In-Hospital Care Pathways for Stroke
An Updated Systematic Review

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C are pathways are structured care plans that are used by the different members of the multidisciplinary team and are usually implemented to manage more than one aspect of patient care (eg, diagnosis, investigation, acute stroke treatment). When used within a case management framework, care pathways can assist health care professionals with clinical decision-making, and they aim to promote organized and efficient patient care that is based on the best-available research evidence and clinical guidelines.1,2 A care pathway can take the form of a printed or electronic document, and it often replaces the patient’s case record for the duration of the hospital stay. Many hospitals have adopted this tool, often as one of the components of a continuous quality improvement scheme, with an aim to improve the quality of stroke care, reduce variation of standards, minimize resource utilization, and educate health care staff.3,4 But is there sufficient evidence to support the use of care pathways for the management of stroke patients?

The first Cochrane review of in-hospital care pathways for stroke found some evidence that care pathways may increase the use of certain investigations and reduce the likelihood of urinary tract infections and readmission to hospital.5 However, this benefit might be at the expense of a lower quality of life scores and patient satisfaction. The original Cochrane review has recently been updated with the inclusion of several more recent clinical studies. This article summarizes the findings of the updated Cochrane review.6

Materials and Methods
We searched the Cochrane Stroke Group Trials Register (last searched in June 2003), Cochrane Central Register of Controlled Trials (Issue 2, 2003), MEDLINE (1975 to June 2003), EMBASE (1980 to June 2003), CINAHL (1982 to June 2003), ISI Proceedings: Science & Technology (1990 to November 2003), and HealthSTAR (1994 to May 2001, when it ceased to exist). We also hand-searched the Journal of Integrated Care Pathways (2001 to 2003), formerly Journal of Managed Care (1997 to 1998) and Journal of Integrated Care (1998 to 2001). We also checked the reference lists of articles retrieved from these searches. We considered all randomized and nonrandomized clinical studies that compared care pathway care with standard medical care.

Results
Since the original Cochrane review,5 5 new nonrandomized studies have been found and their findings are included.7–11 In total, we included 3 randomized controlled trials (total of 340 patients) and 12 nonrandomized studies (total of 4081 patients).2,3,7–19 Seven of the care pathways were implemented for acute stroke management, 3 were for stroke rehabilitation, and 5 were for combined acute stroke management and rehabilitation.

There was significant statistical heterogeneity in the analysis of many of the outcomes. In summary, we found no significant difference between care pathway and control groups in terms of death or discharge destination. However, patients managed with a care pathway were more dependent at discharge (weighted mean difference in functional independence measure = −3.8; 95% confidence interval [CI], −7.3 to −0.2; P=0.04). Evidence from mainly nonrandomized studies suggested that patients managed with a care pathway might be: (1) less likely to have a urinary tract infection (odds ratio, 0.51; CI, 0.34 to 0.79); (2) less likely to be readmitted to hospital (odds ratio, 0.11; CI, 0.03 to 0.39); and (3) more likely to have a computed tomography brain scan (odds ratio, 2.42; CI, 1.12 to 5.25). Evidence from randomized trials suggested that patient satisfaction and quality of life were significantly lower in the care pathway group (P=0.02 and P<0.005, respectively). We also found that the quality of documentation (of hospital care) was significantly more comprehensive in the care pathway group.

Six studies (2 randomized and 4 nonrandomized) assessed length of stay. The 2 randomized studies showed a nonsignificant trend toward a longer mean length of stay in care pathway group.14,19 By contrast, the 4 nonrandomized studies showed that mean length of stay was significantly shorter in the care pathway group.7,8,16,17 The aggregate result showed a nonsignificant trend toward shorter mean length of hospital stay in the care pathway group.

Five studies (2 randomized and 3 nonrandomized) assessed hospitalization costs. One randomized study found no significant difference in hospitalization cost between the 2 groups,14 and another randomized study found a lower mean hospitalization cost in the care pathway group.18 Three

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nonrandomized studies found a fall in the mean hospitalization cost.\textsuperscript{12,13,16}

Lastly, no significant differences were found between the 2 groups in terms of: (1) therapy input; (2) other medical complications (eg, pneumonia, seizures, dehydration, deep vein thrombosis); (3) other investigations (eg, carotid duplex scanning, echocardiography); and (4) certain procedures (eg, use of intravenous fluids, urinary catheterization).

Conclusion
Like the original Cochrane review,\textsuperscript{5} this updated review has included both randomized and nonrandomized studies.\textsuperscript{6} Readers must therefore be extremely cautious when interpreting the results because of the potential for bias and confounding, and the significant statistical heterogeneity between the studies.

In this updated review, we found no evidence that care pathway care provided significant additional benefit over standard medical care in terms of major clinical outcomes (death or discharge destination). In fact, there was some evidence from one randomized\textsuperscript{14} and one nonrandomized study\textsuperscript{8} that patients in the care pathway group were significantly more dependent on discharge. Nevertheless, there is weak evidence that care pathway might be associated with fewer urinary tract infections and readmissions, and more comprehensive use of computed tomography brain scans. The impact of care pathway care on length of stay and hospitalization costs remains unclear, and more detailed research in this area might be helpful.

Impact on Practice
Studies have found advantages and disadvantages associated with this complex intervention. Because many of the results were derived from nonrandomized studies, they may be influenced by potential biases and confounding factors. In the meantime, the most important element of stroke management in hospital remains to be organized stroke unit care with rehabilitation. However, there is still insufficient high-quality evidence to support the routine implementation of care pathways for acute stroke or stroke rehabilitation.

Note: The full text of this review is available in the Cochrane Library (for subscribers http://www3.interscience.wiley.com/cgi-bin/nrwhome/106568753/HOME). The full article should be cited as: Kwan J, Sandercock P. In-hospital care pathways for stroke. The Cochrane Database of Systematic Reviews 2004. Issue 4.

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