Fracture</td>
<td>70.0</td>
<td>23.0</td>
<td>0/1</td>
</tr>
</tbody>
</table>

*Note. CNS = central nervous system.*
and for each pair of observers was calculated with the Kappa agreement statistic. Agreement beyond chance for each observer over time ranged from 63.6% to 100%. The independent abstractor achieved perfect agreement over time, and the therapists’ ratings changed to become closer to those of the independent abstractor. Agreement beyond chance between observers ranged from 72.4% to 92%. Agreement increased from 2% to 18% from Time 1 to Time 2, suggesting that increased skill in administering the instrument leads to increased agreement (see Tables 2, 3, and 4 for complete agreement statistics).

The intraobserver and interobserver reliability of the percentage of applicable criteria met by each chart was calculated with intraclass correlation coefficients. The intraclass correlation coefficient is an agreement statistic that includes variation due to random error as well as variation due to bias. Intraclass correlation coefficients are generally lower than Pearson correlation coefficients, which measure only the trends of scores, not true agreement. It has been shown that an intraclass coefficient of .60 to .80 represents substantial agreement (Mitchell, 1979).

The intraobserver reliability coefficient was .77 for the three occupational therapy observers and .65 for all four observers. There was a statistically significant difference between the independent abstractor and the occupational therapists ($p < .002$). The independent abstractor tended to score the chart lower than the occupational therapists, particularly during Time 1 administration. The occupational therapists’ ratings changed during the second abstraction and became closer to the independent abstractor’s ratings. The interobserver reliability coefficient was .73 for the three occupational therapists and .72 for the four observers.

Discussion

The development and use of a criteria map to evaluate quality of care in the treatment of self-care disability provided comprehensive and relevant information about each chart audited. The criteria map provided information about the whole process of clinical care, from assessment through treatment to evaluation. The charts in our study received a wide range of scores. This could have occurred for a number of reasons. Several of the criteria were difficult to score or unrealistic. For example, some items in the map refer to emergency communication because it is one of the items on the Klein-Bell ADL Scale. These items were seldom found in the audited charts. It may be unrealistic to expect that emergency communication is an important assessment and treatment area in an acute care hospital setting. More immediate self-care problems often assume priority. The criteria map therefore needs to be adapted to reflect the clinical priorities of each setting. When the items considered unrealistic were eliminated, the percentage scores of the audited charts increased by 10% to 20%. Other reasons for wide-ranging scores could be related to the study methodology. The charts used in this study were selected because of convenience and were not truly representative of the care provided by the occupational therapy department of either hospital. Further studies are required to apply this process to a representative sample.

This study has provided useful information regarding the criteria mapping procedure. The training provided for this study spent approximately 3 hours covering the criteria map process and scoring a sample case. It was clear that this training should be more extensive, because many questions regarding criteria definitions were raised during data collection. It is recommended therefore that the training be increased and that it include scoring and discussion of more than one sample chart. Further training should eliminate some of the inconsistencies and increase the reliability in scoring. In addition, not all of the definitions in the abstractor’s manual included enough examples of appropriate alternative statements suitable for each criterion. These examples should be expanded to eliminate any need for interpretation by the abstractor.

Even with the short training, the reliability and agreement coefficients obtained are certainly acceptable. The occupational therapists and the independent abstractor achieved substantial agreement in rating.

Table 3

<table>
<thead>
<tr>
<th>Percentage of Agreement With Independent Abstractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
</tr>
<tr>
<td>Observer 1</td>
</tr>
<tr>
<td>Observer 2</td>
</tr>
<tr>
<td>Observer 3</td>
</tr>
</tbody>
</table>

* Kappa agreement beyond chance statistics.

Table 4

<table>
<thead>
<tr>
<th>Percentage of Agreement Between Therapists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
</tr>
<tr>
<td>Observer 1 vs. 2</td>
</tr>
<tr>
<td>Observer 1 vs. 3</td>
</tr>
<tr>
<td>Observer 2 vs. 3</td>
</tr>
</tbody>
</table>

* Kappa agreement beyond chance statistics.

February 1989, Volume 43, Number 2
ing charts using the self-care criteria map. The greatest variance between the independent abstractor and the occupational therapists was variance between the observers, not over time. Over time, the independent abstractor remained consistent and the therapists’ ratings became more similar to those of the independent abstractor. The therapists’ scores may have been higher initially because of assumptions they made about the chart recording. The therapists may have scored the charts more leniently by giving the benefit of the doubt to the records or by interpreting unclear record information. The consistency of the independent abstractor is particularly helpful because the cost of abstraction by independent medical records personnel is substantially less expensive than by occupational therapists.

The greatest variance in the occupational therapists’ scores was over time, not between observers. This is likely due to training effects over the 2-day study period and to the assumptions the therapists may have made in their ratings of the charts. This variance over time should be decreased with more training prior to the administration of the instrument.

The criteria map developed for this study could be used as an ongoing quality assurance monitoring tool, reflecting the specific goals of an occupational therapy department. In this study, the goal for each patient was that all basic self-care skills would be assessed and intervention provided if required. Specific outcome goals could also be set for individual patients or across programs. Regular chart audits with the criteria map would determine the extent to which these goals were achieved. Remedial action could follow if required and the results of that action could be judged with the criteria map. The employment of this instrument could regularly and inexpensively document information about both the process and the outcome of occupational therapy care.

This study has demonstrated that criteria mapping is an appropriate quality assurance tool for use in occupational therapy chart audit procedures. Although this was the first time this process had been used for an audit of occupational therapy services for self-care problems, high levels of intra- and interobserver reliability were obtained. More extensive training of abstractors and further development of the abstractor’s manual could result in even greater reliability.

Acknowledgment
This study was funded through formulation funds from the National Health Research and Development Program of Health and Welfare Canada, Grant 6603-123149.

References


McMaster University, Department of Clinical Epidemiology and Biostatistics. (1984). How to read clinical journals: VI. To learn about the quality of care. Canadian Medical Association Journal, 130, 377–381.


