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Review

# Care pathways for acute stroke care and stroke rehabilitation: From theory to evidence

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**Abstract**

Care pathways aim to promote evidence- and guideline-based care, improve the organisation and efficiency of care, and reduce cost. In the past decade, care pathways have been increasingly implemented as a tool in acute stroke care and stroke rehabilitation. In the most recent Cochrane systematic review, which included three randomised and 12 non-randomised studies, patient management with stroke care pathways was found to have no significant benefit on functional outcome, and patient satisfaction and quality of life might actually be worse. On the other hand, it was associated with a higher proportion of patients receiving investigations and a lower risk of developing certain complications such as infections and readmissions. Overall, the evidence supports the use of care pathways in acute stroke but not stroke rehabilitation. Future developments, including electronic care pathways, patient pathways, and pre-hospital care pathways for hyperacute stroke, will be discussed.


*Keywords:* Systematic review; Critical pathway; Hospitalization; Cerebrovascular accident; Randomised trials

## 1. Care pathways: The theory

Care pathways are increasingly being implemented across many countries to improve the care of stroke patients, but there is relatively little debate about what they are and how they affect patient care and outcome.[1,2] One reason could be that care pathways are generally regarded as harmless, and policy makers are keen to adopt new health service interventions that are intuitively beneficial, even though they have not yet been thoroughly tested. This paper describes the definition and origin of care pathways, the theoretical basis of using them, and the best available evidence of their benefits and risks.

### 1.1. Definition of a care pathway

Care pathways are organisational interventions that aim to promote evidence- and guideline-based care, improve the organisation and efficiency of care, and reduce cost. The medical literature is abundant with articles that praise this tool, describing the many potential benefits associated with their use.[1] However, the multitude of benefits ascribed to care pathways may be partly due to a lack of conceptual clarity surrounding the definition of the intervention.[3] There is currently no universally accepted definition for a care pathway.[4,5] Other terms used to denote a care pathway include clinical pathways, critical pathways, care path method, anticipatory recovery pathways, and CareMaps™.[1,6] Although these terms are used to describe a common concept, they may in fact be describing different interventions, used within different settings for different conditions, and implemented according to different objectives. From examining the literature, the three essential elements of a care pathway include: (i) it is a plan of care; (ii) it is developed and used by the multidisciplinary team

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(doctors, nurses, therapists); and (iii) it is applicable to several aspects of care (assessment, diagnosis, investigation, treatment). It is indisputable that other elements, such as variance reporting, are vital for the function of certain care pathways, but these elements are absent in many published care pathways and are therefore not regarded by many as essential in defining a *basic* care pathway – although some experts may disagree.[7]

### 1.2. The origin of care pathways

The concept of care pathways was acquired from the industrial world. In 1958, the US Navy planned to build the Polaris submarine. Due to the enormous complexity of the project and the huge number (over 3000) of contractors involved, a new method called "Program Evaluation and Review Technique" (PERT) was developed to assist with the planning and scheduling of the project.[8] PERT helped to define the essential tasks and the length of time needed to accomplish them.[9] Around the same time, DuPont company and Remington Rand Corporation developed a similar tool, called the "Critical Path Method", to assist with the scheduling of the shutdown of DuPont chemical plants.[10] The term 'critical' referred to the steps that took the longest time, so that any delay in completing these steps would delay the entire project. It was quickly realised that identifying the optimal pathway in the production of individual items was beneficial both in terms of cost and productivity.

Similar tools were applied to healthcare in the USA in the 1980s when case management was first introduced in response to escalating healthcare costs and increasing consumer demands. Care pathways were used as part of case management to promote high-quality patient care that is delivered in a timely and cost-effective manner.[11] Early care pathways were designed for medical conditions or surgical procedures that were regarded as common, 'simple' (that is usually single pathology with little variation in practice), and costly.[12,13] Later, care pathways were applied to manage more complex conditions such as stroke, diabetes, psychotic illness, and palliative care. In some countries (including the UK), the primary objective of using care pathways is perhaps less to do with cost-containment, but more to do with the promotion of evidence- and guideline-based practice.[14–16]

### 1.3. How care pathways operate

The four major aims of using care pathways are summarised in Table 1. Care pathways are designed to be used as a structured clinical record by every member of the multidisciplinary team.[17] The format of care pathways varies from being a small-scaled paper-based document to elaborate computer programs that guide the healthcare professional through every step of the patient's management.[18]

On the whole, care pathways are different from other forms of information provision systems that aim to assist healthcare professionals with clinical decision-making, such as guidelines and protocols. Furthermore, since care pathways are usually applicable to several aspects of care, they are also different from other mono-faceted tools such as diagnostic algorithm (for example, stroke diagnostic protocol for paramedical staff), or screening tools for specific interventions (for example, thrombolysis for acute ischaemic stroke).[19]

In the acute setting or rehabilitation, care pathways are usually initiated at the time of admission and terminated when the patient is discharged or transferred to another setting. The interventions are mapped out in terms of days of inpatient care. For emergency or intensive care pathways, the interventions can be mapped out in terms of hours or even minutes of care, whereas care pathways in the primary care or community setting often define the weeks or even months of care. The essential elements of how to design and implement care pathways are summarised in Table 2.

### 1.4. Variance reporting and analysis

Many (but not all) care pathways have an in-built system to assess clinical outcomes and monitor practice variation, called variance reporting or tracking.[20,21] Variances represent the discrepancies between planned and actual events. They can also represent outcomes that differ from those anticipated or deviations from the projected timeline.[22] Some experts argue that the most important difference between care pathways and other forms of information provision systems is that care pathways have a mechanism for variance reporting and analysis.[7] There is no doubt that variance reporting is feasible and useful for less complex conditions such as fractured neck of femur.[23] However, for more complex conditions such as acute stroke, where the progress of recovery and prognosis are highly unpredictable, many centres have abandoned variance reporting simply because variances occur too frequently and the process is too time-consuming. If the care pathway also includes strategies to deal with common variances, the care pathway might become too lengthy and impractical to use, leading to poor compliance or even

Table 1
Major aims of using care pathways

- To assist healthcare professionals in making clinical decisions according to the best-available evidence, local policies, and national guidelines
- To improve the quality of patient care by reducing variation in clinical practice and improving efficiency
- To reduce length of stay and hospitalisation costs
- To improve communication between disciplines, and between patient and healthcare professionals
- To improve quality of documentation and facilitate data collection for audit and research projects