

## **7 CLINICAL PATHWAYS FOR REHABILITATION**

### **7.1 INTRODUCTION**

A limited research on rehabilitation practice in Belgium (See chapter 6) indicated that a large variability is possible related to intensity and duration of therapy for patients with comparable characteristics. An additional question to find out whether this variability is also represented in the currently used clinical pathways, was formulated. The goal of this chapter was an identification and comparison of clinical pathways for rehabilitation after amputation of lower extremity, multiple sclerosis, spinal cord injury, stroke and total hip replacement. Guidelines and the results of randomised clinical trials were considered as out of scope for this chapter, as they are not necessarily reflected in clinical practice.

Due to a lack of scientific reports containing evidence to support all clinical decisions in rehabilitation, the content of a clinical pathway is often influenced by the opinion of stakeholders and the financing and organisational aspects of the health care system in a country. A comparison of clinical pathways developed in different countries, might neutralise these influences and might result in a more neutral description of the 'optimal' clinical pathway.

At a macroscopic level, the clinical pathways can be used to discuss current variability in rehabilitation practice in Belgium. Besides, these clinical pathways can be used to argue certain choices related to the future supply of rehabilitation services.

This chapter was performed by a collaboration between the "Centrum voor Ziekenhuis- en Verplegingswetenschap, Leuven" (CZV) and the department of Physical Medicine and Rehabilitation, Leuven (PMR).

The CZV offered an introduction course on clinical pathways and continuous support during this (sub-)project. The CZV provided a network of contacts concerned with the development of clinical pathways, in different countries.

PMR composed a team of residents of Physical Medicine and Rehabilitation.

Clinical pathways were searched, analysed and compared by use of a general template (Figure 7.1) in which the most relevant parameters were integrated. It was not the objective to analyse the type of interventions in detail.

Figure 7.1: Template for analysis and comparison of clinical pathways

General information of the clinical pathway			
Search algorithm			
Source (Website/Journal)			
Title			
Author			
Publication year			
Pathology			
Origin (Country/City/Hospital/Institute/Organisation/...)			
Objective (Clinical practice/Resource allocation/...)			
Method used in the development of the clinical pathway			
Focus on outcome/Focus on process			
* Focus on outcome: Tasks depend on outcomes			
* Focus on process: Tasks depend on delay, availability of resources, ...			
Content of the clinical pathway			
Phase ...	Delay after onset pathology		
	Method of identification of patient needs		
	Conditions to start this phase		
	Acute care/Post-acute care/Maintenance		
	Inpatient/Outpatient		
	Mono-/Multidisciplinary		
	Involved professionals		
	Type of therapy (physical therapy, vocational therapy, ...)		
	Intensity of therapy (X Hours/Day/Week)		
	Expected outcomes		
	End of phase	Method of outcome measurement	
		Conditions to end this phase	
		Length of phase	
Phase ...	Delay after onset pathology		
	Method of identification of patient needs		
	Conditions to start this phase		
	Acute care/Post-acute care/Maintenance		
	Inpatient/Outpatient		
	Mono-/Multidisciplinary		
	Involved professionals		
	Type of therapy (physical therapy, vocational therapy, ...)		
	Intensity of therapy		
	Expected outcomes		
	End of phase	Method of outcome measurement	
		Conditions to end this phase	
		Length of phase	

## 7.2 LOWER EXTREMITY AMPUTATION (LEA)

### 7.2.1 Methodology

The literature for rehabilitation pathways after LEA was explored.

First examples of pathways were searched on the website of evidence based medicine of KU Leuven.

There was a link to the website [www.consorta.com](http://www.consorta.com). The combinations “clinical pathway and amputation”, “clinical pathway and amputee”, “critical pathway and amputation” and “critical pathway and amputee”, were searched. No results were found.

The website of NHS in the U.K.<sup>v</sup> was searched on the topic: “Protocols and Care pathways”. Under the heading “Clinical Department” one reference to “amputation leg” was found. This clinical pathway was included. But the authors remarked that the document does not allow for Care Pathway Variance recording. The origin of the

<sup>v</sup> [www.library.nhs.uk](http://www.library.nhs.uk)

pathway is UK, West Yorkshire, Keighley, Airedale General Hospital. The year of publication was not traced.

The website of the American Association of Physical Medicine and Rehabilitation ([www.aapmr.org](http://www.aapmr.org)) was consulted and 7 articles in the period 2000-2006 were found. We excluded 2 articles by abstract and read 5 articles in full text. We only kept 1 clinical pathway as relevant.

The Pubmed database was searched with the keywords critical pathways, integrated care pathway, amputation, amputees and rehabilitation. (See Appendix to chapter 7)

The Cinahl database was searched using the keywords amputation care, critical path, amputation stumps, below knee amputation and above knee amputation. (See Appendix to chapter 7)

International experts were contacted on this topic (See Appendix to chapter 7). Two reactions were received which seemed useful. It concerned only one real clinical pathway. The other one concerned a theoretical protocol.

One clinical pathway was received via the CZV (Centrum voor Ziekenhuis- en Verplegingswetenschap, Leuven). The origin is the Shangai General Hospital, Shangai .

All these search algorithms were double checked by a second reader to avoid a selection bias.

## 7.2.2 Results

Four existing critical pathways concerning rehabilitation of patients who had an amputation of the lower extremity, above or below the knee, were selected.

Origin	Country	Number of pathways
Europe	United Kingdom	1
	Belgium	1
America	USA	1
Asia	Shangai	1

### 7.2.2.1 Patient characteristics

All these pathways concerned planned amputations on a vascular basis, and therefore can not be used for traumatic amputees.

### 7.2.2.2 Delay after LEA

All pathways start in the pre-operative phase, when the decision for amputation is made. For this phase, there are almost no differences between the different pathways.

The day of the intervention is only in one path considered as part of the post-acute phase.

One pathway indicates that rehabilitation therapy starts at the day after surgery, in two other pathways on day two after surgery. In the other pathway no concrete timing is given.

The maintenance phase after therapy starts in the week following surgery (2 pathways), depending on the progression (criteria are discussed in detail in the Appendix) (1 pathway), or is not explicitly described (1 pathway).

### 7.2.2.3 Method of identification of patient needs

Patients' needs are determined by a multidisciplinary team and comprise medical assessment, level of amputation and premorbid lifestyle, performed. The medical assessment includes a physical examination and evaluation of the mental state. No further detail on the eventual use of standardised assessment instruments is given.

An assessment is performed in the pre-operative phase. In the other phases no assessments are mentioned.

#### 7.2.2.4 *Conditions to start rehabilitation*

The start of the pre-operative phase is related to the planning of an amputation of the lower extremity.

The start of the post-operative phase depends on the patient's physical evolution, wound healing, stump-modelling, three points march, motivation and cooperation, as mentioned in one pathway.

The follow-up factors during all phases of rehabilitation are pain control and a good physical status (criteria not described in detail).

#### 7.2.2.5 *Duration of rehabilitation*

In one pathway the post-operative phase is continued until the day of discharge, 4 weeks after surgery. The pathway stops at the day of discharge.

In one pathway, the different phases are based on the patients' progression (criteria for patient progression are described in the Appendix). The pathway is divided in a pre-prosthetic training, a prosthetic training and the community integration. A long term follow-up is foreseen until 18 months after surgery.

The other pathways contain no exact numbers of days or weeks of each phase following surgery.

#### 7.2.2.6 *Involved professionals*

All rehabilitation programs are organised by a multidisciplinary team. This team includes:

- Physicians: orthopaedic (all pathways) and vascular surgeons (all pathways), physical therapist (all pathways) and anaesthesiologist (only 1 pathway in the pre-operative phase);
- Nurses (all pathways); one pathway refers to the involvement of a nurse specialised in diabetes mellitus;
- Physical therapist and occupational therapist (all pathways);
- Recreational therapist (one pathway);
- Social worker (three pathways);
- Dietician (two pathways);
- Podiatrist (one pathway).

No distinction between the different phases is made related to team composition.

In one pathway the supply of a physio-amputee school is foreseen.

#### 7.2.2.7 *Intensity of therapy*

All rehabilitation programmes foresee physical therapy once a day during inpatient rehabilitation. Concerning outpatient rehabilitation no intensity of therapy is discussed.

#### 7.2.2.8 *Type of therapy*

During the pre-operative phase, all pathways include informing patients and their relatives, in an inpatient setting.

The care on the day of intervention is focused on monitoring the physical status of the patient and wound healing.

In all pathways, physical and occupational therapy is starting in the post-operative phase, in an inpatient setting. One pathway mentions rehabilitation therapy activities performed by nurses.

All post-acute and maintenance phases contain pain control, stump modelling and march training as most important goals. A multidisciplinary team is taking care of the medical and paramedical follow-up.

The phases after the post-operative phase are performed in an inpatient and/or an outpatient setting.

#### 7.2.2.9 *Expected outcomes and the use of outcome measurement tools*

The main outcome for the pre-amputation phase is having an informed and well-prepared patient, who is fit for surgery.

On the day of the intervention, all critical pathways include pain control and stump modelling as the main goals. Patient's physical and mental status are continuously monitored.

One program indicates that day of discharge may depend on wound-healing and stump status. Another pathway lets the day of discharge depend on the patient's progression based on a physical assessment.

### 7.2.3 Conclusion

In literature, many descriptions of the use clinical pathways or rehabilitation programs for lower extremity amputations, were detected. Only four pathways were obtained for analysis and comparison.

All pathways start in the pre-operative phase. All pathways make use of a multidisciplinary team, consisting in all programs of physicians, physical therapists, occupational therapists and nurses. Social workers and dieticians are also team-members, but not in all pathways. Physical therapy is given daily during inpatient rehabilitation, but the exact amount of time of therapy is not explicitly noted in all pathways.

The duration and content of the rehabilitation process described in the 4 clinical pathways differs. But this can be explained by the fact that each pathway only covers a part of the disease trajectory. Acute, post-acute and maintenance post-acute phases differ between the 4 pathways, as do the outcome measurements. Only 1 program included long-term follow-up until 18 months post-operatively. In only 1 pathway, prosthetic training is included, without giving concrete details. In the other 3 pathways, there is no report on prosthetic training or adaptation of prostheses. Perhaps, they only provide the prosthetic training in an outpatient setting.

## 7.3 MULTIPLE SCLEROSIS (MS)

### 7.3.1 Methodology

The objective of the search was to find clinical pathways for rehabilitation in case of multiple sclerosis, used in different countries.

The search algorithm on the website of the American Academy of Physical Medicine and Rehabilitation was performed by the subheadings Legislative, Business and Clinical Pathways and Multiple Sclerosis (N=23).

In the PubMed search the keywords rehabilitation, multiple sclerosis, critical pathway, clinical pathway, integrated care pathway and care map were used. (See Appendix to chapter 7)

Cochrane library search algorithms contained the keywords clinical care pathway, multiple sclerosis, critical care pathway and care pathway. (See Appendix to chapter 7)

Search on the website of the national library of health of the U.K. was performed through 'protocols & care pathways' and 'multiple sclerosis' (N=0).

Different experts were contacted to ask whether they had a clinical pathway for rehabilitation in multiple sclerosis, and were willing to provide it. E-mail addresses were obtained through the publications found by the literature search (N=9), through the website of RIMS (rehabilitation of multiple sclerosis - Europe) (N=22), the website of the department of health of the UK (N=3), and through the website of the National multiple sclerosis society of the USA (N=1). Personal contact with professionals in Belgium took place (N=1).

Results of the searches were screened by title and/or abstract. The search algorithms were double checked by a second reader to avoid selection bias, and results were discussed with professionals of the CZV and department of PMR.

## 7.3.2 Results

During the search on the website of the American Academy of Physical Medicine and Rehabilitation, 4 publications (see Appendix to chapter 7) were considered as relevant. Full text of all articles was scanned.

In the PubMed search 7 articles (see Appendix to chapter 7) were identified as relevant. Full text of all articles was scanned.

In the Cochrane library and on the website of the national library of health in the U.K., no relevant publications were detected.

Through contact with professionals, both by e-mail or personal contact, only 2 clinical pathways for rehabilitation for multiple sclerosis were received.

Only the two clinical pathways obtained via expert contact were apt to be analysed and compared.

### 7.3.2.1 *Patient characteristics*

Both pathways describe a multidisciplinary path for inpatients, for acute/post-acute or maintenance therapy.

### 7.3.2.2 *Delay after onset of MS*

Delay after onset of pathology wasn't described in either of them.

### 7.3.2.3 *Method of identification of patient needs*

The pathways are different related to the methods of identification of patient needs; one pathway uses a psychological questionnaire, composed by the local team members, concerning expectations/satisfaction. The other uses functional tests (Barthel, FIM, ESS) and consultation of the patient to discuss feasible objectives.

### 7.3.2.4 *Conditions to start rehabilitation*

Conditions to start the clinical pathway were rather functional in one pathway (identification of areas of potential functional improvement involving 2 or more disciplines, patients must be able to undertake an intensive therapy, definition of a clearly defined set of functional objectives which aim at reducing their degree of disability and/or handicap), and rather time-based in the other (minimum 3 weeks of admission).

### 7.3.2.5 *Duration of rehabilitation*

Length of stay was 3 weeks, and every single week was described separately in both clinical pathways.

### 7.3.2.6 *Involved professionals*

A difference between both paths is also that the medical staff consists of a neurologist and a specialist in physical medicine and rehabilitation in one; in the other, they only mentioned the involvement of a neurologist. Apart from this difference, involved professionals are similar.

Concerning the controlling system (signing of joint procedures,...) of the pathways, solutions of both described pathways are also different: by developing the first pathway, it was felt appropriate to introduce a key-worker system, with the key-worker acting as the coordinator for the patient's clinical pathway. The other pathway doesn't mention a control system yet, but professionals are working out a control mechanism on PC.

### 7.3.2.7 *Intensity of therapy*

Intensity of therapy was not described in one path, and varied from 2,5 up to 4 h/day in the other.

### 7.3.2.8 *Type of therapy*

Type of therapy was similar in both pathways: physical therapy, vocational therapy/occupational therapy, speech and language therapy, (neuro-)psychological and social support.

### 7.3.2.9 *Expected outcomes and the use of outcome measurement tools*

In both pathways expected outcomes were identified by setting goals, and adjusting them if needed. In one pathway, goals are set according the RAP-profile (rehabilitation activity profile), but goals were not further described in detail, in neither of the pathways.

Method of outcome measurement was described with Barthel Index, FIM and ESS in one pathway. The other path described outcome measures, only for the last phase (phase of discharge): RAP (rehabilitation activity profile)-goals and the psychological questionnaire concerning expectations/satisfaction.

## 7.3.3 *Conclusion*

Very few concrete clinical pathways for rehabilitation of multiple sclerosis were found through literature search and contact with (inter)national experts. Few experts use a concrete clinical pathway, or are eager to communicate it.

Only two clinical pathways for rehabilitation of multiple sclerosis (Belgium – UK) were withheld and a comparison of both showed great similarity in objective and method of development. Both paths are focused on process and are patient centred, and are comparable in patient characteristics, type of therapy, length of stay and involved professionals (apart from the fact that involvement of a specialist of physical medicine and rehabilitation was described in only one path). Main differences were found in the method of identification of patients' needs, and conditions to start the pathway.

Due to extreme variability and unpredictability in multiple sclerosis, rehabilitation still seems to be mainly based on clinical experience and expert opinion.

## 7.4 SPINAL CORD INJURY (SCI)

### 7.4.1 Methodology

The objective of the search was to find clinical pathways for rehabilitation after spinal cord injury, used in different countries.

Literature search was started with a consultation of the website of the Belgian and Dutch Clinical Pathway Network<sup>w</sup>, followed by the website of the American Academy of Physical Medicine and Rehabilitation, was followed. Twenty-five papers (1994-2002) about clinical pathways for spinal cord injury were identified. Three papers described in detail a clinical pathway for SCI for the acute phase. One of these clinical pathways started in the acute phase and went over in the post-acute phase.

The Protocols & Care Pathways Specialist Library of the NHS National Library for Health<sup>x</sup> were also consulted but this link did not contain any clinical pathways for SCI.

The Pubmed database was explored using the keywords critical pathway and spinal cord injuries. This search resulted in 7 publications. Two of them were relevant. (See Appendix to chapter 7)

Google was searched by the algorithm (Critical Pathway) OR (Clinical Pathway) OR (Integrated care Pathway) AND (Spinal Cord Injury). We only found one paper of interest which was included yet after consultation of the AAPM&R website.

All search algorithms were double checked by a second reader to avoid a selection bias.

After the literature search, more than 60 clinical pathway experts in different countries were contacted and asked to forward information on the content of clinical pathways for spinal cord injury (See Appendix to chapter 7). Experts were contacted in Belgium, The Netherlands, the United Kingdom, France, the US, Australia and Switzerland. Authors of the selected scientific articles were also contacted. Besides this, 36 international colleagues were contacted by the "Centrum voor Verplegings- en ziekenhuiswetenschap, Leuven". Members from ISCoS (International Spinal Cord Society), AFIGAP (Association Francophone Internationale des Groupes d'Animation de la Paraplégie) and DuFSCoS (Dutsh Flemish Spinal Cord Society) were contacted as well. At last some direct colleagues in Physical Medicine and Rehabilitation who are at work in different foreign countries, were asked for information. In total 66 emails were sent of which 21 answered (21/66). Six colleagues let us know that in their hospital no clinical pathway is used for spinal cord injury (UK, Australia, USA and Belgium). One person sent an irrelevant answer (USA). Seven colleagues referred to guidelines they use. However these guidelines are no real clinical pathways (USA, UK, Zwitserland and the Netherlands). One person referred to an interesting article which was already detected during the literature search (Prague). From New Zealand a clinical pathway "Halovest" was sent. From Switzerland (Sion) we received one clinical pathway concerning the post-acute phase after SCI. Two e-mails came from centres where the development and implementation of a clinical pathway for SCI is in progress (France, UK). One person referred to a general clinical pathway for inpatients on a neurological rehabilitation facility, not specifically for spinal cord injury.

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<sup>w</sup> <http://www.uzleuven.be/ebm/kp>

<sup>x</sup> <http://www.library.nhs.uk/pathways/searchResults.aspx?searchText=rehabilitation&tabID=288>

## 7.4.2 Results

Four clinical pathways for spinal cord injuries which were useful for the comparative study, were withheld. Two clinical pathways concerning the acute phase after spinal cord injury were available in literature (USA). One clinical pathway about the post-acute phase came from Switzerland. One clinical pathway started with the acute phase and went over in the post-acute phase (USA). The clinical pathways were analysed and compared.

### 7.4.2.1 *Patient characteristics*

All concerned inpatient treatment in a multidisciplinary setting. One included only non-ventilatory dependent tetraplegia, one only paraplegia, one only cervical or high thoracic SCI and one did not mention the type of SCI.

### 7.4.2.2 *Delay after onset of SCI*

Three of the pathways describing the acute phase after SCI, started immediately after onset of the lesion. One pathway describing the post-acute phase, started 5 weeks after injury. The other rehabilitation pathway did not mention time of onset after injury.

### 7.4.2.3 *Method of identification of patient needs*

Concerning the pathways limited to the acute phase of SCI, all of the patients required intensive care based on patient's type of injury and neurological status. All of the patients were monitored by technical and laboratory exams. One pathway also mentioned the use of two outcome tools, made by the interdisciplinary team itself.

Concerning the pathways focusing on the post-acute phase, discharge goals and care pathway were reviewed with patient and family.

### 7.4.2.4 *Conditions to start rehabilitation.*

One pathway mentioned medical criteria such as haemodynamic stable patient and no acute medical interventions, but also functional criteria such as the ability to sit up and participate in therapy 3 consecutive hours for 3 days.

The other pathways did not mention a condition to start.

### 7.4.2.5 *Duration of each phase of the clinical pathway / length of stay*

Concerning the pathways related to the acute phase of SCI, different phases before and after spinal stabilisation were described. Two of them specified the first 24 hours after injury in detail. One of them considered the first 5 weeks after injury. The two others did not specify time/objectives for the patient to be ready for exit of the path.

No information on duration of the whole rehabilitation programme was given.

Concerning the pathways related to the post-acute phase of SCI, one pathway described 3 different phases; delay after injury was not mentioned. The first involved preparing to sit up, and considered 30 days. The second involved sitting up and considered 53 days. The third phase involved preparing discharge and did not mention a specific length of phase. In total, length of stay was more than 85 days.

The other pathway described 4 different phases and started 5 weeks after injury. Each of these phases was continued for 6 days. In total, length of stay was 24 days.

### 7.4.2.6 *Involved professionals*

All three acute pathways considered the usual emergency team, the nutritionist and social counselling. In one pathway, the rehabilitation specialist was asked in consult. Another also asked the rehabilitation specialist in consult and treatment by a multidisciplinary rehabilitation team (physical and occupational therapist, nurse and if

necessary a speech therapist) was started. In the other pathway, only a multidisciplinary rehabilitation team was mentioned without the rehabilitation specialist. One pathway also included the chaplain, the case manager, the sex therapist, the urologist and enterostomal therapist.

In both pathways describing the post-acute phase of SCI, a rehabilitation specialist, a physical therapist, an occupational therapist, a registered nurse and psychosocial counselling were involved in all the phases of the rehabilitation programme. One of the pathways mentioned the involvement of a urologist, an enterostomal therapist, an assistive technologist and a case-manager.

#### 7.4.2.7 *Intensity of therapy*

Only one pathway for the post-acute phase described 2 hours of physical therapy each day, as well as academic classes 3 hours/week.

For the other pathways no intensity of therapy was mentioned.

#### 7.4.2.8 *Type of therapy*

Considering the acute phase of SCI, the content of therapy was not described in case of the involvement of a multidisciplinary rehabilitation team.

Considering the post-acute phase of SCI, in one case the goals for each phase and each therapist were formulated. In another case only the goals for each phase without specifying the therapist, were formulated.

#### 7.4.2.9 *Expected outcomes and the use of outcome measurement tools*

In the acute phase of SCI, an outcome measurement tool was used once, developed by the multidisciplinary team concerning prevention of skin breakdown and calories intake per day. This team also developed a checklist focusing on haemodynamic stability, respiratory system, neuro/skeletal system, skin, bowel, bladder, sleep, communication, psychosocial activity and ADL, nutrition and education. The two others did not use specific tools, though mentioned medical criteria to continue to the following phase.

In the post-acute phase of SCI, in one pathway FIM was used. To go to a next phase, the patient must score a certain amount of points for each of the criteria.

The other rehabilitation pathway contained three phases. The first phase considered the preparation to sit up. For the second phase, the expected outcome was sitting up in a chair. The third phase was finished when the patient was ready for discharge. No specific criteria or tools were mentioned.

### 7.4.3 Conclusion

The use of clinical pathways after SCI is widely considered as useful. In general, clinical pathways for SCI could have a number of benefits although we need to be careful with the interpretation of the results.

It appears to be a difficult task to obtain a detailed description of pathways for rehabilitation after SCI.

Search based on literature and international contacts, delivered lots of non-specific guidelines and only 4 concrete pathways. The latter were included for further analysis. Two pathways are related to the acute phase (>USA), only one is related to the post-acute phase (>Switzerland) and one is related to the acute as well as the post-acute phase (>USA).

All of the acute pathways, described the first 24 hours in detail. For the post-acute phase, no specific pattern was followed, as one described phases by time and another by functional criteria. All of the pathways included physical and occupational therapy and discharge planning from the beginning, though only one pathway described intensity of the therapy (2hours/day of physical therapy and 3hours/week academic classes) during the post-acute phase. The content of therapy was not specified. Inclusion of the

rehabilitation specialist was mentioned in two of the acute clinical pathways within the first 24 hours but in all the pathways for the post-acute phase. The use of an outcome measurement tool made by the interdisciplinary rehabilitation team itself was once mentioned. One study mentioned the use of the FIM as outcome tool. No further standardised tools were included for evaluation.

## 7.5 TOTAL HIP REPLACEMENT (THR)

### 7.5.1 Methodology

Pubmed was searched using the Mesh terms total hip replacement and critical pathway. This resulted in 29 articles, of which 15 were related to the aim of the search. The authors who described the implementation/evaluation of a clinical pathway were – if possible - contacted and asked if the pathway could be made available. No pathways were passed on.

On the website of the NHS 3 critical pathways concerning total hip replacement were detected.

A search via [www.aapmr.org](http://www.aapmr.org) (terms: care pathway and orthopaedics) resulted in one relevant publication on the benchmarks of occupational therapy within orthopaedic critical pathways.

Most of the assessed critical pathways, were found through expert contact of the “Centrum voor Ziekenhuis- en Verplegingswetenschap” of Leuven. Using their contacts, two more pathways were obtained from NHS hospitals in the UK, one German pathway, two North American pathways and one Australian.

Contacts in Belgium resulted in 1 pathway for Belgium.

All the pathways were analysed for length of stay, therapies given to the patient, involved professionals and the milestones set for the patient.

### 7.5.2 Results

A total of 10 pathways describing rehabilitation after total hip replacement, were selected. In Figure 7.2, the geographical origin of the pathways is shown.

**Figure 7.2: Geographical origin of clinical pathways for rehabilitation after total hip replacement.**

Origin	Country	Number of pathways
Europe	United Kingdom	5
	Germany	1
	Belgium	1
America	USA	2
Oceania	Australia	1

### 7.5.2.1 *Patient characteristics*

The patients included in the pathways are patients who had an elective total hip replacement.

Eight acute clinical pathways are dealing with the immediate inpatient care after surgery. One pathway (from the UK) describes an inpatient rehabilitation service as well as an outpatient rehabilitation service. The Belgian pathway only considers the post-acute phase during hospitalisation. It describes the care in a rehabilitation facility after discharge from the orthopaedic ward.

### 7.5.2.2 *Delay after THR*

Six of the nine acute clinical pathways mention the start of therapy on the first day after surgery. In three pathways rehabilitation starts on the day of surgery.

One pathway describes rehabilitation in the post-acute phase after total hip replacement. No information is given on the delay after total hip replacement, it is defined as starting after discharge from the acute care setting.

### 7.5.2.3 *Method of identification of patient needs*

Eight of the ten pathways describe a pre-admission assessment of the patient. The assessment tools mentioned in one pathway are nursing assessment, fall risk assessment, thrombosis risk assessment, wound healing risk assessment, discharge risk assessment, Norton score and patient special needs assessment. Two other pathways use a questionnaire or a check list for pre-admission assessment without giving detailed information on the criteria. Seven of the nine pathways describe the involvement of a physical therapist before admission. Five out of the eight pathways have an occupational assessment as well. One pathway even describes the possibility of a pre-admission home visit.

In all pre-admission assessments the surgeon and a nurse are involved.

### 7.5.2.4 *Conditions to start rehabilitation*

Total hip replacement is the only inclusion criterion. No other in- or exclusion criteria are mentioned.

### 7.5.2.5 *Duration of rehabilitation*

The length of stay in the acute care facility (= orthopaedic ward) ranges from 3 to 11 days. The pathway with a length of stay of 3 days contains an outpatient rehabilitation service which includes a home care program with multidisciplinary rehabilitation. This program lasts 7 days.

The end of the acute phase is discharge from the acute care facility.

At discharge, all pathways mention physical therapy as an outpatient rehabilitation service. In the pathways from the UK home-based occupational therapy is also supplied if necessary. Different discharge destinations are possible. The pathways do not mention criteria for discharge to a rehabilitation centre.

One post-acute pathways starts after discharge from the orthopaedic ward. The length of stay in the rehabilitation centre varies between 23 and 40 days.

### 7.5.2.6 *Involved professionals*

Concerning the involved professionals, we conclude that all pathways contain a physical therapist. Eight of the ten pathways include occupational therapy. Other therapists mentioned are a social worker, a recreational therapist and a speech therapist.

#### 7.5.2.7 *Intensity of therapy*

None of the pathways gave information on the amount of therapy in hours a day. All pathways describe daily therapy. No information is given on therapy during the weekends.

#### 7.5.2.8 *Type of therapy*

All pathways contain physical therapy. Physical therapy includes mobilisation, isometric exercises and ambulating with a walking aid. Eight of the ten pathways include occupational therapy. The content of the therapy varies between pathways: supplying the necessary walking aid, ADL-assessment, kitchen assessment, stair climbing...

#### 7.5.2.9 *Expected outcomes and the use of outcome measurement tools*

In Figure 7.3 a detailed overview is given of the milestones needed to be reached at discharge. In general we conclude that ambulating independently with a walking aid, be able to climb stairs and be able to perform ADL independently are the milestones needed to be achieved for discharge.

Figure 7.3: Benchmark of discharge criteria after total hip replacement

	Length of Stay	Physical Therapy discharge criteria	Occupational Therapy discharge criteria	Outpatient rehabilitation services?
<b>Belgium</b>	23-40	March with 1 elbow crutch March 400 m Walk stairs Active flexion, extension and abduction of hip	ADL independently Hip ergonomics	No information
<b>Lakes US</b>	5	Knows home exercise program Able to ambulate independently with safe gait with crutches/walker on level surface and stairs Correct total hip precautions	Proper use of ADL-equipment Self care independent Independent transfers	Discharge to appropriate level of care, with appropriate level of care
<b>St John's US</b>	4	No information	No information	DC: home, home care, rehabilitation centre, LTAC, ECF, home with community referral.
<b>Germany</b>	6	Walks partially independent Stair climbing Full weight bearing Able to perform car transfer	Not involved	Physical therapist at home
<b>Australia</b>	7	Ambulating independently using walking aids Able to perform safe hygiene needs	Not involved	No information
<b>UK Airedale</b>	6	Able to mobilise independently using appropriate walking aids Able to negotiate stairs. Understands precautions to be taken following hip replacement	Able to dress independently using appropriate aids.	Services/ aids in place to enable safe discharge to take place
<b>Isle of Wight UK</b>	11	No information	No information	No information
<b>London UK</b>	<i>Acute phase: 3 (rehabilitation facility)</i> Post-acute phase: 7 (home-based)	<i>Acute phase:</i> transfers independently bed to chair; Independently mobile with frame/elbow crutches; attempt stairs <i>Post-acute phase:</i> Mobile independent with aid, ascend and descend stairs safely with aid, able to mobilize outside home	<i>Acute:</i> not involved <i>Post-acute phase:</i> transfers independently, able to prepare a light meal	No information
<b>Peterborough UK</b>	7	Discharge checklist	Discharge checklist	Physical therapy
<b>Rotherham</b>	7	Physical therapy assessment of sitting, mobilise with elbow crutches, stair climbing	Transfers, kitchen and dressing practice.	No information

### 7.5.3 Conclusion

Clinical pathways in the acute phase after total hip replacement, are widely used. Most of them start with an extensive pre-admission assessment. In 8 of the 10 pathways described above, an occupational therapist as well as a physical therapist are involved. Only 2 pathways (Australia and Germany) work without an occupational therapist. The duration of daily therapy sessions is never mentioned. There is very little information available on the type of therapy in the post-acute phase. The Belgian pathway describes the post-acute phase and one pathway of the UK gives information on the home-based therapy provided by an outpatient team including a physical therapist, an occupational therapist and a nurse.

Multidisciplinary rehabilitation after total hip replacement is used world wide in the acute phase after surgery. Very little information is available on the continuation of rehabilitation programmes after discharge from the acute care facility.

## 7.6 STROKE

### 7.6.1 Methodology

A scan of the published literature was performed to collect information on clinical pathways for stroke rehabilitation.

Pubmed was searched using the MeSH terms “critical pathways”, “cerebrovascular accident” and/or “rehabilitation” (N=64). Cinahl was searched using the MH terms “critical path” and “stroke patients” (N=4). The NHS Library<sup>y</sup> was explored for “stroke” within the category of “Protocols & Care Pathways” (N=3). The website of the American Academy of Physical Medicine and Rehabilitation was also searched on “clinical pathways” and “Cerebrovascular Accident (Stroke)” (N=43). The CVZ was asked if clinical pathways for stroke rehabilitation were available in the archives. Grey literature (Google) was searched using the keywords “managed care”, “stroke” and “rehabilitation”, “integrated care” and “stroke”.

### 7.6.2 Results

In total, 7 relevant clinical pathways were selected for further analysis (See attachment). As demonstrated in Figure 7.4, detailed description of clinical pathways was only found for pathways developed in 3 countries: UK, US and Belgium. This might influence the findings during analysis. Another important remark is the fact that, although a lot of guidelines for rehabilitation practices during the post-acute phase of stroke are published, specially clinical pathways for the acute phase of stroke were found and only two clinical pathways for the post-acute phase of stroke were found.

All pathways were developed and applied at an individual hospital level. For most pathways it was mentioned that they were developed by a multidisciplinary team consisting of physicians, nurses, physical therapists, occupational therapists, speech therapists and social workers. Evidence of best practices combined with professional standards and existing infrastructure were the basis to formulate a consensus on practice represented in the clinical pathway. Half of the pathways are process focused, half of the pathways are outcome focused.

The goals of developing clinical pathways were timely interdisciplinary coordination, reducing practice variations, quality improvement, facilitation of discharge planning, promoting cost-effective resource use and reducing length of stay.

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<sup>y</sup> [www.library.nhs.uk/pathways/](http://www.library.nhs.uk/pathways/)

**Figure 7.4: Countries in which selected clinical pathways were developed.**

ORIGIN	COUNTRY	NUMBER OF PATHWAYS
EUROPE	U.K.	4
	BELGIUM	1
AMERICA	U.S.	2

#### 7.6.2.1 *Patient characteristics*

All pathways were developed for stroke patients. Five covered the acute phase of the disease trajectory. Two covered the post-acute phase.

#### 7.6.2.2 *Delay after stroke*

Clinical pathways for the acute phase of stroke start on day 1 after stroke. The clinical pathway for the post-acute phase starts later because of the condition of medical and neurological stability before applying the clinical pathway.

#### 7.6.2.3 *Method of identification of patient needs*

Patient needs are identified by a multidisciplinary assessment. All involved professionals performed a specific part of the assessment. In some pathways the assessment is done by use of validated outcome measures (FIM, Barthel Index, National Institute of Health Stroke Scale Measures, Duke Mobility Scale). In other pathways assessment is performed using criteria defined within the development team. In all pathways the results of the assessment are discussed with the patient as well as with his/her family.

#### 7.6.2.4 *Conditions to start rehabilitation*

In the pathways for the acute phase the focus is on multidisciplinary assessment rather than on the start of therapy. Moreover, in two pathways for the acute phase no therapy is started yet. In the other pathways rehabilitation therapy is started if the need for rehabilitation could be demonstrated by the results of the assessment. For these pathways, the day on which therapy starts, ranges from 3 days to 1 week after start of the pathway. In one pathway the start of therapy differs per type of therapy: dietician treatment starts on day 1, equipment such as a wheelchair and cushions are provided on day 3, speech therapy starts on day 3 and physical as well as occupational therapy start on day 4.

In the pathways for the post-acute phase, therapy is started after the multidisciplinary assessment is finished.

#### 7.6.2.5 *Duration of rehabilitation*

If mentioned, the pathways for the acute phase focused on the process, take maximum 7 days. In the pathways for the acute phase focusing on outcomes, duration depends once on the discharge outcomes reached and once on the completion of the assessment.

The duration of rehabilitation in one pathway for the post-acute phase is +/- 4 weeks, depending on the goals reached. In the other pathway for the post-acute phase which is process focused, duration of the hospital stay is estimated on 8 weeks. These 8 weeks include 4 phases each of 2 weeks.

#### 7.6.2.6 *Involved professionals*

The composition of the multidisciplinary team is very comparable between all pathways. In every pathway the multidisciplinary team is consisted of:

- A physician

- A nurse
- A physical therapist
- An occupational therapist
- A speech therapist
- A dietician

This multidisciplinary team is involved during the assessment as well as during therapy.

In some pathways a psychologist is involved. In half of the pathways a social worker is involved. Only in 2 of the pathways the involvement of a specialist in rehabilitation is explicitly mentioned.

#### 7.6.2.7 *Intensity of therapy*

Intensity of therapy was never mentioned.

#### 7.6.2.8 *Type of therapy*

In the cases where the start of rehabilitation therapy is included in the pathway for the acute phase, it concerns always physical therapy, occupational therapy and speech therapy.

Type of therapy or involved professionals are not defined in one pathway for the post-acute phase. Instead of this, specific intervention goals in different domains are listed. An example for the domain of activities of daily living: patient has baseline skills in feeding, hygiene/grooming and dressing. This makes it easier to implement this pathway in different organisations with typical activities per type of professional. The other pathway for the post-acute phase contains specific goals directly linked to a type of professional. Goals change over the four phases. In each phase physical therapy, occupational therapy and speech therapy are offered.

#### 7.6.2.9 *Expected outcomes and the use of outcome measurement tools*

Based on the results of the assessment, treatment goals are identified. In one of the pathways it was explained that goals were determined by stroke severity, number and degree of impairments, expected outcome, pre-morbid functional status, and patient/caregiver attributes or needs. For each therapeutic intervention short term goals and estimated time to achieve these goals were defined in advance.

Only in two pathways the same assessment tool is used at the beginning and at the end of the pathway.

In one pathway four categories of outcomes are identified:

- Patient discharge outcomes
- Patient clinical outcomes
- Patient satisfaction outcomes
- Final Program outcomes

Assessment of clinical outcomes is used to determine rehabilitation goals and performed by use of:

- National Institute of Health Stroke Scale Measures (Stroke deficits)
- Orpington Prognostic Scale Measures (Stroke severity)
- Barthel Index; FIM; Instrumental Activities of Daily Living (ADL)
- Fugl-Meyer; Duke Mobility Scale (Motor function)
- Geriatric depression scale (Depression)

- Medical Outcomes Study Short Form Health Survey (Health status and quality of life measure)

Assessment of discharge outcomes is done at the end of the pathway process. Discharge outcomes include criteria focusing on patient safety and continuity of care during hospitalization and the patient's ability to successfully transit to the next level of care whether it be home, rehabilitation- or skilled nursing facility. The discharge outcomes are individualised to assist the patients in achieving their highest potential. *Examples:* Patient performs bed to chair transfers, demonstrates ability to perform care at home, demonstrates understanding of risks for injury, safety measures and use of adaptive equipment.

### 7.6.3 Conclusion

“The earlier rehabilitation is started the better the recovery” as one of the principles of rehabilitation of stroke patients <sup>138</sup> is represented in existing clinical pathways. Except for two, the obtained clinical pathways concern the acute phase of stroke.

Intensity of therapy is described in none of the pathways. Duration of rehabilitation is difficult to consider because each pathway only covers a part of the disease trajectory (acute or post-acute phase).

Identification of patient's needs are always based on a multidisciplinary assessment. In some pathways this assessment is done by use of validated outcome measures. In other pathways this assessment is done by use of criteria defined within the multidisciplinary development team. The results of this assessment are used to define rehabilitation goals or to evaluate expected outcomes.

Pathways for the acute phase are very comparable related to delay after stroke, involved professionals and type of therapy.

One of the pathways for the post-acute phase is special because involved professionals and type of therapy are not integrated. Instead of this, specific intervention goals in different domains are listed. Besides, this pathway prescribes medical and neurological stabilisation before its start.

Stroke management involves the expertise of several disciplines, which can result in poor coordination or inefficiencies in patient treatment. This can be avoided by the use of clinical pathways which ensures that important areas of treatment are not overlooked and unnecessary delays are prevented.

However, the effectiveness of the use of clinical pathways could not be confirmed yet. A reason can be that the development of clinical pathways is based on the premise that patients will have predictable recovery, whereas stroke patients show considerable variability in timing, nature, and order of recovery. Other explanations can be the dependence on external influences such as accommodation and personal support. <sup>139</sup>

Anyway, there is currently insufficient supporting evidence to justify the routine implementation of care pathways for acute stroke management or stroke rehabilitation.

**Key points**

- There are only few clinical pathways available for rehabilitation of lower extremity amputation, multiple sclerosis and spinal cord injury.
- A lot of clinical pathways exist for rehabilitation of total hip replacement and stroke, but they are mostly limited to the acute phase of the disease trajectory.
- Characteristics of the available pathways are:
  - Only part of the disease trajectory is covered and there is no information about duration of the whole rehabilitation process;
  - Intensity and content of therapy are mostly not mentioned;
  - The involvement of a multidisciplinary team is nearly always mentioned;
  - Outcome measures are not commonly used;
  - Some pathways focus on outcome criteria, other focus on time-related steps of the rehabilitation process;
- The selected clinical pathways are difficult to compare. Variability can not be confirmed nor rejected.