Integrated Care Pathways and Quality of Life on a Stroke Rehabilitation Unit

David Sulch, MRCP; Anne Melbourn, RGN; Inigo Perez, MD; Lalit Kalra, PhD, FRCP

Background and Purpose—Integrated care pathways (ICP) may not reduce disability, institutionalization, or duration of hospitalization compared with conventional multidisciplinary team (MDT) care in organized stroke rehabilitation. Their potential to improve patient health status or satisfaction with care is not known.

Methods—A comparison of quality of life, caregiver strain, and patient/caregiver satisfaction at 6 months after stroke was undertaken in 152 stroke patients randomized to receive ICP or MDT care. Differences in processes of care were recorded with the use of a predefined schedule. Multivariate analyses were undertaken to identify the effect of age, sex, stroke severity, functional status, mood, and use of care pathway on quality of life score.

Results—The 2 groups were comparable for baseline characteristics of age, sex, stroke severity, and initial disability. MDT care was characterized by greater emphasis on return of higher function and caregiver needs compared with ICP. EuroQol Visual Analogue Scale (EQ-VAS) scores were higher in the MDT group (median, 72 versus 63; \( P < 0.005 \)), who also had higher scores for EuroQol dimension of social functioning (\( P = 0.014 \)). Higher EQ-VAS scores were independently related to MDT care (\( P = 0.04 \), Rankin score (\( P = 0.01 \)), and psychological function (\( P < 0.0001 \)) but not to age, sex, or stroke severity. There were no significant differences in patient or caregiver satisfaction between the 2 settings.

Conclusions—Better quality of life in patients receiving conventional MDT care may be attributable to improved social functioning and greater attention to higher function and caregiver needs during rehabilitation. (Stroke. 2002;33:1600-1604.)

Key Words: delivery of health care, integrated quality of life rehabilitation

The use of integrated care pathways (ICP) in healthcare delivery is becoming increasingly important in complex rehabilitation settings because of their propensity to improve interdisciplinary coordination and efficiency of healthcare delivery.\(^1\)\(^2\) This is especially applicable to stroke rehabilitation, which is a paradigm of complex multidisciplinary care and may thus be particularly suited to this approach. It is not surprising that many policy documents, such as the National Services Framework in the United Kingdom\(^3\) and the American Heart Association Stroke Plan,\(^4\) stress the key role of ICP in the development of quality healthcare over the next 5 to 10 years.

Despite the perceived benefits of ICP in stroke rehabilitation highlighted in policy documents, research has shown that this approach has little effect on basic indicators of outcome such as mortality or functional recovery.\(^5\)\(^6\) However, novel methods of healthcare delivery may have subtle effects on wider aspects of outcome relating to overall well-being or perceptions of care, which may not be identified by disease/disability-oriented measures. Many patients, families, and professionals consider quality of life (QOL) in the longer term as central to recovery from stroke,\(^7\) and measures to assess well-being used in conjunction with disease-specific measures provide a better assessment of long-term health outcome in disability and chronic disease.\(^8\)\(^9\)

We have previously published results of a randomized controlled study to evaluate the effectiveness of an ICP in a specialist stroke rehabilitation setting.\(^6\) The ICP did not provide any benefits in terms of mortality, institutionalization, functional recovery, or length of stay. However, a significant adverse effect on QOL was seen in the group managed with the ICP compared with those receiving conventional multidisciplinary team (MDT) care. This effect was unexpected because it had been anticipated that the ICP would improve care delivery by streamlining treatment and communication, resulting in a positive effect on QOL. This study was undertaken to investigate differences in QOL between the 2 groups in greater detail and to identify possible reasons for these differences.

Subjects and Methods

Subjects
The study was undertaken in 152 consecutive patients transferred to a stroke rehabilitation unit within 2 weeks of the acute event. Patients...
were excluded if they presented with mild deficits (specialist rehabilitation not indicated), very severe deficits (rehabilitation could not be commenced within 2 weeks), or severe premorbid physical or cognitive disability (limited scope for specialist stroke rehabilitation). Details of patient selection, eligibility criteria, and randomization procedure have been published previously.6

**Interventions**

Patients were assigned to care led by the ICP and coordinated by a stroke nurse (n=76) or to conventional consultant-led MDT care (n=76). Interventions were provided in separate bed areas staffed by 2 different teams of nurses but sharing medical and therapy input (different therapists but within the same unit). The teams worked independently of each other with separate team meetings.

In the ICP method, therapeutic activities were grouped according to stage and predicted patient needs. Key goals for each therapeutic intervention and the time estimated to achieve these were defined in advance. The ICP covered all aspects of inpatient rehabilitation from admission (assessments) to discharge (including referrals for community therapy) but did not extend into the postdischarge phase. A senior nurse implemented ICP management in the hospital and communicated appropriate recommendations to community rehabilitation teams but had no role in the delivery of this care.

Patients receiving conventional rehabilitation were assessed comprehensively for individual needs by the MDT, and a customized rehabilitation program was designed under the supervision of a consultant. Therapeutic activities, goals, and the time taken to achieve these goals were discussed in weekly multidisciplinary meetings and were changed on the basis of patients’ progress.

**Assessments**

Demographic and other data, such as cognition and premorbid functional ability, were collected at entry to the study. Baseline data on stroke severity (Orgogozo scale)10 and disability (Barthel Index)11 were recorded. QOL outcomes were measured at 6 months after stroke with the use of the EuroQol Visual Analogue Scale (EQ-VAS)12,13 Other outcome measures included the Barthel Index and the modified Rankin Scale for handicap.14 Caregiver strain was assessed with the use of a standard instrument.15 We assessed patient and caregiver satisfaction using a questionnaire validated for use in stroke patients16,17 but modified for use in this study. The questionnaire assessed satisfaction with items of patient/caregiver satisfaction questionnaire were compared with the asymptotic test. Continuous and ordinal variables such as Barthel Index, modified Rankin Scale, Caregiver Strain Index, and EuroQol were compared with the Mann-Whitney test. Factors influencing overall QOL score were investigated by entering EuroQol scores into a univariate analysis against factors such as sex, age, stroke severity, use of care pathway, and functional status, as well as the individual EuroQol domains. The independent effect of the care pathway was investigated by undertaking multiple linear regression with stepwise deletion on the whole patient group (n=121), with the overall EuroQol score used as the dependent variable and factors found to be significant at the 20% level used as the explanatory variables. Data were analyzed with the use of SPSS for Windows version 9.0.

**Data Analysis and Statistics**

A sample size of 136 was calculated on the basis of length of stay, the primary end point in the original trial. This sample gave the study 80% power to detect a 20% difference in EuroQol score and a 20% difference in processes of care at the 5% significance level at 6 months.

Age and Orgogozo scores at baseline were compared with the t test for unpaired data. Proportions and heterogeneity of distributions for categorical values such as sex, premorbid functional abilities at baseline, processes of care, domains of EuroQol, and individual items of patient/caregiver satisfaction questionnaire were compared with the asymptotic test. Continuous and ordinal variables such as Barthel Index, modified Rankin Scale, Caregiver Strain Index, and EuroQol were compared with the Mann-Whitney test. Factors influencing overall QOL score were investigated by entering EuroQol scores into a univariate analysis against factors such as sex, age, stroke severity, use of care pathway, and functional status, as well as the individual EuroQol domains. The independent effect of the care pathway was investigated by undertaking multiple linear regression with stepwise deletion on the whole patient group (n=121), with the overall EuroQol score used as the dependent variable and factors found to be significant at the 20% level used as the explanatory variables. Data were analyzed with the use of SPSS for Windows version 9.0.

**Results**

The ICP and MDT groups were comparable for age (75±11 versus 74±10 years), sex (46% versus 56% male; P=NS), domicile, and premorbid function. There were no differences in the baseline mean Orgogozo score (57±24 versus 53±22) and median Barthel Index score (5 versus 5) between the 2 groups. Assessment, documentation, and communication were significantly better in patients managed by the ICP method, whereas a significantly higher proportion of patients had goals for higher function and greater attention was given to caregiver needs in the MDT care group (Table 1). Precise details of differences in the processes of care within individual categories have been reported previously.19

Data at 6 months were available for 62 of 76 patients (82%) in the ICP group and 59 of 76 patients (78%) in the MDT group. Reasons for missing data included death (ICP, 6; MDT, 7), severe dysphasia (ICP, 6; MDT, 8), loss to follow-up (1 in each group), and failure to complete questionnaire (1 in each group). The EQ-VAS score was significantly better in the MDT group at 6 months after

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**TABLE 1. Significantly Different Processes of Care Between ICP and MDT Groups During Hospital Management**

<table>
<thead>
<tr>
<th>Care Process</th>
<th>ICP Group</th>
<th>MDT Group</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional assessment</td>
<td>49/66 (74%)</td>
<td>14/64 (22%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Written MDT goals</td>
<td>75/76 (99%)</td>
<td>56/76 (74%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Written goals for higher function</td>
<td>7/61 (11%)</td>
<td>25/59 (42%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Caregiver needs assessed</td>
<td>28/64 (44%)</td>
<td>43/66 (65%)</td>
<td>0.021</td>
</tr>
<tr>
<td>Caregiver training performed</td>
<td>28/64 (44%)</td>
<td>43/66 (65%)</td>
<td>0.021</td>
</tr>
<tr>
<td>Documented death/follow-up</td>
<td>68/76 (89%)</td>
<td>53/76 (70%)</td>
<td>0.024</td>
</tr>
<tr>
<td>GP notified of death/discharge</td>
<td>61/76 (80%)</td>
<td>34/76 (45%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**GP indicates general practitioner.**
stroke (median, 72 versus 63; \( P<0.005 \)). Of the 5 major domains contributing to QOL, patients in the MDT group performed significantly better on the EuroQol domain for social functioning (\( P=0.014 \)), but those in the ICP group performed better in the EuroQol domain for self-care (\( P=0.041 \)) (Table 2). The other 3 domains showed no significant differences between the 2 groups. Sensitivity analyses assuming best and worst possible outcome in each domain for missing patients were undertaken. These did not change results except for the domain for self-care, where the difference between the 2 groups became insignificant for the worst outcome (all missing patients unable to wash or dress).

Discharge Rankin score, discharge Barthel score, and psychological function and social function domains of EuroQol correlated at the 20% level with EQ-VAS score. Because some of these relationships may be interdependent, relevant variables were entered into a multiple linear regression analysis (Table 3). Care led by the MDT (\( P=0.044 \)), Rankin score (\( P=0.011 \)), and the psychological function domain of EuroQol (\( P<0.0001 \)) remained associated with a better EQ-VAS score (\( P=0.044 \)). Barthel score (\( P=0.076 \)) and the social function domain of EuroQol (\( P=0.114 \)) did not remain independent determinants of QOL in this analysis, possibly because of an overlap between Barthel/Rankin scores and social/psychological domains of EuroQol.

No significant differences were found between the ICP and MDT groups in patient or caregiver satisfaction, either considered overall or considered as individual questions (Table 4). Dissatisfaction in at least 1 area was expressed by 82% (47 of 57) of the ICP group and 79% (45 of 57) of the MDT group. Strong dissatisfaction in at least 1 area was expressed by 35% (20 of 57) of the ICP group and 23% (13 of 57) of the MDT group but was not statistically significant. Patients and caregivers expressed most dissatisfaction with degree of recovery, quantity of therapy provided, and provision of information regarding allowances or services needed on discharge. Although there was a higher caregiver strain index in the ICP group (mean, 5.9 versus 4.6; median, 6 versus 5), this did not achieve statistical significance (\( P=0.054 \)).

### Discussion

This detailed analysis of QOL outcomes confirms that ICP-led stroke rehabilitation on a specialist unit is associated with a poorer QOL than that achieved by conventional MDT management. Restoration of normal social functioning (which was better with conventional care) appears to be an important determinant of QOL at 6 months. Conventional care was better than ICP-led management in striving to restore higher functional abilities and in supporting caregivers and was probably better in reducing caregiver strain, all of which may have contributed to improved social functioning in these patients.

Functional recovery is a key determinant of overall QOL scores in stroke rehabilitation.20 This study suggests that complex functional recovery in terms of return to premorbid social functioning (hobbies, employment) complements the importance of recovery of basic activities of daily living such as washing and dressing. Satisfactory functional recovery depends on a wide range of factors and processes, many of which are difficult to generalize to the heterogeneous group of stroke patients undergoing rehabilitation. The success of rehabilitation (beyond restoring basic independence) depends on the ability to tailor therapy program to individual needs, which are dictated by the nature and severity of deficits, patient expectations, and caregiver support. While prompts to aid recognition of these problems can be built into an ICP, the complex processes required to resolve such problems cannot be predefined or addressed on a predetermined timeline. Thus, ICP-led management may lack the flexibility required to adjust for variations and complexities of stroke...
rehabilitation beyond the achievement of basic functional abilities.

The limitations of this study need to be acknowledged. Efforts were made to reduce the contamination bias by keeping crossover of nurses and therapists between the 2 groups to a minimum and ensuring that teams worked independently of each other. However, since both groups were managed on the same rehabilitation unit, this could not be avoided completely because of common medical input, possible sharing of information between therapists in the office, or discussion of management by patients and relatives. Information on differences in management between the groups after discharge from the hospital was not collected and may have contributed to differences in QOL outcomes at 6 months. Data were missing in a significant number of patients at 6 months, and although nonreport bias is a potential confounder, the proportion of patients with missing data in both groups was similar, and sensitivity analysis did not change the results significantly. The study had adequate power to detect a significant difference of 20% in the EQ-VAS scores, but it is possible that some of the trends in EQ-5D and caregiver stress may have achieved significance if the study was adequately powered for these variables.

The potential of ICP-led management in improving stroke rehabilitation is open to debate because the ideal ICP should not only make processes of standardized multidisciplinary care more efficient but also enhance the overall well-being of individual patients. Implementation of a rigid ICP approach based on expectations of a common pathway of recovery and common needs in all stroke patients may be counterproductive. It is important that pathways in rehabilitation are flexible enough to encompass the diversity of recovery and patient needs in stroke rehabilitation. This study demonstrates that well-meaning interventions for generic use may prove to have limited benefits in specialized environments. Introduction of the ICP approach in settings with well-established multidisciplinary practices should be carefully monitored to ascertain that it continues to be relevant and beneficial in these settings.

Acknowledgment

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References

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