One year post stroke

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A research on quality of life of elderly
ischaemic stroke patients and follow-up care

Leonie de Weerd

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One year post stroke

A research on quality of life of
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CHAPTER 1

GENERAL INTRODUCTION

BACKGROUND

The definition of a stroke or CVA is 'a clinical syndrome characterised by rapidly developing clinical symptoms and / or signs of focal, and at times global (applied to patients in deep coma and those with subarachnoid haemorrhage), loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin' (WHO / Hatano, 1976). This definition includes strokes due to brain infarcts and intracerebral / subarachnoidal haemorrhages. About 75% of all strokes are caused by cerebral ischaemia, 15% by intracerebral haemorrhages and 5% by subarachnoidal haemorrhages (Franke, 2011). This thesis is only about patients with an ischaemic stroke.

Over the years much attention has been devoted to the treatment of strokes and the outcomes shortly after a stroke. Little is known, however, about the outcomes and primary care for Dutch patients over a longer time period following a stroke. This thesis provides more insight into the health status of stroke patients one year post-stroke when they once again fall under the care of the general practitioner. In addition, clarity is provided about whether thrombolysis actually has any added value in this phase. Further a description is given of whether the intended changes in the survival and use of care following the introduction of the 'Dutch Transmural Protocol TIA/CVA' (Giesen, 2004), have actually occurred and to what extent the criteria in the agreement have been fulfilled.

PATHOPHYSIOLOGY

The brain needs a continuous supply of blood (oxygen and glucose) to function well. This is because the brain tissue cannot store any energy. If the average arterial blood pressure falls under 40-50 mmHg then the cerebral perfusion decreases. The same mechanism arises during an ischaemic stroke, in which a thrombus in a cranial artery blocks the circulation to the area beyond this. Irreversible damage occurs as soon as the blood supply decreases to less than 20%. The most important causes of an ischaemic stroke are an embolism originating from the internal carotid artery, a cardiac embolism, local blockage due to a vessel wall problem, stenosis of the large cerebral arteries and abnormalities in the blood composition (Kuks, 2003).

PREVALENCE/INCIDENCE

Each year about 45,000 people in the Netherlands experience a stroke. In 2009 about 23,500 men and 23,000 women experienced a first-ever stroke (Vaartjes, 2011; Bots, 2006). In about 35% of the cases it was a first-ever stroke that was not fatal and did not result in a hospital admission. It is estimated that 50 to 70% of stroke patients are hospitalised. The absolute lifetime risk of experiencing a stroke is more or less the same for men and women, namely, 17.4% and 18% respectively at the age of 75 years (Hollander, 2003).

In 2007, the prevalence of a stroke in the Netherlands was 226,600. The prevalence and incidence increase strongly with age (Vaartjes, 2011). Due to the future ageing of the population the care for patients with a stroke will become increasingly more important (Liang 2008). The number of people who experience a stroke will increase by 40% over the coming years (RIVM. Nationaal Kompas Volksgezondheid 2011).

A stroke is the second most important cause of mortality worldwide. In 1990, it caused about 4.4 million deaths worldwide (Murray, 1997). Recent research has demonstrated that although the incidence of an ischaemic stroke is increasing the associated mortality is still decreasing. As stroke is the most important cause of disability in adults, the growing number of stoke survivors is placing a considerable economic and humanitarian burden on society. Stroke prevention is therefore becoming increasingly more important (Vaartjes, 2013).

The average age at which men develop a stroke is 70 years. For women it is 75 years. More than half of all strokes occur in people older than 75 years (Feigin, 2003).

A PATIENT WITH AN ISCHAEMIC STROKE IN EVERYDAY PRACTICE

During his surgery, the general practitioner is called by the assistant. She has a panicking Mr Takens on the phone. His wife, 81 years, with a history of hypertension and moderate COPD can suddenly no longer walk properly and seems to have suffered a loss of strength. The general practitioner makes an emergency visit.

When he reaches Mrs Takens it transpires that she has had the symptoms for one hour. Prior to this she had no symptoms and then all of a sudden while drinking coffee she dropped her cup. She wanted to get up but could not. The general practitioner investigates the patient and notes that she has a hemiparesis right. This is probably due to an ischaemic stroke. There do not appear to be any contraindications for thrombolysis. In consultation with the patient and the neurologist, the general practitioner decides to urgently admit the patient for a thrombolysis treatment.

The next section provides an overview about the care pathway followed by a stroke patient from the moment he or she experiences a stroke and it gives an insight into the considerations that doctors make in the case of a patient with stroke.

DEVELOPMENTS IN THE CARE FOR STROKES

In recent years much attention has been paid to care for people with a stroke. This covers mainly the initial care of patients with an ischaemic stroke. In the 1990s, one-third of patients with a stroke were treated by the general practitioner and just over half were referred to hospital (Meer, 1990). At that time there was no guideline for stroke, there were no stroke units and no treatment with thrombolysis. Consequently the factors the general practitioner took into account with respect to the care of stroke patients and whether to refer them to hospital were very different. The severity of the stroke and the availability of care were the most important considerations in this respect. Diagnostic uncertainty did not really play a role. As there was no good treatment for stroke patients, general practitioners tended to send just younger patients to hospital for further diagnosis and only sent elderly patients in if they were completely dependent. This meant that during the initial days after a stroke, general practitioners had frequent contact with the patients. However, after the acute phase this frequency rapidly decreased and then little care was provided (Schuling, 1993).

In the case described above this would mean that Mrs Takens would not have been sent to hospital with all of the associated consequences. After all there was no treatment of patients with a stroke. Nowadays things are very different. The question is whether this actually results in a better prevention and a higher quality of life.

Thrombolytic therapy

Nowadays thrombolysis is being used increasingly more often. By dissolving a thrombus the cerebral blood supply can be restored. Of all treatments for an acute ischaemic stroke, an intervention with tPA (tissue plasminogen activator) within 4.5 hours after the start of the stroke is the most effective. As a result of this attitudes towards and treatment of stroke patients have changed considerably (Donnan, 2011).

Research has revealed that patients with an ischaemic stroke have 30% more chance of either minimal or no disability after three months if tPA is administered within 4.5 hours after the symptoms first occurred (Wardlaw, 2012). In addition, patients who are treated with thrombolysis up to 6 hours after the ischaemic stroke are significantly less likely to die or become physically dependent (modified Rankin Scale 3 to 6) (Wardlaw, 2003). An important characteristic of thrombolysis is its time dependency: the faster the treatment is started the more effective it is (time = brain). In the case described above this would mean that the general practitioner consults the neurologist and sends the patient to hospital as quickly as possible.

However, not everybody receives a thrombolysis. In 'The Netherlands stroke survey' it was clear that only 7% of all acute stroke patients who are referred to hospital ultimately receive a thrombolysis (Lingsma, 2008). This undertreatment is due to the patients' lack of knowledge about stroke symptoms and the subsequent actions to be taken in response to this, late arrival in the hospital, the tight therapeutic margin and the variation in the selection of patients for thrombolysis (Donnan, 2011).

Organisational forms of acute stroke care also influence the proportion of patients treated with tPA. In the Netherlands two organisational models for acute stroke care are currently recognised: treatment in community hospitals (decentralised model) and centralised stroke care (requires that patients eligible for thrombolytic therapy are transported to a single specialised stroke unit, bypassing smaller community hospitals that may be located closer to the patient). In the literature, centralised care in stroke centres has found to be associated with rapid referral and early access to tPA treatment, better functional outcome, and high quality of care. However, reports on a head-to-head comparison between centralised and decentralised care for the proportion of patients treated with tPA and outcome are lacking. Recently, the first head-to-head study to compare efficacy between both organisational models was published. The likelihood of treatment was almost twice as high in the centralised model compared to decentralised model. However, for patients arriving within 4.5 hours at the hospital the thrombolysis rates were similar for both models. This suggests that the effect on treatment with thrombolysis is mainly caused by pre-admission factors. The centralised organisational model resulted in a larger proportion of patients arriving within 4.5 hours after a stroke (Lahr M et al Stroke 2012).

A feared complication of thrombolytic therapy is intracranial haemorrhaging. Symptomatic intracranial haemorrhage occurs in 1.7 to 8.0% of treated patients (Donnan,

2011). Despite this complication, thrombolytic therapy is still very effective and there is no reason to withhold this treatment from stroke patients, even in the case of elderly patients (Uyttenboogaart, 2007).

In the case of Mrs Takens the thrombolysis proceeded without complications. However, does that really mean that her future quality of life will be better than it would have been had she not received this treatment? At present, only limited data are available on this.

Stroke Unit

After thrombolysis, Mrs Takens was admitted to the stroke unit. This is a neurological department in a hospital specialised in the care of patients in the acute or subacute stage of a stroke. Several studies in the 1990s demonstrated that acute care of stroke patients in a stroke unit resulted in less mortality (Langhorne, 1993), less dependence, and less additional medical help (Stroke Unit Trialists' Collaboration, 1997) than admission to a normal ward. In addition, rehabilitation and prevention are worked on faster (Verhoeven, 2004). In particular, the prevention and treatment of infections as a complication results in less mortality during the treatment in a stroke unit (Govan, 2007). Furthermore, treatment in a stroke unit is more cost-effective than a specialised stroke team or home care (Kalra, 2005).

During her admission to the stroke unit, Mrs Takens developed pneumonia. This was treated immediately and two weeks later Mrs Takens could be discharged. However, she was only discharged after she had received information on subjects such as prevention and she had also been started on anticoagulants, statins and antihypertensives. Mrs Takens was temporarily admitted to a nursing home for further recuperation and rehabilitation.

Rehabilitation and prevention

An important part of the treatment of a stroke is the post-acute rehabilitation. Organised multidisciplinary rehabilitation in the post-acute period, at least one week after the occurrence of the stroke, has significant benefits (Langhorne, 2001). Stroke patients need a rehabilitation programme or service before they return to their own living environment (Agency for Health Care Policy and Research, 1995).

Over the years increasing clarity has been obtained about the role of preventing a stroke by means of monitoring blood pressure, cholesterol level and glucose level. Various interventions for the treatment of cardiovascular and cerebrovascular risk factors can reduce the risk of a first-ever stroke. This is particularly the case for the treatment of hypertension. Routine check-ups by the physician are an essential aspect of the stroke prevention programme (Gorelick, 1999). Antiplatelet therapy for the prevention of a stroke can also be defended, as it keeps the underlying disease, arteriosclerosis, as stable as possible (Zusman, 1999).

As a result of all these new insights, the role of the general practitioner changed and it

became apparent that a targeted treatment plan was necessary. In response to this, two guidelines were published (NHG Practice Guideline CVA (Verhoeven, 2004) and the Dutch Transmural Protocol TIA/CVA (Giesen, 2004)) so that appropriate care can be provided in the suitable setting. Patients must be referred to the hospital faster and the general practitioner assumes responsibility for the chronic treatment at home (Limburg, 1997). However, do these guidelines actually accomplish what they set out to do and are mortality or a recurrent stroke indeed prevented?

The Dutch Transmural Agreement TIA/CVA
The Dutch Transmural Protocol TIA/CVA (LTA) was compiled in 2004 by the Dutch College of General Practitioners (NHG) and the Netherlands Society of Neurology (NVN) and contains agreements about the diagnosis, treatment, referral and back referral for a TIA/CVA.

In a nutshell, the LTA has resulted in the following changes to the tasks performed by the general practitioner and the neurologist:
- Acute neurological paralysis symptoms are a reason for the general practitioner to make an emergency visit if thrombolysis is possible in the region. A patient without contraindications must be referred urgently for thrombolysis.
- By means of the FAST test the general practitioner can enquire on the phone about whether a stroke has occurred (Wiersma, 2005).
- Rapid referral to a neurologist is desirable for both a TIA and a stroke.
- Admission to and treatment in a stroke unit is the preferred course of action.
- Rapid completion of the diagnosis by a neurologist and determining a quick indication for thrombolysis and/or carotid surgery.
- The neurologist is responsible for the quick start of rehabilitation.
- The neurologist provides treatment advice for secondary prevention, but the general practitioner remains responsible for starting and continuing measures for secondary prevention.

With the Dutch Transmural Protocol an effort was made to realise more effective treatment that would result in less mortality and residual symptoms in the chronic phase. The question is whether the guideline is actually adhered to in practice and what could be improved in this respect.

THE CONSEQUENCES OF A STROKE / TREATMENT AFTER THE LTA

The period following a stroke can be divided into three phases, namely: acute phase, rehabilitation phase and chronic phase.

Acute phase

The acute phase usually starts at the stroke unit and lasts about two weeks. In this phase the emphasis is on optimising factors that play a role in maintaining functional brain tissue (blood pressure, glucose, oxygen level, temperature, nutrition) and the prevention of complications such as pneumonia, deep vein thrombosis and decubitus (CBO guideline, 2008). Information is also given to the patient and the members of his or her family. In general, the neurologist will discuss the diagnosis, treatment methods and preventative measures. The prognosis will also be considered. At the same time the risk factors will be described and a start will be made on secondary prevention (Verhoeven, 2004; Giesen 2004).

Rehabilitation phase

Next the rehabilitation phase will start and this will last up to six months after the stroke. In this phase most attention is paid to reducing functional limitations and to the return home and integrating back into society. The rapid starting of rehabilitation has a favourable effect on the functional recovery (CBO guideline, 2008).

Dependent on the severity of the residual symptoms following a stroke various rehabilitation options are available. Older patients, in particular, can be rehabilitated in a nursing home where the nursing home general practitioner is responsible for the care. Alternatively the patient can be sent to a rehabilitation centre where the rehabilitation physician is responsible for the care provided. Finally, rehabilitation in the home situation can be chosen where the general practitioner is responsible for the care. However, only a minority of patients with a stroke are rehabilitated at home. This thesis only considers patients who ultimately fall under the responsibility of the general practitioner again (Verhoeven 2004; CBO guideline 2008).

Chronic phase

After six months (when no further improvement in the functioning is expected) the chronic phase starts. A stroke has far-reaching consequences for both the patient and those close to him or her. Highly prevalent loss of function following a stroke are paresis, visual field loss, aphasia, disrupted spatial awareness, disrupted ability to think, swallowing dysfunction and incontinence (Franke, 2011). A spastic paresis in at least one of the limbs occurs in 80-90% of stroke patients in the acute phase. Some 50% of them continue to experience problems from motor paralysis during the chronic phase. Aphasia occurs in 30% of stroke patients and for three-quarters of them recovery occurs within

the first two weeks. However, in one-fifth of cases the aphasias persists into the chronic phase. Dysartria is present in 35% of stroke patients in the acute phase and in 15% in the chronic phase (Verhoeven, 2004).

Motor paralysis is not the only symptom of a stroke. Cognitive, behavioural, emotional and psychological consequences often occur as well (Hochstenbach, 1996; Haacke, 2006). Reduced cognitive capacities can lead to disruptions in the orientation, attention, memory or observation. Emotional changes can lead to a loss of initiative, emotional instability, impulsiveness, loss of inhibition, egocentricity, attention-seeking behaviour, aggressiveness, anxiety or irritability and a change in sexuality. Fatigue symptoms and depression can also occur. The psychosocial consequences in particular appear to be chronically present (Hochstenbach, 1996; Verhoeven, 2004).

In the chronic phase the focus is on processing, acceptance, learning to live with permanent impairments and support of the informal carers. Once again the general practitioner is often the first point of contact in the care provided. He or she can supervise patients in learning to live with disabilities and psychological problems. Furthermore, he or she will have to continue targeting secondary prevention (Verhoeven, 2004; CBO guideline 2008).

The severity of the residual symptoms, both physical and psychological, determine the quality of life (Franke, 2011). As the mortality rate for stroke is decreasing, patients will have to increasingly learn to live with their disabilities and limitations. Consequently it will become increasingly important to examine the quality of life and to target policy at this (Haacke, 2006). This is one of the main reasons why this thesis has been written.

After six weeks of rehabilitation, Mrs Takens was discharged to home. There she once again fell under the care of the general practitioner. After the discharge, the general practitioner paid a visit to Mrs Takens. All was well and the patient could cope reasonably well at home. However, six months later the general practitioner was phoned by Mr Takens. Mrs Takens was not herself and appeared to be more sombre …

OBJECTIVES AND OUTLINE OF THE THESIS

Just like Mrs Takens, the patient groups described in this thesis are in the chronic phase after stroke. As little is known about the quality of life and the primary care for these patients, we have tried to obtain more insight into their health status and have tried to determine whether thrombolysis actually provides any added value in this phase. Further we examined whether changes have actually occurred in the survival and use of care since the introduction of the Dutch Transmural Agreement TIA/CVA and we also determined the extent to which criteria in this guideline have been met.

To improve post-stroke survival and minimise the risk of stroke recurrence the 'Dutch Transmural Protocol TIA/CVA' was developed. It advises general practitioners

to provide quality healthcare at the right time without compromising the continuity of care. **Chapter 2** examines whether survival improved after implementation of the new protocol, and whether the frequency of contact with the general practitioner, registration of comorbidity and prescription of medication have increased.

Chapter 3 describes what kind of follow-up care and rehabilitation the patients with ischaemic stroke receive and to what extent aftercare fulfils the criteria of the 'Dutch Transmural Protocol TIA/CVA'.

As little is known about late physical and psychological consequences of ischaemic stroke in primary care patients in the Netherlands, deciding whether patients in the chronic phase receive quality aftercare is difficult. Knowledge of stroke outcomes is also important for improving the quality of life. This issue is examined in **Chapter 4**. This chapter describes the well-being of patients one year post-stroke who returned to their home immediately after discharge from hospital and determines factors that can influence well-being. Health-related quality of life is compared to the health-related quality of life of the general Dutch population of the same age.

Chapter 5 studies the well-being and quality of life of patients who underwent thrombolytic therapy. This observational study examines whether thrombolytic therapy in stroke patients leads to better quality of life outcomes compared to patients without thrombolytic therapy one year post-stroke. It was also examined whether daily functioning, mental functioning and activities improved after thrombolytic treatment.

In **Chapter 6** the effects of a new rehabilitation programme are described. This new programme (ATC) was designed because there were indications that patients living at home face different problems than during rehabilitation and that stroke patients at home often failed to seek help for many of the problems they faced. The ATC programme helps to detect these problems earlier and makes it easier to give advice. A major difference between the old and new programme is the frequency of follow up and contacts between patients and a professional during which support and treatment can be given. In **Chapter 6** it is examined whether the new follow-up care programme specifically aimed at maintaining daily functioning, quality of life and activities results in better outcomes in stroke patients compared to conventional follow-up care.

Finally, in **Chapter 7** the main findings are discussed and the implications for future research are described.

Chapter 8 summarises the main findings of this thesis and in **Chapter 9** a Dutch summary is given.

REFERENCES

Agency for Health Care Policy and Research (no authors listed). Post-stroke rehabilitation: assessment, referral, and patient management. U.S. Department of Health and Human Services Clin Pract Guidel Quick Ref Guide Clin. 1995 May;(16):i-iii, 1-32.

Bots ML, Dis SJ van. Factsheet Beroerte. Uitgave Nederlandse Hartstichting 2006.

CBO. Diagnostiek, behandeling en zorg voor patiënten met een beroerte. Utrecht: CBO; 2008

Donnan GA, Davis SM, Parsons MW, Ma H, Dewey HM, Howells DW: How to make better use of thrombolytic therapy in acute ischemic stroke. Nat Rev Neurol. 2011 Jun 14;7(7):400-9.

Feigin VL, Lawes CM, Bennett DA, Anderson CS. Stroke epidemiology: a review of population-based studies of incidence, prevalence, and case-fatality in the late 20th century. Lancet Neurol. 2003 Jan;2(1):43-53.

Franke CL (Atrium mcParkstad), Vaartjes I (Julius Centrum), Eysink PED (RIVM), Bots ML (Julius Centrum). Wat is beroerte en wat is het beloop? In: Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid. Bilthoven: RIVM, <http://www.nationaalkompas.nl> Nationaal Kompas Volksgezondheid\ Gezondheid en ziekte\Ziekten en aandoeningen\Hartvaatstelsel\Beroerte, 13 december 2011.

Giesen AGM, Franke CL, WiersmaTj et al. Landelijke Transmurale Afspraak TIA/CVA. Huisarts Wet. 2004;47(11):521-526.

Gorelick PB, Sacco RL, Smith DB, Alberts M, Mustone-Alexander L, Rader D, et al. Prevention of a first stroke: a review of guidelines and a multidisciplinary consensus statement from the Dutch Stroke Association. JAMA. 1999 Mar 24-31;281(12):1112-20.

Govan L, Langhorne P, Weir CJ. Does the prevention of complications explain the survival benefit of organized inpatient (stroke unit) care?: further analysis of a systematic review. Stroke. 2007 Sep;38(9):2536-40.

Haacke C, Althaus A, Spottke A, Siebert U, Back T, Dodel R. Long-term outcome after stroke: evaluating health-related quality of life using utility measurements. Stroke. 2006; 37(1): 193-98.

Hatano, S. Experience from a multicentre stroke register: a preliminary report. Bull World Health Organ. 1976;54(5):541-53.

Hochstenbach JB, Donders AR, Mulder T, Van LJ, Schoonderwaldt H. [Many chronic problems in CVA patients at home]. Ned Tijdschr Geneeskd. 1996; 140(22): 1182-1186.

Hollander M, Koudstaal PJ, Bots ML, Grobbee DE, Hofman A, Breteler MM. Incidence, risk, and case fatality of first ever stroke in the elderly population. The Rotterdam Study. J Neurol Neurosurg Psychiatry. 2003; 74(3): 317-321.

Kalra L, Evans A, Perez I, Knapp M, Swift C, Donaldson N. A randomised controlled comparison of alternative strategies in stroke care. Health Technol Assess. 2005 May;9(18):iii-iv, 1-79.

Kendall J. Thrombolysis for acute ischaemic stroke: a new challenge for emergency medicine. Emerg Med J. 2008 Aug;25(8):471-5.

Kuks JBM, Snoek JW, Oosterhuis HJGH. Klinische neurologie. 5 ed. Houten: BohnStafleu Van Loghum, 2003.

Kwiatkowski TG, Libman RB, Frankel M, Tilley BC, Morgenstern LB, Lu M et al.: Effects of tissue plasminogen activator for acute ischemic stroke at one year. National Institute of Neurological Disorders and Stroke Recombinant Tissue Plasminogen Activator Stroke Study Group. N Engl J Med. 1999 Jun 10;340(23):1781-7.

Lahr MM, Luijckx GJ, Vroomen PC, van der Zee DJ, Buskens E. The chain of care enabling tPA treatment in acute ischemic stroke: a comprehensive review of organisational models. J Neurol. 2013 Apr;260(4):960-8.

Langhorne P, Williams BO, Gilchrist W, Howie K. Do stroke units save lives? Lancet. 1993 Aug 14;342(8868):395-8.

Langhorne P, Duncan P. Does the organization of postacute stroke care really matter? Stroke. 2001 Jan;32(1):268-74.

Liang BA, Lew R, Zivin JA. Review of tissue plasminogen activator, ischemic stroke, and potential legal issues. Arch Neurol. 2008 Nov;65(11):1429-33.

Limburg M, Kappelle LJ. Structured care for stroke patients: stroke units and transmural stroke services. Ned Tijdschr Geneeskd. 1997 Mar 22;141(12):566-7.

Lingsma HF, Dippel DW, Hoeks SE, Steyerberg EW, Franke CL, van Oostenbrugge RJ et al.: Variation between hospitals in patient outcome after stroke is only partly explained by differences in quality of care: results from the Netherlands Stroke Survey. J Neurol Neurosurg Psychiatry. 2008 Aug;79(8):888-94.

Meer K van der, Smith RJA.CVA-patiënten in de huisartspraktijk. Een onderzoek onder 1 procent van de Nederlandse bevolking. Huisarts Wet. 1990a; 33: 141-144.

Murray CJ, Lopez AD. Mortality by cause for eight regions of the world: Global Burden of Disease Study. Lancet. 1997 May 3;349(9061):1269-76.

No authors listed. Na CVA meer revalidatie mogelijk. Medisch Contact 2006; 45: 1808-1809.

RIVM. Nationaal Kompas Volksgezondheid 2011

Schuling J, Stroke patients in general practice. Impact, recovery and the GP's management in the first six months poststroke. Thesis, 1993. University of Groningen, the Netherlands.

Stroke Unit Trialists' Collaboration (no authors listed). Collaborative systematic review of the randomised trials of organised inpatient (stroke unit) care after stroke. BMJ. 1997 Apr 19;314(7088):1151-9.

Stroke Unit Trialists' Collaboration (no authors listed) How do stroke units improve patient outcomes? A collaborative systematic review of the randomized trials. Stroke. 1997 Nov;28(11):2139-44.

Uyttenboogaart M, Schrijvers EM, Vroomen PC, De KJ, Luijckx GJ: Routine thrombolysis with intravenous tissue plasminogen activator in acute ischaemic stroke patients aged 80 years or older: a single centre experience. Age Ageing. 2007 Sep;36(5):577-9. Epub 2007 Apr 3.

Vaartjes I (Julius Centrum), Bots ML (Julius Centrum), Poos MJJC (RIVM). Hoe vaak komt een beroerte voor en hoeveel mensen sterven eraan? In: Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid. Bilthoven: RIVM, <http://www.nationaalkompas.nl> Nationaal Kompas Volksgezondheid\ Gezondheid en ziekte\Ziekten en aandoeningen\Hartvaatstelsel\Beroerte, 13 december 2011.

Vaartjes I, O'Flaherty M, Capewell S, Kappelle J, Bots M. Remarkable decline in ischemic stroke mortality is not matched by changes in incidence. Stroke. 2013; Mar;44(3): 591-7.

Verhoeven S, Beusmans GHMI, Van Bentum STB, Van Binsbergen JJ, Pleumeekers HJCM, Schuling J. NHG-standaard CVA. Huisarts Wet. 2004;47: 509-520.

Wardlaw JM, del Zoppo GJ, Yamaguchi T, Berge E. Thrombolysis for acute ischaemic stroke (Review). Cochrane Database of Systematic Reviews 2003; 3: CD000213

Wardlaw JM, Murray V, Berge E, del Zoppo G, Sandercock P, Lindley RL, Cohen G. Recombinant tissue plasminogen activator for acute ischaemic stroke: an updated systematic review and meta-analysis. Lancet. 2012 Jun 23;379(9834): 2364-72.

Wiersma TJ, Pleumeekers HJ, Beusmans GH, Schuling J, Goudswaard AN. Summary of the practice guideline 'CVA' from the Dutch College of General Practitioners. Ned Tijdschr Geneeskd. 2005 Dec 17;149(51):2850-6.

Zusman RM, Chesebro JH, Comerota A, Hartmann JR, Massin EK, Raps E, et al. Antiplatelet therapy in the prevention of ischemic vascular events: literature review and evidence-based guidelines for drug selection. Clin Cardiol. 1999 Sep;22(9):559-73.

SURVIVAL OF STROKE PATIENTS AFTER THE INTRODUCTION OF THE 'DUTCH TRANSMURAL PROTOCOL TIA/CVA'

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ABSTRACT

Background

Earlier research showed that healthcare in stroke could be better organized, aiming for improved survival and less comorbidity. Therefore, in 2004 the Dutch College of General Practitioners (NHG) and the Dutch Association of Neurology (NVN) introduced the 'Dutch Transmural Protocol TIA/CVA' (the LTA) to improve survival, minimize the risk of stroke recurrence, and increase quality of life after stroke. This study examines whether survival improved after implementation of the new protocol, and whether there was an increase in contacts with the general practitioner (GP)/nurse practitioner, registration of comorbidity and prescription of medication.

Methods

From the primary care database of the Registration Network Groningen (RNG) two cohorts were composed: one cohort compiled before and one after introduction of the LTA. Cohort 1 (n=131, first stroke 2001-2002) was compared with cohort 2 (n=132, first stroke 2005-2006) with regard to survival and the secondary outcomes.

Results

Comparison of the two cohorts showed no significant improvement in survival. In cohort 2, the number of contacts with the GP was significantly lower and with the nurse practitioner significantly higher, compared with cohort 1. All risk factors for stroke were more prevalent in cohort 2, but were only significant for hypercholesterolemia. In both cohorts more medication was prescribed after stroke, whereas ACE inhibitors were prescribed more frequently only in cohort 2.

Conclusion

No major changes in survival and secondary outcomes were apparent after introduction of the LTA. Although, there was a small improvement in secondary prevention, this study shows that optimal treatment after introduction of the LTA has not yet been achieved.

1. INTRODUCTION

The prevalence of stroke in general practice in the Netherlands is 13.3 in 1000 men and 13.4 in 1000 women [1]. Additionally, within 5 years after stroke, 50% of patients will die and 30-50% will experience another stroke [2].

A stroke has considerable impact on the patient's life and his/her family [2,3]. Stroke can cause various neurological deficits, including paralysis, loss of vision, aphasia, spatial disorder, disturbance in thinking, difficulty in swallowing and incontinence [4]. Moreover, stroke has cognitive, behavioral, emotional and social consequences [5] and, in the chronic phase, negatively affects quality of life [3,4].

Studies have shown that healthcare in stroke patients could be better organized, that more thrombolysis treatment should be given and that more admissions to a stroke unit would result in better survival and less comorbidity [6-9]. It became increasingly obvious that secondary prevention (e.g. controlling blood pressure, cholesterol and glucose) is also very important. Treatment of cardiovascular/cerebrovascular risk factors reduces the risk of stroke, in particular hypertensive treatment. Moreover, consistent measurements to control whether treatment is effective are essential in stroke prevention programs [10]. All these findings emphasized that specific treatment is required for stroke patients.

A transmural stroke service, in which neurologists and general practitioners (GPs) participate, would allow proper care to be delivered in the appropriate setting. Patients should be quickly referred to the hospital and the GP is responsible for secondary prevention at home [11]. To improve survival after stroke and minimize the risk of stroke recurrence, the Dutch College of General Practitioners (NHG) and the Dutch Association of Neurology (NVN) introduced the 'Dutch Transmural Protocol TIA/CVA' (the LTA) in 2004 [12]. It also offers the GP and neurologist the advice to provide quality healthcare at the right time, without compromising the continuity of care.

The LTA protocol states that when acute neurological symptoms are apparent, the GP should visit the patient immediately so that thrombolytic treatment can be given within 3 hours after the symptoms started. Other indications for an emergency visit are unconsciousness, worsening of neurological symptoms, or when the event is so worrying for the patient or his/her environment that delay is not justified. Visiting the patient at home can be postponed if the situation is stable and no thrombolysis is possible [12].

The protocol recommends that agreements should be made about healthcare between the local hospital and GPs. In general, when a GP suspects an ischemic stroke, treatment with a platelet inhibitor or a coumarin derivative is started the same day and patients are admitted to a hospital (preferably a stroke unit). The protocol states that the neurologist is responsible for the remaining necessary medication, and for starting rehabilitation and secondary prevention in hospital. After discharge from hospital, the GP continues this treatment.

Antihypertensive medication is prescribed to patients with hypertension 2 weeks after the patient has stabilized. The protocol advises the prescription of statins to patients

with a total cholesterol of 3.5 mmol/L or higher [12]. For treatment of high glucose levels, the NHG protocol 'Diabetes mellitus type 2' must be followed [13]. Health education should be performed by a neurologist, but the GP should also discuss risk factors, lifestyle changes and use of medication with the patient. This is important because patients regard the GP and neurologist as their main source of information [12,14,15].

GPs are responsible for assisting in the coordination of rehabilitation and post-hospital care of patients at home. The neurologist has to provide a discharge letter with treatment advice and a risk profile within 1 week after discharge from hospital to ensure that quality aftercare is possible [12,15].

The purpose of this study is to compare the survival of patients one year after stroke before and after the introduction of the LTA. We were not interested in establishing a causal relationship in survival before and after stroke due to the introduction of LTA, but only to show changes in survival occurring between pre- and post LTA time periods. We expected survival to be better in stroke patients after the introduction of the LTA, because follow-up and secondary prevention is implemented more regularly when complying more strictly with the LTA. Secondary outcomes include survival at 2-year follow-up, difference in the number of contacts with the GP/nurse practitioner, and difference in secondary prevention (e.g. prescription of medication, comorbidity, risk factors). We expected the number of contacts with the GP and the prescription of medication and comorbidities to be higher, because the LTA recommends that GPs check and monitor patients more regularly after stroke.

2. METHODS

2.1. Study design and setting

In this registry study, the database of the Registration Network Groningen (RNG) was used. This primary care-based network was established in 1989, and consists of three group practices in the northern part of the Netherlands with about 20 GPs and about 30,000 patients [16]. The RNG is a validated register [17]. All contacts, diagnoses, referrals and prescriptions are registered in the RNG using the International Classification of Primary Care (ICPC) [18]. Anonymous patient data were used according to the privacy assignments by the RNG. The study was in agreement with the regulations for publication of patient data and, therefore, no further approval was required from the Medical Ethical Committees of the University Medical Centre Groningen.

2.2. Participants and data collection

The study includes two cohorts of patients, one cohort compiled before and one after introduction of the LTA. Inclusion criteria were patients who had a first stroke in 2000-2001 (cohort 1) and in 2005-2006 (cohort 2). These patients had to be registered in the general practice for at least one year and were followed for two years after stroke. No additional selection criteria were applied. A total of 263 patients were included. Details on history, risk factors, mortality, morbidity, medication and referrals were obtained from the RNG.

2.3. Statistical analysis

For statistical analysis SPSS 15 for Windows (SPSS Inc., Chicago) was used. Statistical significance was set at $p<0.05$ (two-sided). To test differences between groups the Student's t-test was used for normal distributed (continuous) variables and the Mann-Whitney U test was used for not normal distributed continuous, ordinal scaled or count variables. The Chi-square test was used for independent observations of nominal or dichotomous variables. The Kaplan-Meier method was used to estimate the survival distributions and the log-rank test was used to compare differences in survival between the groups [19,20].

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3. RESULTS

3.1. Baseline characteristics

A total of 263 patients were included: 131 patients in cohort 1 (first stroke 2000-2001) and 132 patients in cohort 2 (first stroke 2005-2006). Table 1 provides details on baseline characteristics: there were no significant differences between the two groups.

Table 1: Baseline characteristics of the study population

Variables	Cohort 1 (%)	Cohort 2 (%)	p-value
Patients included	131	132	
Gender			0.096*
- *Men*	72 (55)	59 (45)	
- *Women*	59 (45)	73 (55)	
Age, in years: average [range]	69.82 [19-105]	70.86 [31-103]	0.565†
Risk factors present before stroke/History			
- *K85 (high blood pressure without hypertension)*	8 (6)	9 (7)	0.815*
- *K86/87 (hypertension)*	34 (26)	31 (23)	0.643*
- *T93 (hypercholesterolemia)*	2 (2)	3 (2)	0.658*
- *T90 (diabetes)*	17 (13)	16 (12)	0.834*
- *K91 (arteriosclerosis)*	2 (2)	1 (1)	0.557*
- *K89 (TIA)*	5 (4)	9 (7)	0.278*
Average number of contacts (consults and visits) with general practice in the year preceding stroke			
- *Contact moments GP*	5.40	5.76	0.914‡
- *Consult GP*	3.48	5.76	0.346‡
- *Visits GP*	2.46	3.17	0.811‡
- *Contacts nurse practitioner*	1.00	1.01	0.319‡
Average exposure time§ in days	528	554	0.256‡

* Pearson's Chi-square test, †Independent T-test, ‡ Mann-Whitney test.
§ Exposure time: time during which patients were registered in a general practice during the study.

3.2. Survival

Both cohorts were followed for two years, during which time some patients died. There was no significant difference in survival between the two cohorts at one-year follow-up (p=0.511) (Fig 1) or at two-year follow-up (Fig 2) (p=0.188).

Figure 1: Survival at one-year follow-up
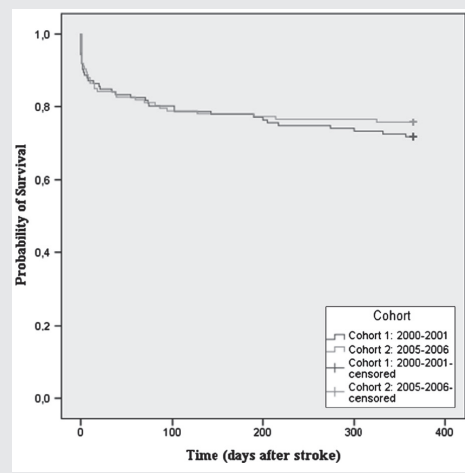
Figure 2: Survival at two-year follow-up
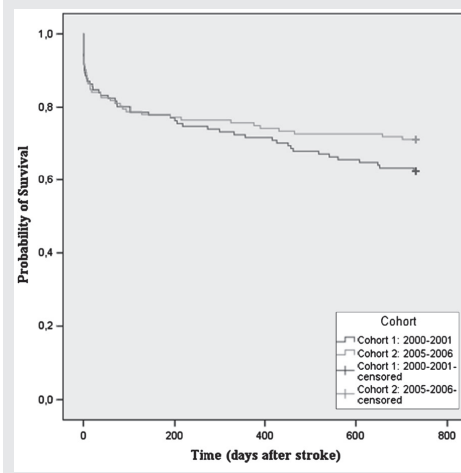
Table 2 shows the percentage of patients that died in both cohorts. In cohort 1 more men and women died than in cohort 2; however, the difference is not significant. In both cohorts more patients died with increasing age.

Table 2: Number (%) of deceased patients during the two-year follow-up

Deceased	Cohort 1 (%)	Cohort 2 (%)	p-value#
Men			
related to stroke*	8 (11)	6 (10)	0.862
within one year	17 (24)	14 (24)	0.987
within two years	24 (33)	18 (31)	0.730
Women			
related to stroke*	6 (10)	6 (8)	0.698
within one year	20 (34)	18 (25)	0.244
within two years	25 (42)	20 (27)	0.071
0-60 years			
related to stroke*	4 (3)	2 (2)	0.523
within one year	4 (3)	2 (2)	0.523
within two years	5 (4)	3 (2)	0.619
0-80 years			
related to stroke*	10 (8)	6 (5)	0.306
within one year	21 (16)	15 (11)	0.280
within two years	27 (21)	17 (13)	0.091
Deceased related to stroke	14 (11)	12 (9)	0.665
Deceased during one-year follow-up	37 (28)	32 (24)	0.461
Deceased during two-year follow-up	49 (37)	38 (29)	0.138

* Related to first stroke: death within 3 days.
#Pearson's Chi-square test.

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3.3. Healthcare in general practice

For healthcare consumption of patients in general practice, a distinction was made between the consults and visits with the GP and/or nurse practitioner. There were no significant differences between healthcare consumption of the two cohorts with the exception of the average number of contacts with the nurse practitioner (Table 3).

Table 3: Healthcare provided by general practice during two-year follow-up

Variables	Cohort 1 (range)	Cohort 2 (range)	p-value#
Median number of contacts with GP (consults/visits) per patient per year	8.0 (0-44)	7.0 (0-36)	0.801
Median number of consults per patient per year	2.0 (0-31)	2.0 (0-30)	0.746
Median number of home visits per patient per year	2.0 (0-33)	1.0 (0-30)	0.230
Median number of contacts with nurse practitioner per patients per year	0.0	0.0 (0-17)	<0.001

\# Mann-Whitney test.

3.4. Secondary prevention

Theoretically, the LTA should lead to an increase in the number of ICPC codes in cohort 2 compared to cohort 1 (Table 4). Table 4 shows that all ICPC codes are more frequently applied in cohort 2 than in cohort 1; however, the difference is significant only for hypercholesterolemia.

Table 4: Number (%) of patients with different risk factors included in the prescription register and/or journal two years after stroke.

ICPC	Cohort 1 (%)	Cohort 2 (%)	p-value*
K85 (high blood pressure without hypertension)	3 (2.3)	8 (6.1)	0.127
K86/87 (hypertension)	54 (41.2)	63 (47.7)	0.288
T93 (hypercholesterolemia)	24 (18.3)	45 (34.1)	0.004
T90 (diabetes)	26 (19.8)	31 (23.5)	0.474
K91 (arteriosclerosis)	1 (0.8)	2 (1.5)	0.566

*Pearson's Chi-square test.

3.5. Medication

With the introduction of the new protocol more attention is paid to secondary prevention and the prescription of medication, e.g. aspirin and statins. Table 5 presents data on the number of patients who were prescribed several types of medication in the year preceding the stroke and in the following two years post stroke.

    The results show that in both cohorts significantly more cholesterol-lowering medication and antithrombotics were prescribed after stroke. Also, only in cohort 2 significantly more medication affecting the renin-angiotensin system was prescribed after stroke.

Table 5: Number of patients who were prescribed several types of medicine from one year before stroke (Before) until two years post stroke (After)

Medication	Number of patients in Cohort 1 (%)			Number of patients in Cohort 2 (%)		
	Before	After	p-value*	Before	After	p-value*
Antithrombotics	50 (38.2)	85 (64.9)	<0.001	56 (42.4)	103 (78.0)	<0.001
Diuretics	55 (33.6)	36 (27.5)	0.165	47 (35.6)	49 (37.1)	0.798
Beta-receptor blocker	35 (26.7)	46 (35.1)	0.120	49 (37.1)	48 (36.4)	0.898
Calcium channel blocker	14 (10.7)	21 (16.0)	0.116	18 (13.6)	13 (9.8)	0.339
Medication influencing renin-angiotensin system	20 (15.3)	30 (22.9)	0.243	40 (30.3)	58 (43.9)	0.022
Antidiabetics	20 (15.3)	19 (14.5)	0.964	24 (18.2)	28 (21.2)	0.536
Cholesterol-lowering medication	15 (11.5)	23 (17.6)	0.035	39 (29.5)	68 (51.5)	<0.001

* Pearson's Chi-square test.

4. DISCUSSION AND CONCLUSION

4.1. Discussion

This study examined whether the survival of stroke patients changed after the introduction of the 'Dutch Transmural Protocol TIA/CVA', and whether the number of contacts with the GP/nurse practitioner, registration of comorbidity, and prescription rate of medication increased.

The two cohorts were well matched regarding the number of patients, age, gender and comorbidity.

After introduction of the LTA there was no significant difference in survival between cohort 1 and 2. We expected survival to improve after introduction of the LTA because the GPs could use the FAST test, i.e. a checklist in which patients are sent to hospital directly after telephone contact without causing any delay [12,21]. An explanation for this result might simply be that the LTA does not lead to improved survival, despite rapid and effective patient care. Another possibility is that the situation envisaged with the LTA was not achieved, perhaps due to problems associated with the implementation of thrombolysis and stroke unit treatment [22,23].

Although survival is slightly better in cohort 2 (Fig. 1 and 2), our results show that there was no significant improvement in long-term survival after introduction of the LTA; a longer follow-up period might perhaps reveal a significant difference as both curves tend to diverge progressively over time.

The number of patient contacts in general practice was expected to increase after introduction of the LTA, because the LTA recommends GPs to aim for intensive rehabilitation and to monitor secondary prevention in stroke patients [12]. This should lead to an increase in the number of GP contacts, especially in the first year after stroke. There was a slight increase in contacts with the nurse practitioner, a nurse practitioner assists the GP in care for chronic patients [24], including stroke patients. This might be explained by the recent introduction of nurse practitioners for cardiovascular risk management in GP offices. Although there was an increase in contacts with the nurse practitioner this was not the case for the number of GP contacts and visits. A possible explanation is the establishment of GP centers, which probably means that visits by the GP in the evenings/weekends are no longer necessary [25]. Moreover, there is a tendency towards more telephone contacts and fewer home visits [26]. Another explanation is that insufficient attention is paid to rehabilitation by GPs, implying the stricter implementation of the LTA may still be beneficial. Exposure time (defined as number of days during which patients were registered in a general practice) was the same in both groups.

According to the LTA, secondary prevention in stroke patients is important, especially for the GP [12]. This should lead to an increase in the number of risk factors in cohort 2 compared to cohort 1. The data indeed showed an increase, but only the increase of

hypercholesterolemia is significant; this might be because (in 2003) treatment of stroke patients (without elevated cholesterol) with statins proved to be effective [12,27]. However, whether secondary prevention has in fact improved remains debatable. A future questionnaire study among GPs and patients might provide more insight into secondary prevention after implementation of the LTA.

Implementation of the LTA was expected to increase use of medication to treat risk factors. The increase in prescription rate of certain types of medication is not per se due to the introduction of the LTA, but also because of new insights into drug use. In both cohorts almost all medication is prescribed more frequently after stroke than before stroke. However, only for cholesterol-lowering medication and antithrombotic medication is this increase significant. The increase in use of statins is probably because they are known to be effective in stroke patients, regardless of cholesterol levels [27]. Furthermore, significantly more ACE inhibitors are prescribed after stroke in cohort 2; this might be because ACE inhibitors are known to very effective in the treatment of hypertension [28].

Overall, this study showed only minimal differences between cohort 1 and 2. A possible reason for this is that there were no major differences in the groups before introduction of the LTA. Another explanation could be that there was already a shift in the referral and treatment patterns in stroke.

This study has several limitations. The study population was selected from general practices in the northern part of the Netherlands. To be more representative, the study group should be selected from multiple general practices throughout the Netherlands.

Furthermore, this registry study and its design were not suitable to examine a causal relationship between the introduction of LTA and observed changes in primary and secondary outcomes.

In 2003 in the Netherlands a new healthcare system was introduced and (amongst other changes) required more accurate registration of data. Cohort 1 was selected before these changes and cohort 2 after these changes were introduced. Therefore, some results may be due to improved registration rather than to the influence of the LTA. However, in the present study this is accounted for by, for example, not examining the number of prescriptions written by the GP because this was hardly registered in cohort 1.

It should also be noted that registration in the RNG depends on the personal preference of the GP. The ICPC codes do not measure in absolute terms what they intend to measure. A follow-up study should not only use the dataset, but should also send questionnaires to the patients so that all details from the medical records can be verified.

4.2. Conclusion

The 'Dutch Transmural Protocol TIA/CVA' was introduced to improve survival after stroke and minimize the risk of stroke recurrence. No major change in one-year survival was found after introduction of the LTA. For the secondary outcomes, a significant increase was found in the number of patients diagnosed with of hypercholesterolemia and in prescriptions of

ACE inhibitors. Also, a slight increase was observed in the number of contacts with the nurse practitioner. However, these results may be due to the introduction of the LTA and/or to other causes.

4.3. Practice Implications

This study shows that, even after introduction of the LTA, the ideal treatment has not yet been achieved. Improvements might be made by more stringent follow-up of the LTA in general practice. Future research should focus on, e.g., using questionnaires to obtain more data on implementation of the LTA by GPs, and to what extent it is found to be effective. Also, a longer follow-up period might reveal a significant difference in survival.

REFERENCES

1. Vaartjes I (Julius Centrum), Bots ML (Julius Centrum), Poos MJJC (RIVM). Incidence and prevalence of stroke and how many people die because of stroke (article in Dutch). Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid. Bilthoven: RIVM, <http://www.nationaalkompas.nl> Nationaal Kompas Volksgezondheid\Gezondheid en ziekte\Ziekten en aandoeningen\ Hartvaatstelsel\ Beroerte, 13 december 2011.

2. Verhoeven S, Beusmans GHMI, van Bentum STB, van Binsbergen JJ, Pleumeekers HJCM, Schuling J: The practice guideline 'CVA' from the Dutch College of General Practitioners (article in Dutch). Huisarts Wet 2004, 47: 509-520.

3. Weerd de L., Rutgers WA, Groenier KH, Meer van der K.: Perceived wellbeing of patients one year post stroke in general practice - recommendations for quality aftercare. BMC Neurol 2011, 11: 42.

4. Franke CL (Atrium mc Parkstad), Vaartjes I (Julius Centrum), Eysink PED (RIVM), Bots ML (Julius Centrum). What is a stroke and what is the course? (article in Dutch) Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid. Bilthoven: RIVM, <http://www.nationaalkompas.nl> Nationaal Kompas Volksgezondheid\Gezondheid en ziekte\Ziekten en aandoeningen\ Hartvaatstelsel\ Beroerte, 13 december 2011.

5. Haacke C, Althaus A, Spottke A, Siebert U, Back T, Dodel R: Long-term outcome after stroke: evaluating health-related quality of life using utility measurements. Stroke 2006, 37: 193-198.

6. Langhorne P, Williams BO, Gilchrist W, Howie K: Do stroke units save lives? Lancet 1993, 342: 395-398.

7. Stroke Unit Trialists' Collaboration. Collaborative systematic review of the randomised trials of organised inpatient (stroke unit) care after stroke. BMJ 1997, 314: 1151-1159.

8. Stroke Unit Trialists Collaboration. How do stroke units improve patient outcomes? A collaborative systematic review of the randomized trials. Stroke 1997, 28: 2139-2144.

9. Govan L, Langhorne P, Weir CJ: Does the prevention of complications explain the survival benefit of organized inpatient (stroke unit) care?: further analysis of a systematic review. Stroke 2007, 38: 2536-2540.

10. Gorelick PB, Sacco RL, Smith DB, Alberts M, Mustone-Alexander L, Rader D et al.: Prevention of a first stroke: a review of guidelines and a multidisciplinary consensus statement from the National Stroke Association. JAMA 1999, 281: 1112-1120.

11. Limburg M, Kappelle LJ: [Structured care for stroke patients: stroke units and transmural stroke services]. Ned Tijdschr Geneeskd 1997, 141: 566-567.

12. Giesen AGM, Franke CL, Wiersma TJ, Binsbergen van JJ, Boiten J, Flikweert S et al.: Dutch Transmural Protocol transient ischaemic attack/cerebrovascular accident (article in Dutch). Huisarts Wet 2004, 47: 521-526.

13. Rutten GEHM, De Grauw WJC, Nijpels G, Goudswaard AN, Uitewaal PJM, Van der Does FEE et al. The practice guideline 'Diabetes mellitus type 2' (second revision) from the Dutch College of General Practitioners (article in Dutch). Huisarts Wet 2006, 49: 137-152.

14. Wachters-Kaufmann C, Schuling J, The H, Meyboom-de JB: Actual and desired information provision after a stroke. Patient Educ Couns 2005, 56: 211-217.

15. Weerd dL, Rutgers AWF, Groenier KH, Meer vdK: Health care in patients 1 year post-stroke in general practice: research on the utilisation of the Dutch Transmural Protocol transient ischaemic attack/cerebrovascular accident. Aust J Prim Health. 2012, 18(1): 42-9.

16. van der Veen WJ, Groenhof F. RNG registration annual report 2008. Registration Network Groningen. Department of general practice, UMCG . 2009.

17. Biermans MC, Elbers GH, Verheij RA, Jan vd, V, Zielhuis GA, Robbe PF: External validation of EPICON: a grouping system for estimating morbidity rates using electronic medical records. J Am Med Inform Assoc 2008, 15: 770-775.

18. Lamberts H, Wood M: International Classification of Primary Care. Oxford: Oxford University Press; 1987.

19. Field A: Discovering Statistics Using SPSS, Second Edition edn. SAGE Publications LTD; 2005.

20. Swinscow TDV, Campbell MJ: Statistics ar Square One. London: BMJ Books; 2002.

21. Wiersma TJ, Pleumeekers HJCM, Beusmans GHMI, Schuling J, Goudswaard AN: Summary of practice guideline 'CVA' from the Dutch College of General Practitioners. Ned Tijdschr Geneeskd 2005, 149: 2850-2856.

22. Franke CL, Stolker H, Verschoor E: Integrated care for stroke (article in Dutch) Medisch Contact 2004, 35: 1361-1364.

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23. Wimmers RH, Loor de S, ranke CL: Timepressure (article in Dutch). Medisch Contact 2005, 40: 1584-1586.

24. Houwelling ST, Raas GPM, Bilo HJG, Meybo B: Shifting of tasks is against the rules (article in Dutch). Medisch Contact 2003 2003, 43.

25. Scholten GJM: Annual report 2006. Doctors Service Groningen <http://www doktersdienstgroningen.nl> 2007.

26. Berg van den M: Workload of GPs (article in Dutch). Medisch Contact 2003, 26. http://medischcontact.artsennet.nl/nieuws-26/archief-6/tijdschriftartikel/08631/de-werkdruk-van-de-huisarts.htm.

27. Kjeldsen SE, Kristinsson A, McInnes GT, Mehlsen J, Nieminen M, O'Brien E, Ostergren J, ASCOT investigators: Prevention of coronary and stroke events with atorvastatin in hypertensive patients who have average or lower-than-average cholesterol concentrations, in the Anglo-Scandinavian Cardiac Outcomes Trial-Lipid Lowering Arm (ASCOT-LLA): a multicentre randomised controlled trial. Lancet 2003, 361(9364):1149–58.

28. Wing LM, Reid CM, Ryan P, Beilin LJ, Brown MA, Jennings GL, Johnston CI, McNeil JJ, Macdonald GJ, Marley JE, Morgan TO, West MJ, Second Australian National Blood Pressure Study Group: A comparison of outcomes with angiotensin-converting-enzyme inhibitors and diuretics for hypertension in the elderly. N Engl J Med 2003, 348(7):583–92.

HEALTH CARE IN PATIENTS 1 YEAR POST-STROKE IN GENERAL PRACTICE: RESEARCH ON THE UTILISATION OF THE DUTCH TRANSMURAL PROTOCOL TRANSIENT ISCHAEMIC ATTACK/ CEREBROVASCULAR ACCIDENT

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ABSTRACT

This study evaluates the kind of aftercare that ischaemic stroke patients receive and the extent that aftercare fulfils the criteria of the 'Dutch Transmural Protocol transient ischaemic attack/cerebrovascular accident'. Fifty-seven patients were interviewed 1 year post-stroke about secondary prevention and aftercare. Forty general practitioners (GPs) completed a questionnaire about guidance and secondary prevention (concerning medication and lifestyle advice). Most patients would like to see their GP more regularly. More aftercare was required than was planned. The use of aspirin remained the same, fewer patients used statins and more used antihypertensives. Of the 40 GPs who participated, 12% did not apply prevention. Blood pressure, glucose and cholesterol were measured in 84%, 28% and 40% of patients. All of these measures were often elevated, but treatment was not given. Lifestyle advice was offered to one-quarter of patients. Considering all of the advice given in the Dutch Protocol, several aspects can be improved in relation to secondary prevention. Too little attention is paid to giving lifestyle advice, stricter medical checkups by GPs are necessary and there is a decrease in use of preventive medication, partly because GPs monitors use of medication inadequately. The use of the Dutch Protocol in aftercare can be improved by a more detailed description of advice.

1. INTRODUCTION

Annually, 41,000 people in the Netherlands are affected by strokes (Bots and Poos 2006; Bots and van Dis 2006). The absolute lifetime risk of stroke is similar for men and women (Hollander et al 2003). Stroke is the fifth most common cause of death worldwide (88.5 deaths/100,000/year) (WHO 2004; Wardlaw et al 2009). The elderly are particularly affected by strokes. Because of future aging it is important to pay more attention to prevention and aftercare (Liang, Lew and Zivin 2008; Castilla-Guerra, del Carmen Fernández-Moreno and Alvarez-Suero 2009).

Wijk et al. (2005) suggested that in the 10 years after a stroke ~54% of patients experience at least one vascular event. Comorbidities such as vascular diseases and diabetes increase the risk of stroke recurrence (Wilkinson et al. 1997; Kirshner 2008). Secondary prevention consists of advice about lifestyle and preventive medication. Lifestyle advice for preventing strokes includes encouraging patients to quit smoking and avoid environmental smoke, discouraging heavy alcohol consumption (maximum of one drink per day for women and two drinks per day for men), weight management (body mass index between 18.5 and 24.9 kg m–2) and encouraging patients to engage in physical activity (>30 min of moderate exercise on most days). Medication is administered to treat hypertension, hypercholesterolaemia and hyperglycaemia (Kirshner 2008). All patients with a history of ischaemic stroke are treated with a platelet inhibitor. Oral anticoagulants are started when patients have atrial fibrillation (de Keyser 2006). Wilkinson et al. (1997) found that after 1 year, 61% of stroke patients use aspirin, 13% warfarin and 56% antihypertensives, 85% reported drinking less than eight units of alcohol each week and the incidence of smoking decreased from 73% at the time of stroke to 30% at the 5-year follow up.

There is little research about the use of health care for stroke patients. One study of the long-term follow-up of stroke patients reports that all patients visited their general practitioner (GP) and that 39% of them received physiotherapy, 13% required speech therapy, 6% received occupational therapy, 29% used district nursing services, 24% attended a day centre, 22% received local authority home help and 6% had private home help. Patients require more health care when they are more disabled, are female or when they do not have a carer (Wilkinson et al. 1997).

In the Netherlands, a 'Dutch Transmural Protocol transient ischaemic attack (TIA)/ cerebrovascular accident (CVA)' was written to assist the continuity of health care in stroke patients. The protocol contains agreements about the way to diagnose strokes and about treatment and follow-up after stroke (Giesen et al. 2004). This paper reports on the extent to which aftercare fulfils the criteria of this protocol.

The protocol advises that decisions about aftercare are agreed between the local hospital and GPs. In general, when a GP suspects an ischaemic stroke, treatment with a platelet inhibitor or a coumarin derivative is started the same day and patients are

admitted to a hospital. The protocol states that the neurologist is responsible for the remaining necessary medication and for starting rehabilitation and secondary prevention in hospital. After discharge from hospital, GPs continue this treatment. Antihypertensive medication is given to patients with hypertension 2 weeks after the patient is stabilised. The protocol advises the prescription of statins to patients with a total cholesterol of 3.5 mmol L-1 or higher (Giesen et al. 2004). For treatment of high glucose levels, the Dutch College of General Practitioners (NHG) Protocol 'Diabetes mellitus type 2' must be followed (Rutten et al. 2006). Health education should be provided by a neurologist, but the GP also should discuss risk factors, lifestyle changes and the use of medication with the patient. This is important because patients regard their GP and neurologist as the main information providers (Giesen et al. 2004; Wachters-Kaufmann et al. 2005).

GPs are responsible for assisting in coordinating rehabilitation and aftercare needs of patients at home. The neurologist should provide a handover note about treatment advice and a risk profile within a week of discharge from hospital to ensure quality aftercare is possible (Giesen et al. 2004).

The purpose of this study is to identify what kind of aftercare and rehabilitation patients with ischaemic strokes receive. In particular, to evaluate to what extent aftercare fulfils the criteria of the 'Dutch Transmural Protocol TIA/CVA'.

2. METHODS

2.1. Study design

The study included all the ischaemic stroke patients admitted to the Department of Neurology, Martini Hospital Groningen, between November 2006 and October 2007. This comprised 244 patients. Patients younger than 65 years were excluded because of their different profile in functioning and social life. Patients discharged to places other than their home were excluded because the GP is not responsible for their medical care in this situation. The ethics committees of the Martini Hospital Groningen approved the study. Informed consent was obtained (written and verbal) from all patients.

After informed consent, clinical details such as stroke severity, history, comorbidity, risk factors before stroke, medication and demographic information were obtained from medical records.

All of the patients were visited by a medical practitioner 1-year post-stroke. The patients were interviewed and questionnaires were administered. Their GPs were asked to complete a questionnaire about secondary prevention measures for their patients.

2.2. Measures at 12 months

Patients were asked about changes in habits such as smoking, alcohol consumption and physical exercise after their strokes. We also asked about the medication used, the frequency of contact with their GPs, nurse practitioners or assistants, and the reason for this contact. In addition, we asked if and how many times they had had contact with a doctor from the hospital and for what reason. We also asked about rehabilitation; specifically, if they had had any physiotherapy, speech therapy, occupational therapy, home help, day centre or admittance to hospital, and how many times.

GPs were asked to complete a questionnaire (mostly multiple choice) about guidance and secondary prevention for their patients. The questionnaire is provided in Fig. 1.

Figure 1. Questionnaire for general practitioners (GPs) about the aftercare and rehabilitation of patients after ischaemic stroke.

Questionnaire about provided secondary prevention and aftercare in your stroke patient

Did you have contact with your patient the former year (between discharge from hospital and now)?
☐ Yes
☐ No

If yes, how many times?
☐ 1-2 times
☐ 3-5 times
☐ 6-10 times
☐ >10 times

Why did you have contact?
☐ Secondary prevention after stroke
☐ Because of the rehabilitation after stroke
☐ Discomfort or complaints related to stroke
☐ Complaints unrelated to stroke

What kind of secondary prevention did you apply?
☐ Advice about smoking
☐ Advice about physical activity
☐ Advice about losing weight
☐ Advice about diet
☐ Checking weight
   If yes, what was the patients weight measured last time? ...... kg (date: ...-...-....)
☐ Checking blood pressure
   If yes, what was the blood pressure measured last time? .../... mmHg (date: ...-...-....)
☐ Checking Cholesterol
   If yes, what was the cholesterol measured last time? ... total ... LDL ... HDL (date: ...-...-....)
☐ Checking Glucose/HbA1c
   If yes, what was the patients Glucose/HbA1c measured last time? ... Glu ... HbA1c) (date: ...-...-....)
☐ Prescribe lipid-reducing drugs
☐ Prescribe antihypertensives
☐ Prescribe antidiabetics

The 'Dutch Protocol TIA/CVA' states that the GP is coordinating the rehabilitation of the patient when the patient is discharged from hospital. What kind of rehabilitation did you arrange for your patient?
☐ My patient didn't need any rehabilitation.
☐ I send my patient to a physiotherapist.
☐ I send my patient to a speech therapist.
☐ I send my patient to an occupational therapist.
☐ I arranged local authority home help or district nursing service for my patient.
☐ Rehabilitation was arranged by the neurologist.
☐ Rehabilitation was arranged by the rehabilitation doctor.

2.3. Analysis
SPSS 15 for Windows (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Since this is an exploratory study no formal statistical testing was done. Only descriptive statistics are reported.

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3. RESULTS

3.1. Baseline characteristics

Of the 244 patients diagnosed with ischaemic strokes, 57 interviews were conducted. Fig. 2 is a flow chart for the selection of patients for inclusion in the present study.

Figure 2. Flow chart of selection of patients
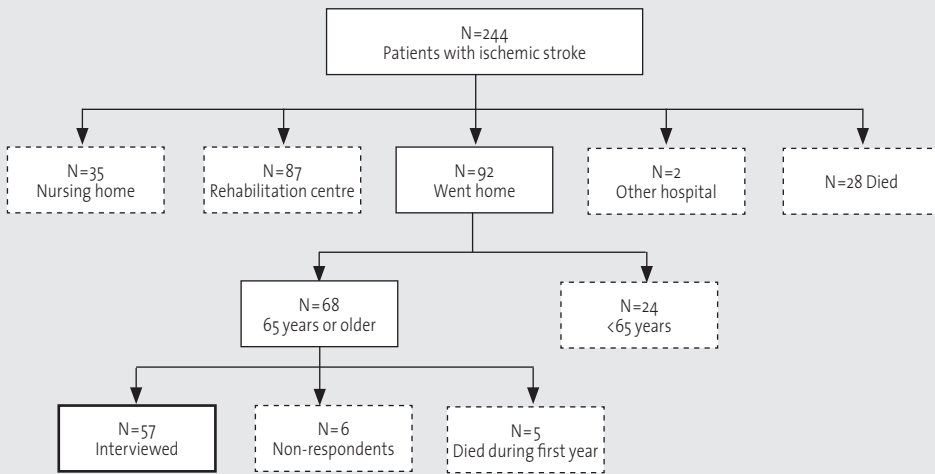
The detailed baseline characteristics of the study population are found in Table 1.

Table 1: Baseline characteristics of the sample population in a study of the aftercare and rehabilitation of patients after ischaemic stroke

Variables	Number (%)
Patients included	57
Gender	
- *Men*	25 (44%)
- *Women*	32 (56%)
Age, average (range)	77 (65-91)
Living situation	
- *Living alone*	29 (51%)
- *Living with a partner*	28 (49%)
Type of stroke	
- *Lacunar Circulation Infarct*	24 (42%)
- *Partial Anterior Circulation Infarct*	21 (37%)
- *Posterior Circulation Infarct*	8 (14%)
- *Total Anterior Circulation Infarct*	0 (0%)
- *Unknown*	4 (7%)
Brain hemisphere	
- *Left side*	35 (61%)
- *Right side*	17 (30%)
- *Unknown*	5 (9%)
NIHSS, average (range)	3 (0-20)
Risk factors present before stroke	
- *No risk factors*	11 (19%)
- *Hypertension*	29 (51%)
- *Hypercholesterolemia*	11 (19%)
- *Diabetes*	12 (21%)
- *Cardiac embolus*	10 (18%)
- *Smoking*	16 (28%)
History	
- *No history*	6 (11%)
- *Ischemic heart disease*	14 (25%)
- *Stroke / TIA*	14 (25%)
- *Atrial fibrillation*	5 (9%)
- *Heart failure*	3 (5%)
- *COPD*	10 (18%)
- *Depression*	2 (4%)
- *Abuse of alcohol*	3 (5%)

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3.2. Medication at discharge from hospital

Table 2 shows the use of medication at discharge from hospital. All patients received some form of blood-thinning medication for secondary prevention. In total, 81% of patients used aspirin in combination with a second platelet aggregation inhibitor (dipyridamole, clopidogrel).

At discharge from hospital, 74% of patients used cholesterol-lowering agents and 84% of patients used one or more antihypertensive medications. The most common medicines used are β-receptor blockers, thiazide diuretics and angiotensin-converting enzyme inhibitors.

Table 2: Use of medication (%) at discharge from hospital and after 1 year since suffering a stroke

Medication	% use at discharge	% use after one year
Blood-thinning medication		
- Aspirin	30	29
- Aspirin & dipyridamole	49	52
- Acenocoumarol	14	14
- Aspirin & clopidogrel	2	0
- Dipyridamole & clopidogrel	2	0
- Clopidogrel	2	2
- No medication	0	2
Cholesterol-lowering medication		
- Simvastatin	58	54
- Another statin	14	15
- Gemfibrozil	2	0
- No medication	26	31
Antihypertensives		
- Beta-receptor blocker	40	35
- Thiazide diuretic	39	46
- ACE-inhibitor	32	30
- Calcium channel blocker	18	20
- Loop diuretic	14	13
- Angiotensin II receptor antagonist	12	13
- Combination preparation	9	13
- No medication	16	13
Remaining medication		
- Proton pump inhibitor	33	35
- H2-receptoe antagonist	4	4
- Insulin	9	9
- Oral glucose lowering medication	11	11
- Beta2-adrenergic agonist	13	20
- Inhalation corticosteroid	7	6
- Combination of the former two	13	11
- Tricyclic antidepressant	6	4
- Serotonin reuptake inhibitor	6	7
- Benzodiazepines	11	13
- Antipsychotics	4	6
- Nitroglycerin	11	11
- Nitrate	7	7
- Calcium	11	13
- Calcium regulating medication	13	13

3.3. Medication one year post stroke

The use of blood-thinning medication did not change much. After 1 year, 81% continued to use aspirin (alone or in combination with other blood-thinning medication). The exact percentages for the various medications are found in Table 2.

After 1 year, slightly fewer patients used cholesterol-lowering medication (69% rather than 74%) and slightly more patients used antihypertensive drugs (87% rather than 84%).

3.4. Lifestyle advice

One-year post-stroke, 57% of the patients indicated doing less physical exercise due to restrictions because of the stroke and 7% had had to cease all physical activities. Most patients tried to keep active with the help of a physiotherapist or using a home trainer. Only 4% of patients reported more physical exercise after their stroke and 10% of patients stated that they were following a low-fat diet post-stroke.

Only a few patients changed their smoking and alcohol consumption; 4% quit smoking and 5% reduced their smoking, but 4% smoked more. As for alcohol, 13% stopped drinking alcohol and 4% reduced their consumption.

3.5. Healthcare

In the year since their stroke, 7% of patients said they had had no contact with their GP. Of the patients who visited their GP, most visited 3–5 times a year. Many patients wanted their GP to visit them more often.

The reasons for visiting GPs were: post-stroke disabilities (6%); complaints unrelated to stroke (42%); questions about medication (18%); and questions about blood pressure (34%). Blood pressure had not been measured in the year since their stroke for 20% of patients.

Table 3 shows the remaining types of aftercare used by patients; 68% visited a neurologist in the first year post-stroke and 18% were readmitted to a hospital. In total, 7% had recurrent strokes in the year after their first stroke.

According to the hospital discharge papers, 55% of the patients were functioning so well that rehabilitation was not necessary. Only 39% of the patients did not actually receive rehabilitation. It seems that GPs started therapy in several cases. Concerning community rehabilitation, 46% of the patients had physiotherapy in the year preceding the interview, 14% had occupational therapy and 16% had speech therapy (Table 3).

The hospital registered 32% of the patients for district nursing services. In reality, 20% received assistance from district nursing services. Local authority home help was received by 27% of patients. This was more than was planned in hospital (namely, 12% of patients). A small group had already had district nursing service or local authority home help before their stroke (Table 3).

Table 3: Aftercare of patients in the year following a stroke

Variables	Percentage of patients
Visited a neurologist	68
Visited another doctor	61
- *Internist*	11
- *Surgeon*	3
- *Cardiologist*	11
- *Pulmonologist*	7
- *Other*	24
Hospital admission	18
Recurrent stroke	7
No revalidation necessary according to the hospital	55
Patients who eventually didn't get revalidation	39
Physiotherapy	46
- *1-2 times*	12
- *3-5 times*	27
- *6-10 times*	15
- *>10 times*	46
Occupational therapy	14
- *1-2 times*	75
- *6-10 times*	25
Speech therapy	16
- *1-2 times*	45
- *3-5 times*	11
- *6-10 times*	22
- *>10 times*	22
District nursing services necessary according to the hospital	32
Patients who eventually got district nursing services	20
District nursing services	
- *More*	16
- *Less*	16
- *The same*	4
Patients who got local authority home help	27
Authority home help	
- *More*	16
- *Less*	5
- *The same*	12

3.6. Guidance and secondary prevention by the GP

In total, 70% of GPs (n = 40) completed the questionnaire about aftercare and secondary prevention.

According to the GPs, 98% of them had had contact with their stroke patients in the preceding year. So, more contact was reported by GPs than by patients. Table 4 shows how many times contact was reported.

The reasons for contact were diverse. According to GPs, 30% concerned rehabilitation, 23% disabilities after stroke and 77% other complaints. This is quite different from the information patients provided.

Table 4: Contacts between the GP and patient in the former year

	According to the GPs	According to the patients
1-2 times	7%	26%
3-5 times	33%	41%
6-10 times	38%	22%
>10 times	21%	11%

Steps for secondary prevention were not taken by 12% of GPs. Most GPs measured blood pressure. Measuring glucose levels and cholesterol was done less frequently. Lifestyle advice was given to a quarter of patients (Table 5).

Table 5: Secondary prevention by and according to the GP

Secondary prevention	Percentage of GPs
No specific prevention	12
Advice about smoking	16
Advice about physical exercise	30
Advice about weight	12
Advice diet	23
Monitoring blood pressure	84
Monitoring cholesterol	28
Monitoring glucose/HbA1c	40
Monitoring weight	7
Prescription of statin	28
Prescription of antihypertensives	40
Prescription of glucose lowering medication	14

Blood pressure was measured by 84% of GPs. However, 39% of patients continued to have hypertension (systolic >140 mmHg or diastolic >90 mmHg). Cholesterol levels were measured by 28% of GPs. Although 92% of patients had a total cholesterol above 3.5 mmol L–1, not everyone used statins. The mean glucose level in this group was 6.5 mmol L–1 (normal <6 mmol L–1) and HbA1c 6.6% (normal <7%); 59% had elevated glucose levels. In total, 63% of GPs did not arrange rehabilitation, while 9% arranged physiotherapy, 2% occupational therapy, 7% speech therapy and 7% home help. Neurologists arranged 16% of the rehabilitation and a rehabilitation doctor arranged 9%. Despite the hospital records containing no indication for rehabilitation, 37% of patients received some form of rehabilitation. GPs indicated that they did not have much experience with rehabilitation because neurologists or rehabilitation specialists take care of this.

chapter 3

4. DISCUSSION AND CONCLUSION

4.1. Discussion

The purpose of this study was to identify what kind of aftercare and rehabilitation patients with ischaemic strokes receive in primary care. In particular, to evaluate to what extent aftercare fulfils the criteria of the 'Dutch Transmural Protocol TIA/CVA'.

4.1.1. Secondary prevention

In total, 12% of GPs reported that they did not initiate any specific form of secondary prevention care. This is probably due to the assumption that specialists would take care of this, or because they assumed that patients were too old to change their risk profile, and perhaps because the GPs were unfamiliar with the protocol. Research indicates, however, that secondary prevention in older stroke patients is as important as in younger patients (Castilla-Guerra et al. 2009).

Secondary prevention consists of lifestyle advice to quit smoking, stop heavy alcohol consumption, manage weight and engage in physical activity (Kirshner 2008). Although 20% of patients smoked at the time of discharge from hospital, 16% received advice about smoking. A little more advice was given about physical activity (30%) and diet (23%). However, all stroke patients should receive lifestyle advice (Giesen et al. 2004; Dutch Institute for Healthcare Improvement, 2007). This deficit may possibly be partly overcome by the nurse practitioner. From the interviews with patients it became clear that they were not very aware of the risk factors for strokes. Other studies show that awareness of stroke risk factors is poor in people at highest risk (Travis et al. 2003; Choi-Kwon et al. 2005). In addition, patients often want to have more information than doctors think they need. It is important to individualise the information provided and it is also important to stimulate patients to actively seek information to supplement the information received from professionals (Travis et al. 2003; Choi-Kwon et al. 2005; Wachters-Kaufmann et al. 2005).

The 'Dutch Transmural Protocol' claims that control of blood pressure must be part of secondary prevention after stroke. Blood pressure was checked in 84% of the patients and 39% still had hypertension. Cholesterol was checked for only 28%: of those checked, 92% had elevated total cholesterol levels. The Dutch 'Diabetes mellitus type 2' protocol is used for glucose regulation (Giesen et al. 2004; Rutten et al. 2006). Glucose was measured in 40% of patients. Of those, 59% had elevated glucose levels. The 'Cardiovascular risk management' protocol suggests that annual therapy evaluation is necessary post-stroke and that the follow-up of changes in risk profile is necessary. Patients with cardiovascular disease have elevated diabetes risk, so it is recommended that glucose levels are measured every 3–5 years (Dutch Institute for Healthcare Improvement 2007).

4.1.2. Use of medication

At discharge from hospital and after 1 year, 81% of patients used aspirin. Of these, 52% used aspirin in combination with dipyridamole and 29% used only aspirin. One-year post-stroke, 18% of patients used no aspirin or dipyridamole, and 14% of patients used acenocoumarol. The risk of further stroke decreases by 13–22% when patients use aspirin daily (Stalenhoef 2006). Use of aspirin is recommended to every stroke patient. If there are any contra-indications, clopidogrel can be used. Patients with atrial fibrillation should use acenocoumarol (Giesen et al. 2004). Research indicates that when dipyridamole or clopidogrel is added to aspirin, it will result in a relative risk reduction of 16% for vascular death, stroke or a heart attack (Dutch Institute for Healthcare Improvement 2000). This combination therapy is not yet recommended in the 'Transmural Protocol' because of ongoing studies of this therapy (Giesen et al. 2004). All in all, some minor aspects of blood-thinning treatment can be adjusted, such as adding dipyridamole to aspirin or adding aspirin when patients stop using acenocoumarol. To better understand the reasons why doctors sometimes do not prescribe these drugs, a second study should be performed to determine the reasons for prescribing or stopping certain medication.

Another important group of medications are the lipid-reducing drugs. At the time of discharge from hospital, 72% of patients used a statin compared with 69% 1-year later. The decrease is possibly due to negative television publicity about statins. Some patients (31%) do not use any statins at all. The 'Transmural Protocol' recommends that every patient with a total cholesterol level above 3.5 mmol L–1 should use a statin. In practice, this means everyone should use it unless life expectancy based on comorbidity is minimal (Giesen et al. 2004). The 'Heart protection study' showed that use of statins lowers the risk of cardiovascular disease regardless of the level of cholesterol. In this study there was an absolute risk reduction of 5–6% with respect to fatal and non-fatal cardiovascular disease through statin use (Stalenhoef 2006; Dutch Institute for Healthcare Improvement 2007). There is also evidence that treatment with statins, even in elderly patients aged between 70 and 80, will reduce the risk of cardiovascular disease (Stalenhoef 2006; Dutch Institute for Healthcare Improvement 2007). In the present study, patients sometimes stopped medication on their own or were never prescribed a statin. It is important that medical practitioners pay more attention to this and convince patients of the benefits of statins.

The use of antihypertensives is another important aspect post-stroke. A reduction of 5–6 mmHg in diastolic blood pressure or 10 mmHg in systolic pressure results in a 24% reduction in the chances of stroke recurrence (Stalenhoef 2006). In our study group, 87% of patients used antihypertensive drugs. This is more than at discharge from hospital. Nevertheless, 13% were on no antihypertensive medication at all. Considering the fact that 16% of GPs did not check blood pressure and that 39% of those patients checked had elevated blood pressure, it can be concluded that stricter and more effective control is desirable. To monitor the prescribing behaviour of GPs better, a more comprehensive study should be performed.

4.1.3. Aftercare

GPs report patient contact more frequently than their patients. This discrepancy is probably due to a different perception of the term 'contact'. GPs possibly take telephone contact into account, while patients only count actual visits. This discrepancy can also be explained by the fact that not all GPs participated. It is possible that only the non-participant GPs had no contact with their patients. Most contacts between doctor and patient concerned complaints unrelated to stroke or to the measurement of blood pressure.

Overall, 7% of patients had another TIA or stroke over the study period. In a study by Appelros et al. (2003), 9% of the survivors experienced another stroke within 1 year. This percentage is very similar to our study. The number of patients with stroke recurrence is too small to investigate whether there is a relationship between the quality of aftercare and the occurrence of a second stroke.

Many patients (46%) received physiotherapy. Speech therapy (16%) and occupational therapy (14%) were less frequently received. The need for aftercare is sometimes underestimated during hospitalisation, possibly because disabilities only become more obvious at home. It is important to attend to this because the early initiation of rehabilitation is related to improved functional outcome (Cifu and Stewart 1999). Previous research shows that physiotherapy based on different approaches has a greater impact on functional independence than no therapy at all (Pollock et al. 2007; Pollock et al. 2008). Fewer patients obtained district nursing services than planned. Many patients responded that it was unnecessary because they could take care of themselves. Local authority home help was used more frequently, because some patients experienced more problems at home than they had expected.

4.1.4. 'Dutch Transmural Protocol TIA/CVA'

The protocol states that a neurologist should start rehabilitation and take measures for secondary prevention. Important information is provided by both neurologists and GPs. When patients return to their homes, neurologists must provide a risk profile and treatment advice within a short period of time. GPs then should handle any follow up (Giesen et al. 2004).

In the present study, the neurologists indeed delivered risk profiles with a short summary of the disease course and the treatment process. Both the neurologists and the GPs should pay more attention to the use of statins and antihypertensives by their patients. Furthermore, we noted that GPs overlooked secondary prevention care for a large group of patients. Therefore, more attention should be paid to secondary prevention and information about patient risk factors.

Our study has several limitations. We studied all patients who went home immediately after discharge from hospital. However, many patients first go to a rehabilitation centre or nursing home to rehabilitate. These patients – when discharged from the rehabilitation

ward – also need GP care and probably need more guidance than the patients in our study. Therefore, our results cannot be generalised to all stroke patients living at home.

The study group is relatively small because of our selection criteria. To make stronger generalisations, a larger group of patients from multiple hospitals and GPs should be interviewed.

Patients who refused to participate in our study were not considered. These patients told us that they were doing fine and that a visit was not necessary.

Furthermore, it should be noted that not all the GPs completed our questionnaire. It is possible that GPs who do not pay attention to secondary prevention did not reply to the questionnaire. In future research, we should ask for checkup frequency and the outcomes of any checkup rather than 'whether' a checkup was performed.

A strength of our study is the data-gathering method. We visited patients at home so that they could fill out the questionnaires with a researcher. A lot of extra information was obtained through conversation. Furthermore, we included responses from the patients' GPs in our study to see if there were any inconsistencies. Patients sometimes have different views on health care than professionals. Another strength is the fact that the same researcher visited all of the patients. This avoids the risk of different interpretations of the results.

4.2. Conclusion

The purpose of this study was to identify what kind of aftercare and rehabilitation ischaemic stroke patients receive on their return home. We also evaluated to what extent aftercare fulfils the criteria of the 'Dutch Transmural Protocol TIA/CVA'.

Several aspects can be improved in relation to secondary prevention. Risk factors and the need for lifestyle changes are not always clear to patients. The protocol recommends that blood pressure, cholesterol and glucose should be checked regularly. This is not implemented by all GPs. Stricter agreements about checkups are necessary. In terms of medication, many patients used the recommended drugs. However, it is advisable to also monitor the use of medication more effectively and to give patients more explanation of medicine use.

In terms of aftercare, it appears that 7% of the patients did not see their GP after their stroke. There was a group of patients who did not have contact with a medical specialist. Extra attention from the GP should be paid to visit these patients post-stroke.

Many patients received physiotherapy and residential home care. Only occasionally did GPs arrange additional therapy. The need for aftercare seems to be underestimated.

The 'Dutch Transmural Protocol TIA/CVA' is reasonably well respected. It is important that particular attention is paid to secondary prevention. This mainly concerns information and advice about risk factors and regular monitoring of blood pressure and cholesterol levels. It would be helpful if this was stated in greater detail in the 'Dutch Transmural Protocol'.

REFERENCES

Appelros P, Nydevik I, Viitanen M (2003). Poor outcome after first-ever stroke: predictors for death, dependency, and recurrent stroke within the first year. Stroke 34:122-26.

Bots ML (Julius Centrum), Poos MJJC (RIVM) (2006). Hoe vaak komt een beroerte voor en hoeveel mensen sterven eraan? Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid Bilthoven: RIVM, <http://www.nationaalkompas.nl> Gezondheid en ziekte\ Ziekten en aandoeningen\ Hartvaatstelsel\ Beroerte.

Bots ML, van Dis SJ (2006). Factsheet Beroerte. Uitgave Nederlandse Hartstichting.

Castilla-Guerra L, del Carmen Fernández-Moreno M, Álvarez-Suero J (2009). Secondary stroke prevention in the elderly: New evidence in hypertension and hyperlipidemia. Eur J Intern Med. 20: 586-90.

Choi-Kwon S, Lee SK, Park HA, Kwon SU, Ahn JS, Kim JS (2005). What stroke patients want to know and what medical professionals think they should know about stroke: Korean perspectives. Patient Educ Couns. 56:85-92.

Cifu DX, Stewart DG (1999). Factors Affecting Functional Outcome After Stroke: A Critical Review of Rehabilitation Interventions. Arch Phys Med Rehabil. 80(5):S35-9.

Dutch Institute for Healthcare Improvement (2000). Richtlijn Beroerte. (Utrecht)

Dutch Institute for Healthcare Improvement (2007). Dutch guideline Cardiovascular risk management (Utrecht). Available at http://www.cbo.nl/thema/Richtlijnen/Overzicht-richtlijnen/ Cardiovasculaireaandoening/ [Verified August 2011]

Giesen AGM, Franke CL, Wiersma Tj, Van Binsbergen JJ, Boiten J, Flikweert S, Van der Kruijk RA, Luijckx GJR, Pleumeekers HCJM, Verhoeven S, Vriezen JA (2004). Landelijke Transmurale Afspraak TIA/CVA. Huisarts Wet 47:521-6.

Hollander M, Koudstaal PJ, Bots ML, Grobbee DE, Hofman A, Breteler MM (2003). Incidence, risk, and case fatality of first ever stroke in the elderly population. The Rotterdam Study. J Neurol Neurosurg Psychiatry 74:317-21.

Keyser de J (2006). Therapieklapper UMCG, University Medical Center Groningen, Groningen.

Kirshner HS (2008). Therapeutic interventions for prevention of recurrent ischemic stroke. The American journal of managed care 15: 212-26.

Liang BA, Lew R, Zivin JA (2008). Review of tissue plasminogen activator, ischemic stroke, and potential legal issues. Archives of neurology 65: 1429-33.

Pollock A, Baer G, Langhorne P, Pomeroy V (2007). Physiotherapy treatment approaches for the recovery of postural control and lower limb function following stroke: a systematic review. Clin Rehabil 21:395-410.

Pollock A, Baer GD, Langhorne P, Pomeroy VM (2008) Physiotherapy treatment approaches for stroke. Stroke 39, 519–520.

Rutten GEHM, De Grauw WJC, Nijpels G, Goudswaard AN, Uitewaal PJM, Van der Does FEE, Heine RJ, Van Ballegooie E, Verduijn MM, Bouma M (2006). NHG-Standaard Diabetes mellitus type 2. Huisarts Wet 49:137-52.

Stalenhoef AF (2006). [Secondary prevention of recurrent stroke by lowering cholesterol levels and blood pressure]. Ned Tijdschr Geneeskd 150:2127-30.

Travis LH, Flemming KD, Brown RD Jr, Meissner I, McClelland RL, Weigand SD (2003). Awareness of stroke risk factors, symptoms, and treatment is poor in people at highest risk. J Stroke Cerebrovasc Dis. 12:221-7.

Wachters-Kaufmann C, Schuling J, The H, Meyboom-de Jong B (2005). Actual and desired information provision after a stroke. Patient Educ Couns. 56:211-7.

Wardlaw JM, Murray V, Berge E, del Zoppo GJ (2009). Thrombolysis for acute ischaemic stroke (Review). Cochrane Database of Systematic Reviews 3: CD000213

van Wijk I, Kappelle LJ, van Gijn J, Koudstaal PJ, Franke CL, Vermeulen M, Gorter JW, Algra A and for the LiLAC study group (2005). Long term survival and vascular event risk after transient ischaemic attack or minor ischaemic stroke: a cohort study, Lancet 365, pp. 2098–2104.

Wilkinson PR, Wolfe CDA, Warburton FG, Rudd AG, Howard RS, Ross-Russell RW, Beech RR (1997). A long-term follow-up of stroke patients. Stroke 28: 507-12.

World Health Organization (2004) The world health report 2004 – changing history. Annex Table 2 Deaths by cause, sex and mortality stratum in WHO regions, estimates for 2002. Available at http://www.who.int/whr/2004/en/report04_en.pdf [Verified July 2010]

chapter 3

PERCEIVED WELL BEING OF PATIENTS ONE YEAR POST STROKE IN GENERAL PRACTICE - RECOMMENDATIONS FOR QUALITY AFTERCARE

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ABSTRACT

Background

Annually, 41,000 people in the Netherlands have strokes. This has multiple physical and psychosocial consequences. Most patients return home after discharge from hospital. Quality aftercare by general practitioners is important to support patients at home. The purpose of this study is to examine the wellbeing of patients who returned home immediately after discharge from hospital, one year post stroke, in comparison with the general Dutch population of the same age and to determine factors that could influence wellbeing.

Methods

All the stroke patients from the Department of Neurology, Martini Hospital Groningen in the period November 2006 to October 2007 were included. People aged under 65 years or with haemorrhaging were excluded. All the patients (N=57) were interviewed at home using the following questionnaires: Barthel Index, SF-36, HADS, CSI and a questionnaire about their way of life.

Results

31% of the patients in this study experienced a decrease in functional status after one year. Nevertheless, there was no significant difference between the median Barthel Index value at discharge from hospital and one year post stroke. ADL independence correlated with a better quality of life. The health-related quality of life was high. Stroke patients have almost the same quality of life as the 'average' Dutch elderly population. Where patients can no longer fully participate in society, their perceived quality of life is also lower. In this study there is an indication of a high prevalence of depression and anxiety disorders in stroke patients. This negatively affects the quality of life a year after stroke. Although caregiver strain was low for the partners of stroke patients, a reduced quality of life is correlated to greater burden.

Conclusions

This study provides valuable insight into the wellbeing of patients living at home one year post stroke. Physical functioning and quality of life are comparable to the general population of the same age, but improvements in mental functioning can be envisaged. In addition, more attention should be paid to maintaining the patients' activities. The wellbeing of these stroke patients could be increased further if greater attention is paid to these aspects of life. This seems to be applicable to general practice.

BACKGROUND

About 41,000 people in the Netherlands are affected by strokes each year [1,2]. Men and women have similar absolute lifetime stroke risks [3]. 25% of all patients die in the first year after a stroke [4]. Mean age at onset is 70 years in men and 75 years in women [5].

Strokes affect patients' lives in many different ways, not only physically but also through a range of emotional, psychic, cognitive and social consequences. The seriousness of post-stroke physical and mental impairments influences quality of life. As stroke mortality declines, more patients have to live with multiple handicaps and impairments. Therefore, improving the quality of life and paying greater attention to rehabilitation is increasingly important [6-8].

The post-stroke period can be divided into three phases, namely the acute phase, the rehabilitation phase and the chronic phase. It is important that these phases be distinguished because they differ in the treatment and support of patients. This study concerns the chronic post-stroke phase, which starts approximately half a year after a stroke. This phase involves acceptance and coping with persistent disabilities [9].

Most patients return home after discharge from hospital. After discharge, patients in the Netherlands must visit their general practitioner (GP) when they experience physical and psychical discomfort. GPs can assist patients with coping with disabilities and psychic problems, even long after the stroke. Furthermore, GPs handle secondary prevention [10]. Accordingly, it is important for GPs to know the primary care outcomes and what makes a good prognosis long after a stroke [7,8]. Only in this way can GPs assist with improving physical and psychical functioning and quality of life.

Little is known about the outcomes for Dutch patients for longer periods post stroke. Most studies are of outcomes in the acute or rehabilitation phase [11]. Therefore, it is important to determine the wellbeing of patients in the chronic phase and to define which factors can improve their quality of life.

As little is known about late physical and psychical consequences of ischemic stroke in primary care patients in the Netherlands, it is hard to decide whether patients in the chronic phase receive quality aftercare. It is logical that physical and psychical stroke outcomes should be related to quality of life. Therefore, to improve quality of life, knowledge of outcomes is important. Only then can future GP interventions be focused on improving quality of life. The purpose of this study is to examine the wellbeing of patients one year post stroke who returned to their home immediately after discharge from hospital and to determine factors that can influence wellbeing. Health-related quality of life is compared to the health-related quality of life of the general Dutch population of the same age.

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PATIENTS AND METHODS

Study design

The study includes all the ischemic stroke patients admitted to the Department of Neurology, Martini Hospital Groningen, between November 2006 and October 2007. A total of 244 patients were included. The exclusion criteria for patients were being under 65 years or moving on to a nursing home/rehabilitation centre/other hospital department after being discharged from hospital. People already living in a retirement home before their stroke were included in the study. The MEC (medical ethical committees) of the Martini Hospital has approved this study (17-01-2008). Informed consent was obtained from all patients.

After informed consent, clinical details including stroke severity, history, comorbidity, risk factors (present before stroke), use of medication and demographic information were obtained from the medical records. Stroke severity was determined by the National Institute of Health Stroke Scale (NIHSS) examination. The comorbidity, history and risk factors recorded were hypertension, prior myocardial infarction, prior transient ischemic attack (TIA) or strokes, diabetes, hypercholesterolemia, atrial fibrillation, cognitive impairment, prior depression or anxiety disorder and smoking. The demographic information collected was age, gender and social status.

One year post stroke (January 2008 to October 2008) all the patients were visited at home by one medical practitioner. Patients were interviewed in person by a trained medical practitioner and standardized questionnaires were administered.

Measures at 12 months

The Barthel Index (BI) was used to assess disability in our patients. The BI measures independence in daily living activities and yields a score ranging from 0 (functionally dependent) to 20–21 (functionally independent). In this questionnaire patients are given three points for eating independently, rather than two points. The sensitivity and reliability of the BI are high for stroke patients [12-14].

To measure health-related quality of life (HRQOL) we used the Short Form 36 (SF-36). The SF-36 consists of 36 questions and comprises 8 health scales (physical function [FF], role limitations – physical [Rlf], social functioning [SF], role limitations – emotional [Rle], bodily pain [BP], general health [GH], vitality [Vit] and mental health [MH]). The original 0–100 scoring algorithm (ranging from 0 [poor HRQOL] to 100 [good HRQOL]) was used based on the summated ratings method. The SF-36 is a reliable and valid measure for determining HRQOL in stroke patients [15-20]. The HRQOL in this study was compared to the HRQOL of the Dutch elderly population [16]. To identify the possible and probable presence of depression and anxiety disorders in our study the Hospital Anxiety and Depression Scale (HADS) was used. The HADS is a 14-item scale divided into depression and anxiety subscales. The possible scores for depression or anxiety range from 0 to 21. A score of 8 to

10 means possible anxiety disorder or depression and a score of 11 or higher indicates the probable presence of a mood disorder [21,22].

Caregiver strain was assessed with the Caregiver Strain Index (CSI). This 13-item questionnaire is a valid instrument for determining the burden on the spouses of stroke patients [23,24].

In addition, patients were asked (multiple choice) if they had changed their activities in relation to the following habits and daily occupations: 1) smoking frequency (unchanged, ceased, less or more), 2) alcohol consumption (unchanged, ceased, less or more), 3) housekeeping (unchanged, ceased, less, more), 4) physical exercise (unchanged, ceased, less or more), 5) hobbies (unchanged, ceased, less or more), 6) reading (unchanged, ceased, less or more), 7) visiting family and friends (unchanged, ceased, less or more), 8) membership of clubs or associations (unchanged, ceased or joined new) and 9) going on holidays (unchanged, ceased, less or more).

Statistical analysis

SPSS 15 for Windows was used for statistical analysis. Statistical significance was set at $p < 0.05$ (2-sided). For comparisons between groups we used the following parametric and non-parametric tests: Student's t-test, one-way ANOVA, Mann-Whitney U test, Kruskall-Wallis, and Chi-square tests for independent observations. Student's paired t-test and Wilcoxon signed rank test were used for correlated observations.

Since the number of observations is rather low, deviations of normality of the Barthel Index could not be assessed in a proper way. Therefore we used non-parametric tests for testing differences of the Barthel Index.

To describe the number of patients who changed their habits due to stroke the responses were categorized into 'more', 'less', 'as much as before' or 'quit'. Pearson's and Spearman's rank correlations were used to measure the impact of different variables on functioning (BI) and health-related quality of life.

Despite the relatively large number of statistical tests applied, we decided to do no correction for 'multiple testing' (for instance by means of the Bonferroni method). Instead, the p-values are merely given as an indication of the strength of the evidence.

RESULTS

244 patients were found to have had an ischemic stroke during the study period. 92 patients went home immediately after discharge. 68 of these patients were 65 years or older. The response rate was 57 (84%) (see Figure 1). We could not complete the HADS questionnaire for two patients and the daily occupations questionnaire for one because these patients did not know how to the answer the questions

Figure 1. Flow chart of selection of patients
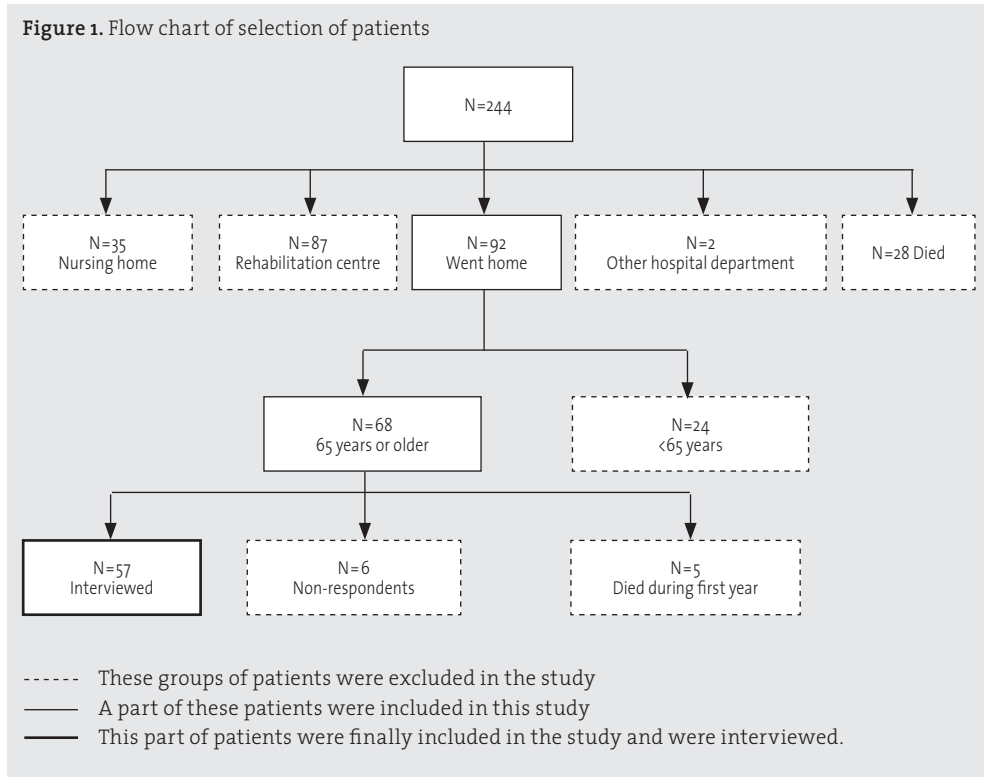
The mean age of the study population was 77 years and 44% of the patients were men. Most patients had had a stroke on the left side of the brain (61%). Hypertension and smoking were most often present as risk factors. A quarter of the patients have a history of having a TIA/stroke and a quarter had ischemic heart disease before their stroke. The detailed baseline characteristics of the study population are provided in Table 1.

Table 1: Baseline characteristics of the study population

Variables	Number (%)
Patients included	57
Gender	
- *Men*	25 (44%)
- *Women*	32 (56%)
Age, average (range)	77 (65-91)
Living situation	
- *Living alone*	29 (51%)
- *Living with a partner*	28 (49%)
Type of stroke	
- *Lacunar Circulation Infarct*	24 (42%)
- *Partial Anterior Circulation Infarct*	21 (37%)
- *Posterior Circulation Infarct*	8 (14%)
- *Total Anterior Circulation Infarct*	0 (0%)
- *Unknown*	4 (7%)
Brain hemisphere	
- *Left side*	35 (61%)
- *Right side*	17 (30%)
- *Unknown*	5 (9%)
NIHSS, average (range)	3 (0-20)
Barthel Index, median (range)	
- *At discharge*	21 (10-21)
- *After 1 year*	21 (13-21)
Risk factors present before stroke	
- *No risk factors*	11 (19%)
- *Hypertension*	29 (51%)
- *Hypercholesterolemia*	11 (19%)
- *Diabetes*	12 (21%)
- *Cardiac embolus*	10 (18%)
- *Smoking*	16 (28%)
History	
- *No history*	6 (11%)
- *Ischemic heart disease*	14 (25%)
- *Stroke / TIA*	14 (25%)
- *Atrial fibrillation*	5 (9%)
- *Heart failure*	3 (5%)
- *COPD*	10 (18%)
- *Depression*	2 (4%)
- *Mild cognitive impairment*	3 (5%)
- *Abuse of alcohol*	3 (5%)

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Functioning

None of the patients who went home immediately after discharge were totally or severely dependent. Most patients at discharge (98.2%) and one year after stroke (96.5%) were not dependent at all or only slightly dependent. 50% of the patients scored the same level of dependency at discharge and one year post stroke. 14% had better scores one year post stroke and 32% had worse scores. Following statistical analyses, there is no significant difference in the median BI score at discharge and one year post stroke (p=0.304). There is no significant difference between men and women. Patients in retirement homes score worse on the BI than patients living alone (Table 2).

Table 2: Functioning after one year according to demographic factors, impairment, disability and change in activities

Variables		N	Median Barthel Index	Range	P
Barthel Index[1]	**At discharge**	57	21	10-21	0,304
	After 1 year	57	21	13-21	
Gender[3]	**Male**	25	21	13-21	0,098
	Female	32	20	14-21	
Social situation[2]	**Living alone**	28	21	16-21	0,044
	Living with partner	27	21	13-21	
	Home for elderly	2	15,5	14-17	
Housekeeping[2]	**As much as before**	25	21	14-21	<0,001
	Quit	9	18	13-21	
	Less	17	19	15-21	
	More	5	21	19-21	
Physical activity[2]	**As much as before**	18	21	17-21	0,003
	Quit	4	15	13-18	
	Less	32	21	15-21	
	More	2	21	21-21	
Hobbies[2]	**As much as before**	35	21	14-21	0,660
	Quit	1	19	19-19	
	Less	19	21	13-21	
	More	1	21	21-21	
Visiting[2]	**As much as before**	38	21	16-21	0,001
	Quit	3	15	13-18	
	Less	15	20	14-21	
	More	0	.		
Experienced quality of life[3]	**The same**	38	21	14-21	0,560
	Diminished	18	20,5	13-21	
Depression[2]#	**None**	48	21	14-21	0,057
	Possible	4	18,5	13-20	
	Probable	3	20	18-21	
Anxiety[2]#	**None**	50	21	13-21	0,489
	Possible	2	19,5	18-21	
	Probable	3	20	19-20	

1 Wilcoxon signed rank test, 2 Kruskall-Wallis test, 3 Mann-Whitney U test.
Based on the HADS (none: <8 points, possible: 8-10 points and probable: >10 points)

In this study, housekeeping (p<0.001), physical activity (p=0.003) and visiting family and friends (p=0.001) are related to a decline in dependency. Having a depression (0,057), an anxiety disorder (p=0.489) or an experienced decline in quality of life (p=0.560) are not related to being more dependent (Table 2).

Daily occupations

45% of patients could perform the same housekeeping tasks as they did before their strokes. 30% of patients could not perform the same housekeeping tasks and 16% had to stop all household activities.

Considering physical activity, 57% of patients engaged in fewer physical activities due to restrictions caused by stroke (paresis of limbs and fatigue). 7% had to cease all physical activities. Most patients tried to keep active with the aid of a physiotherapist or using a home trainer.

63% of patients had trouble maintaining their hobbies. 2% had to quit their hobbies and 34% could not do them as often as before the stroke. Hobbies such as home improvement for men and embroidery for women are were particularly difficult to maintain.

27% of patients made fewer visits to family and friends. Most often these people were living alone, could no longer use their bicycle or lost their driving licences due to their stroke. Although this percentage is high, a lot of patients (68%) reported that visiting family and friends returned to normal one year post stroke.

Mood disorder

Of the patients in our study population 3.5% had a history of depression. There was an indication of depression one year post stroke in 12.7% of patients. About 6% of the Dutch population (aged 18–65 years) are currently depressed or have just had depression [25,26]. For the elderly the figure is 2% [27,28]. Accordingly, the patients in this study seem to suffer more often from depression than the general Dutch population. Women are affected twice as frequently as men [29]. One year post stroke there is no difference in prevalence between men and women (p=0.590).

According to the HADS scores there is an indication for anxiety disorder in 9.1% of patients one year post stroke. Of the Dutch population (aged 18–65 years), 2.3% had experienced an anxiety disorder. Women are also twice as affected by anxiety disorder as men [26]. The twelve-month prevalence for anxiety disorder in the Dutch population is 0.7% [29,30]. This percentage increases with age. Eleven percent of people aged 65–75 years have had an anxiety disorder the preceding year [31]. This can be confirmed in this study. However, no statistical significant difference between the prevalence in men and women could be found (p=0.383).

We compared different variables such as social status or caregiver strain with depression or anxiety disorder in this group of stroke patients. For these variables no statistical significant relationship could be found (p-values varied from 0.245 to 0.680).

Health-related quality of life (SF-36)

Table 3 shows the comparison between the HRQOL of the patients from this study and the Dutch elderly population [16]. In this study the mean age is 77 years (range 65–91). Therefore, most patients fall into the 75-85 years category. When we compare this category to our

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study population, HRQOL is nearly identical, except for two health scales. Patients in this study have a significantly better HRQOL for the 'role limitations – emotional' and 'bodily pain' health scales.

Multiple aspects of the SF-36 were related to physical functioning (Barthel Index). There is a high correlation with the health scale 'physical functioning' (R=0.610) and a moderate correlation with 'role limitations – physical' (R=0.412), 'mental health' (R=0.416) and 'vitality' (R=0.418).

Table 3: Comparison of the SF-36 in our study with the Dutch elderly population

SF-36	Patients in this study		75-85 years#		
	Mean	*SD*	*Mean*	*SD*	*P**
Physical functioning	60,4	28,4	56,0	29,7	0,256
Social functioning	84,2	22,7	82,0	24,9	0,481
Role limitations – physical	62,1	37,5	60,1	43,1	0,698
Role limitations – emotional	91,1	25,8	73,7	40,4	0,000
Mental Health	76,1	17,2	76,9	14,3	0,743
Vitality	63,0	20,3	60,1	21,3	0,284
Bodily Pain	81,7	20,2	72,0	30,3	0,001
General Health	61,5	23,4	59,0	21,2	0,424

Dutch elderly population (75-85 year)   *One-sample T-test

Table 4 presents the relationship between HRQOL and mood or change in activities. Patients with no depression or anxiety presented a significantly higher HRQOL for the 'social functioning', 'role limitations – emotional', 'mental health' and 'vitality' health scales. Patients who stopped or reduced activities such as housekeeping and physical exercise have a significantly worse HRQOL for physical functioning and physical role limitations. Less frequent visits with family and friends is related to a diminished HRQOL (physical and social functioning, mental health and vitality) in this study.

Table 4: Relationship between HRQOL and mood or change in activities (statistical significant results of the independent-samples T-test or one-way ANOVA)

Variables		N	FF	p	SF	p	RLf	p	RLe	p	MH	p	Vit	p	GH	p
Depression#	None	48	62,0	0,284	87,5	0,003	64,1	0,405	96,5	0,000	79,7	0,000	66,8	0,001	64,0	0,062
	Possible	4	38,8		50,0		37,5		50,0		61,0		45,0		38,8	
	Probable	3	55,0		70,8		58,3		55,6		46,7		30,0		46,7	
Anxiety#	None	50	60,3	0,661	86,3	0,009	63,5	0,372	94,7	0,002	78,8	0,000	65,6	0,016	61,9	0,453
	Possible	2	42,5		81,3		25,0		50,0		82,0		45,0		67,5	
	Probable	3	65,0		45,8		58,3		55,6		34,7		35,0		45,0	
House-keeping	As much	25	73,4	0,000	92,0	0,003	76,0	0,033	94,7	0,328	80,6	0,213	68,0	0,217	67,4	0,194
	Quit	9	36,7		61,1		38,9		77,8		67,1		56,1		48,9	
	Less	17	47,4		82,4		51,5		90,2		75,5		57,4		58,2	
	More	5	82,0		92,5		70,0		100		72,0		70,0		66,0	
Physical activity	As much	18	73,9	0,000	82,6	0,963	81,9	0,027	88,9	0,531	74,9	0,795	66,9	0,462	68,1	0,344
	Quit	4	12,5		81,3		37,5		75,0		69,0		50,0		46,3	
	Less	32	57,5		85,5		53,1		93,8		77,8		62,0		60,2	
	More	2	80,0		81,3		75,0		100		76,0		70,0		55,0	
Hobbies	As much	35	62,3	0,888	85,4	0,663	72,9	0,009	93,3	0,751	77,3	0,667	63,6	0,838	59,3	0,166
	Quit	1	70,0		100		100		100		56,0		60,0		55,0	
	Less	19	56,3		80,3		39,5		86,0		75,4		61,3		68,2	
	More	1	60,0		100		75,0		100		72,0		80,0		20,0	
Visiting	As much	38	67,6	0,000	92,1	0,000	67,1	0,141	95,6	0,087	81,8	0,001	68,2	0,003	65,3	0,054
	Quit	3	8,3		62,5		25,0		66,7		65,3		33,3		33,3	
	Less	15	52,3		68,3		56,7		84,4		64,0		56,0		57,7	

FF: physical functioning, SF: social functioning, RLf: role limitations – physical, RLe: role limitations – emotional, MH: mental health, Vit: vitality, GH: general health.

#Based on the HADS (none: <8 points, possible: 8-10 points, probable: >10 points)

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Caregiver strain

Nearly half of the patients (49%) had a partner. In this study most partners experience no strain difference compared to before stroke. Only 4% of the caregivers experienced considerable strain. Of the partners experiencing some form of strain, 2 CSI factors were most problematic, namely, 'changes in family life' and 'the confining nature of caregiving'. Although most caregivers experienced no burden, most were often afraid to go away and leave their partner at home alone.

Gender, social situation, housekeeping, physical activities, hobbies, visiting, depression and anxiety variables were compared to caregiver strain. There were no significant relations between these variables and the amount of caregiver strain (Fisher's exact test).

Table 5 shows the relationship between age, functioning and the HRQOL of stroke patients and caregiver burden. There is a moderate and negative correlation for caregiver strain with the ADL dependency of the patient and with physical functioning from the health-related quality of life.

Table 5: Comparison of caregiver strain with age, functioning and HRQOL.

	CSI (R*)
Age	0,176
Barthel Index	-0,434
Physical functioning (FF)	-0,575
Social functioning (SF)	-0,241
Role limitations – physical (Rlf)	-0,296
Role limitations – emotional (Rle)	0,030
Mental Health (MH)	-0,200
Vitality (Vit)	-0,312
Bodily Pain (BP)	-0,028

*Spearman Correlation

DISCUSSION AND CONCLUSIONS

The aim of this study was to provide insight into the functioning of patients who returned to their home immediately after discharge from hospital, one year post stroke. Insight into the functioning of these patients can ultimately be used to determine whether GPs can assert a positive influence on functioning and quality of life.

One year post stroke most patients are no longer ADL dependent. Although 31% of the patients had lower BI scores, the median score of all patients at discharge and after one year did not differ significantly. Older patients and those more ADL dependent at discharge had a worse ADL dependency after one year. This study also showed a relationship between ADL independence and the loss of social contacts. This is consistent with other research [32,33]. Whether better aftercare and rehabilitation can improve ADL independence and thus improve the number of social contacts should be investigated.

Anxiety and depression are not related to a decline in dependency, but for depression the p-value is only 0.057, so when we repeat this study in a larger group of patients, there possibly could be a significant relation to being more dependent.

45% of patients could perform the same housekeeping tasks as before stroke. A possible explanation is that a lot of women spouses take care of housekeeping, meaning that there is minimal change in the housekeeping tasks for men who suffered a stroke.

Before this study we expected that the prevalence of depression and anxiety disorder in stroke patients would be higher than normal. House et al. [34] confirmed this hypothesis. 2% of the elderly in the Netherlands currently have depression or have just had depression [27,28]. There was an indication for depression in this study in 13% of the patients. This is much higher than in the general elderly population. 11% of the elderly aged 65 to 75 years in the Netherlands have had an anxiety disorder in the past year [31]. In this study 9% of the patients had an indication for anxiety disorder. However, this is a point prevalence and not a year prevalence, meaning that full comparison is not possible.

Since depression and anxiety disorders are often present in stroke patients and because this presence is related to HRQOL, it is recommended that psychic functioning be surveyed more effectively and that these conditions be treated when possible. HRQOL can thus be influenced positively. The percentages in this study, however, can only be regarded as an indication. For definite diagnoses of depression and anxiety disorders, more extensive tests should be performed. Furthermore, the HADS questions are sometimes suggestive. It is possible that patients provide socially desirable answers out of shame on account of these suggestions. More research should be done to confirm that more attention should be paid to psychical functioning.

The health-related quality of life in this study group was high. Other studies have reported lower HRQOL after one year, although they included all patients with ischemic stroke rather than only primary care patients. They possibly studied more severely impaired stroke patients. In contrast, in this study the mean age is higher [35,36]. Taiwanese

older patients one year post ischemic stroke were interviewed at home. These patients on average seemed to have lower HRQOL than the patients in our study [37].

The HRQOL of the study population was almost the same as that of the Dutch elderly population. Only the 'role limitations – emotional' and 'bodily pain' health scales scored differently. In the present study stroke patients seem to experience fewer 'role limitations – emotional' and less 'bodily pain'. This is possibly due to the impact of the stroke in the preceding year. Directly after their strokes, patients experienced more difficulties in functioning in multiple aspects of life. The improvement in functioning could lead to a more positive view of pain and emotional functioning.

As stated, patients with signs of anxiety disorder or depression have a significantly worse HRQOL for the 'social functioning', 'role limitations – emotional', 'mental health' and 'vitality' items. Other studies confirm that psychical functioning is an important factor in HRQOL [6,36].

In this study HRQOL and ADL independence were correlated. Lower ADL independence correlates with worse scores for 'physical functioning', 'role limitations – physical', 'mental health' and 'vitality' in the SF-36. Other studies of HRQOL also show a relationship between difficulties in physical functioning and lower HRQOL [35,37,38].

Patients who cannot do housekeeping, exercise, hobbies or visit family and friends also show significantly lower HRQOL on multiple aspects.

With this in mind, HRQOL could increase further were patients to receive support to resume activities and where psychic problems are recognized and treated. There are indications that brief psychosocial intervention and antidepressant treatment reduces post-stroke depression and improves functional outcomes [39,40]. Another possibility is to start community-based rehabilitation programmes. This could increase stroke patients' activity levels and provide greater satisfaction [41,42,43].

We expected the caregiver strain burden to be high. However, only 4% of spouses experienced considerable strain. Other studies show much higher percentages of caregiver strain. Visser-Meily et al. (2005) found considerable burden experienced by as many as 54% of spouses [44]. However, the study included younger patients and patients from rehabilitation centres with a lower Barthel Index and thus a lower level of ADL independence. A study by Bugge et al. (1999) shows that burden increases over time. After half a year, 37% of spouses experience caregiver strain [45.] Blake et al. (2003) found that 40% of caregivers experience burden [46]. These last two studies were performed with GP patients and compare better with our study population. Predictive factors for burden in these two studies were patient functioning, psychological factors related to the caregiver and social support. The relationship between functioning and caregiver strain can be confirmed in this study. Moreover, there is a negative correlation between some aspects of the SF-36 and caregiver strain. Burden seems to be very low in this study. However, in this study relatively few caregivers were interviewed, the patients were well functioning and the spouses and patients were interviewed together, which may have clouded its

findings. Follow-up research should include more spouses, individual interviews and a control group to determine whether the strain is due to the stroke or due to other factors, such as age. However, in this study no relationship between age and burden was found.

The mortality in our study was relatively low. Seven percent of the patients died in the first year post stroke. Other studies report mortality around 30% [4,47]. Mortality in this study is also low when compared to the Bamford et al. study. However, they included all ischemic stroke patients and patients of all ages. The severity of the strokes in this study was relatively low, given the NIHSS scores at admission to hospital.

This study has several limitations. We studied all patients who went home immediately after discharge from hospital. However, many patients first go to a rehabilitation centre or nursing home to rehabilitate. These patients – when discharged from the rehabilitation centre – also come under GP care and probably have worse outcomes than the patients in this study. Therefore, the results in this study cannot be generalized for all stroke patients living at home.

The study group was relatively small because of the selection criteria (patients who went home immediately after discharge from hospital and patients from a single hospital). To make stronger generalizations, the study group should be larger and patients from multiple hospitals should be interviewed.

Furthermore, the present study group has a very high mean age and thus it is possible that decline in functioning is partially due to normal ageing. To determine the respective roles of stroke and normal ageing in relation to a decline in functioning, a control group should be used.

Finally, patients who refused to participate in this study were not considered. The patients who refused told us that they were doing fine and that a visit was not necessary. Another patient was in hospital for a hip fracture. Theoretically, these patients could have been those whose physical and psychical functioning was very bad, though the number of patients in the group was very small.

A strong point in this study is the method of data acquisition. We visited patients at home and completed the questionnaires together. A lot of information is gained through conversation, not only by talking but also by demonstration.

Another strength is the fact that one researcher visited all of the patients and the fact that we used standardized questionnaires. This avoids the risk of different interpretations of the results.

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CONCLUSIONS

To conclude, this study provides some insight into aspects of the wellbeing of the elderly one year post stroke. Most patients are ADL independent and HRQOL is about the same as in the general Dutch elderly population. Improvements can be envisioned in mental functioning and in maintaining habits and daily occupations. When physical functioning is poor at discharge from hospital, people function even worse after one year. All the former aspects seem to influence quality of life. Although burden is very low on average in this study, caregiver strain seems to be higher when the HRQOL of patients is lower.

Despite the low number of patients, our results indicate that paying more attention to rehabilitation (maintaining habits and daily occupations) and psychical functioning in the first year, could improve HRQOL after one year. Further research with a larger group of patients is needed to confirm whether influencing rehabilitation and psychical functioning actually improves quality of life in stroke patients. There may be a role for GPs in this, for example by regularly monitoring the physical and psychical problems of patients with a short questionnaire and by performing more interventions to improve mood and participation.

REFERENCES

1. **Hoe vaak komt een beroerte voor en hoeveel mensen sterven eraan?** *Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid Bilthoven: RIVM,* http://www.nationaalkompas.nl/ gezondheid-en-ziekte/ziekten-en-aandoeningen/hartvaatstelsel/beroerte/omvang/

2. M.L.Bots, S.J.van Dis. *Factsheet Beroerte.* Uitgave Nederlandse Hartstichting 2006.

3. Hollander M, Koudstaal PJ, Bots ML, Grobbee DE, Hofman A, Breteler MM. **Incidence, risk, and case fatality of first ever stroke in the elderly population. The Rotterdam Study**. *J Neurol Neurosurg Psychiatry* 2003; **74**(3):317-321.

4. Verhoeven S, Beusmans GHMI, Van Bentum STB, Van Binsbergen JJ, Pleumeekers HJCM, Schuling J. **NHG-standaard CVA.** *Huisarts Wet* 2004; **47**:509-520.

5. Feigin VL, Lawes CM, Bennett DA, Anderson CS. **Stroke epidemiology: a review of population-based studies of incidence, prevalence, and case-fatality in the late 20th century.** *Lancet Neurol* 2003; **2**(1):43-53.

6. Haacke C, Althaus A, Spottke A, Siebert U, Back T, Dodel R. **Long-term outcome after stroke: evaluating health-related quality of life using utility measurements.** *Stroke* 2006; **37**(1):193-198.

7. Di Carlo A, Lamassa M, Pracucci G, Basile AM, Trefoloni G, Vanni P, Wolfe CDA, Tilling K, Ebrahim S, Inzitari D. **Stroke in the Very Old : Clinical Presentation and Determinants of 3-Month Functional Outcome: A European Perspective.** *Stroke* 1999;**30**:2313-2319.

8. Béjot Y, Rouaud O, Jacquin A, Osseby GV, Durier J, Manckoundia P, Pfitzenmeyer P, Moreau T, Giroud M. **Stroke in the Very Old: Incidence, Risk Factors, Clinical Features, Outcomes and Access to Resources – A 22-Year Population-Based Study.** *Cerebrovasc Dis* 2010;**29**:111-121.

9. Meyboom-de Jong B, Buis J. *Zorg na een beroerte.* Den Haag: Nederlandse Hartstichting 1995.

10. CBO. *Richtlijn Beroerte.* Utrecht: CBO 2000.

11. Hochstenbach JB, Donders AR, Mulder T, Van LJ, Schoonderwaldt H. [**Many chronic problems in CVA patients at home**]. *Ned Tijdschr Geneeskd* 1996; **140**(22):1182-1186.

12. D'Olhaberriague L, Litvan I, Mitsias P, Mansbach HH. **A reappraisal of reliability and validity studies in stroke.** *Stroke* 1996; **27**(12):2331-2336.

13. de Haan R, Limburg M, Schuling J, Broeshart J, Jonkers L, van Zuylen P. **[Clinimetric evaluation of the Barthel Index, a measure of limitations in dailly activities]**. *Ned Tijdschr Geneeskd* 1993; **137**(18):917-921.

14. Mahoney F.I., Barthel D.W. **Functional Evaluation: The Barthel Index.** *Md State Med J* 1965; **14**:61-65.

15. Anderson C, Laubscher S, Burns R. **Validation of the Short Form 36 (SF-36) health survey questionnaire among stroke patients.** *Stroke* 1996; **27**(10):1812-1816.

16. Zee van der KI, Sanderman R. *Het meten van de gezondheidstoestand met de RAND-36, Een handleiding.* Noordelijk Centrum voor Gezondheidsvraagstukken Rijksuniversiteit Groningen 2006.

17. Demet U, Ferhan S, Ahmet O, Selcuk M. **Comparison of SF-36 and WHOHRQOL-100 in patients with stroke.** *Neurology India* 2008; **56**: 426-432.

18. Ware JE. **SF-36 Health Survey Update.** *Spine* 2000; 25: 3130-3139.

19. Ware JE Jr, Sherbourne CD. **The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection.** *Med Care.* 1992; **30**(6):473-83.

20. McHorney CA, Ware JE Jr, Raczek AE. **The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs.** *Med Care.* 1993; **31**(3):247-63.

21. Bjelland I, Dahl AA, Haug TT, Neckelmann D. **The validity of the Hospital Anxiety and Depression Scale. An updated literature review.** *J Psychosom Res* 2002; **52**(2):69-77.

22. Snaith RP, Zigmond AS. **The hospital anxiety and depression scale.** *Br Med J (Clin Res Ed)* 1986; **292**(6516):344.

23. Thornton M, Travis SS. **Analysis of the reliability of the modified caregiver strain index.** *J Gerontol B Psychol Sci Soc Sci* 2003; 58(2):S127-S132.

24. van Exel NJA, Scholte op Reimer WJM, Brouwer WBF, van den Berg B, Koopmanschap MA, van den Bos GAM. **Instruments for assessing the burden of informal caregiving for stroke patients in clinical practices: a comparison of CSI, CRA, SCQ and self-rated burden.** *Clin Rehabil* 2004; 18: 203-214

25. Bijl R.V., Zessen G.van, Ravelli A., Rijk C.de, Langendoen Y. **The Netherlands Mental Health Survey and Incidence Study (NEMESIS): objectives and design.** *Soc Psychiatry Psychiatr Epidemiol* 1998; 33:581-586.

26. Bijl R.V., Ravelli A., Zessen G.van. **Prevalence of psychiatric disorder in the general population: results of The Netherlands Mental Health Survey and Incidence Study (NEMESIS).** *Soc Psychiatry Psychiatr* Epidemiol 1998; 33:587-595.

chapter 4

27. Tilburg Wv, Beekman ATF. *Affectieve stoornissen bij ouderen*. In: J.A.den Boer, J.Ormel, H.M.van Praag, H.G.M.Westenberg, H.D'haenen, editors. Handboek stemmingsstoornissen. Maarssen: Elsevier/De Tijdstroom, 1999: 72-94.

28. Beekman ATF, Geerlings SW, Tilburg Wv. D*epression in later life: Emergence and prognosis*. In: D.J.H.Deeg, A.T.F.Beekman, D.M.W.Kriegsman, editors. Autonomy and well-being in the aging population II : report from the Longitudinal Aging Study Amsterdam. Amsterdam: 1998.

29. Bijl RV, De Graaf R, Ravelli A, Smit F, Vollebergh WA. **Gender and age-specific first incidence of DSM-III-R psychiatric disorders in the general population Results from the Netherlands Mental Health Survey and Incidence Study (NEMESIS).** *Soc Psychiatry Psychiatr Epidemiol* 2002; **37**:372-379.

30. De Graaf R, Bijl R, Smit F, Vollebergh W, Spijker J. **Risk factors for 12-month comorbidity of mood, anxiety, and substance use disorders: findings from the Netherlands Mental Health Survey and Incidence Study.** *American Journal of Psychiatry 2002*; **159**(4):620-629.

31. Beekman A, Bremmer M, Deeg D et al. **Anxiety disorders in later life: a report from the Longitudinal Aging Study Amsterdam.** *International Journal of Geriatric Psychiatry* 1998; **13**(10):717-726.

32. Chau JP, Thompson DR, Twinn S, Chang AM, Woo J. **Determinants of participation restriction among community dwelling stroke survivors: a path analysis.** *BMC Neurol.* 2009; Sep **7**;9:49.

33. D'Alisa S, Baudo S, Mauro A, Miscio G. **How does stroke restrict participation in long-term post-stroke survivors?** *Acta Neurol Scand.* 2005 Sep;**112**(3):157-62.

34. House A, Dennis M, Mogridge L, Warlow C, Hawton K, Jones L. **Mood disorders in the year after first stroke.** *Br J Psychiatry* 1991; **158**:83-92.

35. Carod-Artal J, Egido JA, González JL, Varela de Seijas E. **Quality of life among stroke survivors evaluated 1 year after stroke: experience of a stroke unit.** *Stroke.* 2000; **31**(12):2995-3000.

36. Kauhanen ML, Korpelainen JT, Hiltunen P, Nieminen P, Sotaniemi KA, Myllylä VV. **Domains and determinants of quality of life after stroke caused by brain infarction.** *Arch Phys Med Rehabil.* 2000; **81**(12):1541-6.

37. Shyu YI, Maa SH, Chen ST, Chen MC. **Quality of life among older stroke patients in Taiwan during the first year after discharge.** *J Clin Nurs.* 2009; **18**(16):2320-8. Epub 2008 Sep 17.

38. King RB. **Quality of life after stroke.** *Stroke.* 1996; **27**(9):1467-72.

39. Mitchell PH, Teri L, Veith R, Buzaitis A, Tirschwell D, Becker K, Fruin M, Kohen R, Cain KC. **Living well with stroke: design and methods for a randomized controlled trial of a psychosocial behavioral intervention for poststroke depression.** *J Stroke Cerebrovasc Dis.* 2008; **17**(3):109-15.

40. Mitchell PH, Veith RC, Becker KJ, Buzaitis A, Cain KC, Fruin M, Tirschwell D, Teri L. **Brief psychosocial-behavioral intervention with antidepressant reduces poststroke depression significantly more than usual care with antidepressant: living well with stroke: randomized, controlled trial.** *Stroke.* 2009; **40**(9):3073-8.

41. Hartman-Maeir A, Eliad Y, Kizoni R, Nahaloni I, Kelberman H, Katz N. **Evaluation of a long-term community based rehabilitation program for adult stroke survivors.** *NeuroRehabilitation.* 2007; **22**(4):295-301.

42. Outpatient Service Trialists. **Therapy-based rehabilitation services for stroke patients at home.** *Cochrane Database Syst Rev. 2003*;(**1**):CD002925.

43. Legg L, Langhorne P, Outpatient Service Trialists. **Rehabilitation therapy services for stroke patients living at home: systematic review of randomized trials.** *Lancet.* 2004; **363**(9406):352-6

44. Visser-Meily A, Post M, Schepers V, Lindeman E. **Spouses' quality of life 1 year after stroke: prediction at the start of clinical rehabilitation.** *Cerebrovasc Dis* 2005; 20(6):443-448.

45. Bugge C, Alexander H, Hagen S. Stroke patients' informal caregivers. **Patient, caregiver, and service factors that affect caregiver strain.** *Stroke* 1999; **30**(8):1517-1523.

46. Blake H, Lincoln NB, Clarke DD. **Caregiver strain in spouses of stroke patients.** *Clin Rehabil* 2003; **17**(3):312-317.

47. Bamford J, Sandercock P, Dennis M, Burn J, Warlow C. **A prospective study of acute cerebrovascular disease in the community: the Oxfordshire Community Stroke Project--1981-86. 2. Incidence, case fatality rates and overall outcome at one year of cerebral infarction, primary intracerebral and subarachnoid haemorrhage.** *J Neurol Neurosurg Psychiatry* 1990; **53**(1):16-22.

QUALITY OF LIFE OF ELDERLY ISCHAEMIC STROKE PATIENTS ONE YEAR AFTER THROMBOLYTIC THERAPY: A COMPARISON BETWEEN PATIENTS WITH AND WITHOUT THROMBOLYTIC THERAPY

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ABSTRACT

Background

An observational study to examine whether thrombolytic therapy in stroke patients realizes better quality of life outcomes compared to patients without thrombolytic therapy one year after stroke. We also examined whether daily functioning, mental functioning and activities improved after thrombolytic treatment.

Methods

A total of 88 stroke patients were interviewed at home one year post-stroke. Health-related quality of life (HRQOL) was assessed using the RAND-36, disability with the Barthel Index, depression and anxiety with the Hospital Anxiety and Depression Scale, and a questionnaire about patient way of life was completed. People aged under 60, moving to a nursing home or with a haemorrhage were excluded.

Results

The thrombolysis group (TG) had more severe stroke (higher NIHSS) scores and were younger than the group without thrombolytic therapy (WTG). The primary outcome was HRQOL, which was high and nearly identical in both groups, however the TG had significantly better HRQOL for the 'mental health' and 'vitality' scales. Patients who stopped or reduced their hobbies because of stroke had a significantly worse HRQOL.

One year after stroke, more patients in the TG were totally or severely ADL dependent (12% TG and 0% WTG, p=0.022). The level of dependence decreased in the TG (p=0.042) and worsened in the WTG (p<0.001) after one year. Being more dependent is related to diminishing daily occupations in both groups. In the TG the level of dependence had less impact on visiting family and friends and going on holiday. The prevalence of anxiety disorder and depression was low compared to other studies and there is no significant difference between the two groups.

Conclusion

No major differences in the primary outcome (HRQOL) could be found between the two groups. In addition, no essential difference could be found in mental functioning and participation. We expected that patients undergoing thrombolytic therapy would have worse quality of life because of the greater initial severity of their stroke. Therefore, thrombolytic therapy seems to be of great importance in achieving better quality of life in ischemic stroke patients who respond to this therapy.

1. BACKGROUND

Acute ischaemic stroke is the second most common cause of death worldwide and a major cause of disability [1,2]. Each year, 19,000 men and 22,000 women in the Netherlands suffer a stroke [3]. The average age of patients suffering a stroke is seventy in men and seventy-five in women [4]. The elderly are particularly affected by strokes. Because of future aging it is important to pay greater attention to prevention and aftercare for stroke patients [5,6].

Currently, the interventions available to improve outcomes after ischaemic stroke are: admission to a stroke unit, the use of aspirin within 48 hours after stroke onset and treatment with intravenous tissue plasminogen activator (tPA) within 4.5 hours after stroke onset. Of these interventions, thrombolysis is the most effective and has dramatically changed attitudes towards and the management of stroke patients [7].

However, only a small percentage of ischaemic stroke patients receive tPA [8]. 'The Netherlands stroke survey' showed that 7% of all patients referred to a hospital with acute ischemic stroke ultimately received thrombolytic therapy [9]. Lack of patient familiarity with stroke symptoms and correct responses, late hospital arrival, the narrow therapeutic window and variance in the selection of patients for thrombolysis are among the factors that contribute to this under-treatment [7]. A feared complication of thrombolytic therapy is intracranial haemorrhaging. Symptomatic intracranial haemorrhage occurs in 1.7 to 8.0% of treated patients [7]. Despite this complication, thrombolytic therapy is still very effective and there is no reason to withhold this treatment from stroke patients, even elderly patients [10]. Stroke patients treated with tPA have after a year an almost twice as good a chance of a good functional outcome and are more likely to have minimal or no disability compared to those without such treatment [11].

A stroke affects patients' lives in many different ways, not only physically but also through a range of emotional, psychological, cognitive and social consequences. The seriousness of post-stroke physical and mental impairments influences quality of life. As stroke mortality declines, more patients have to live with multiple handicaps and impairments. Therefore, improving the quality of life and paying greater attention to rehabilitation is increasingly important [6,12,13].

After discharge from hospital about 50% of patients return to their homes. Their general practitioners (GP) assist patients in coping with disabilities and psychological problems and manage secondary prevention [14]. Little is known about the long-term outcomes for Dutch patients after stroke, especially when compared to patients treated with thrombolysis. Most studies concentrate on functional outcomes in the acute or rehabilitation phase [15]. Accordingly, it is important for GPs to be aware of the primary care outcomes and what contributes to a good prognosis after a stroke [6,12]. In addition, it is important to know what the differences are between patients who received thrombolysis and patients who did not receive this kind of treatment.

As little is known about late physical and psychological consequences of ischemic stroke in primary care patients in the Netherlands, it is hard to determine whether patients are receiving quality aftercare and to determine whether thrombolysis treatment is of added value for a longer period after stroke.

The purpose of this study is to examine the quality of life one year after stroke of patients treated with thrombolysis compared to patients without thrombolytic therapy who returned to their homes immediately after discharge from hospital. We expected patients with thrombolytic therapy to experience a worse quality of life because of the greater initial severity of their stroke. Secondary outcomes include functioning, daily occupations, anxiety and depression.

2. METHODS

2.1. Study design

The study included two groups of patients, namely all the ischemic stroke patients admitted to the University Medical Center Groningen, the Netherlands (UMCG) who were treated with thrombolysis between November 2007 and November 2008, and all the ischemic stroke patients admitted to a community hospital, Martini Hospital Groningen, the Netherlands, who were not treated with thrombolysis, between November 2006 and November 2007. We selected patients from two different hospitals because the UMCG acts as a comprehensive stroke centre to which patients from the region eligible for thrombolytic treatment are transported. The Martini Hospital acts as a community hospital where stroke patients ineligible for thrombolytic treatment are admitted.

The exclusion criteria for the study were being younger than 60 (because of this group's profile in daily functioning and social life, and to create a more homogenous group), and referral to a nursing home, rehabilitation centre or another hospital department after being discharged from the hospital (because the GP stops being responsible for medical care under such circumstances). People already living in a retirement home before their stroke could enter the study. The study was approved by the MEC (medical ethical committee) of the UMCG and informed consent was obtained from all patients.

After informed consent, all patients were visited at home one year after stroke. Patients were interviewed in person by a trained medical practitioner and standardized questionnaires were completed. Clinical details – including stroke severity, comorbidity and vascular risk factors before stroke, medication and demographic information – were obtained from the medical records. Stroke severity was determined by the National Institute of Health Stroke Scale (NIHSS) [16].

2.2. Measures at 12 months

The Barthel Index (BI) was used to assess disability in the patients. The BI measures the level of independence in ADL and yields a score ranging from 0 (functionally totally dependent) to 21 (functionally totally independent). In our questionnaire, patients were awarded three points for eating independently rather than two points in the original questionnaire. The sensitivity and reliability of the BI are high for stroke patients [17,18].

We used the RAND-36 to measure health-related quality of life (HRQOL). The RAND-36 consists of 36 questions and comprises 8 health scales (physical function (FF), role limitations physical (Rlf), social functioning (SF), role limitations emotional (Rle), bodily pain (BP), general health (GH), vitality (Vit) and mental health (MH)). The health scales range from 0 (poor HRQOL) to 100 (good HRQOL). The RAND-36 is a reliable and valid measure for determining HRQOL in stroke patients [19-21].

To identify the possible and probable presence of depression and anxiety disorders in our patients, the Hospital Anxiety and Depression Scale (HADS) was used. The HADS

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is a 14-item scale divided into depression and anxiety subscales. The possible scores for depression or anxiety range from 0 to 21. A score of 8 to 10 corresponds to possible anxiety disorder or depression and a score of 11 or higher indicates the probable presence of a mood disorder [22,23].

In addition, patients were asked about changes in their habits and daily occupations after their stroke, such as smoking, alcohol consumption, housekeeping, physical exercise, hobbies, reading, visiting family and friends, membership of clubs or associations and going on holiday.

2.3. Statistical analysis

SPSS 15 for Windows (SPSS Inc., Chicago) was used for statistical analysis. Statistical significance was set at $p<0.05$ (2-sided). For comparisons between groups, we used the following non-parametric tests: Mann-Whitney, Kruskall-Wallis and Analysis of Variance (ANOVA) using the Rank Transform method. The Rank Transform method consists of replacing the observations by their ranks in the combined sample and performing one of the standard analysis of variance procedures on these ranks [24]. The differences between groups were corrected for age and seriousness of stroke as a covariate. Because of the skewed distribution of the severity of stroke scale, the scores for this scale were converted to percentile ranks and then to normal curve equivalent (NCE) scores. Fisher's exact test was used for categorical variables.

To describe the number of patients who changed their habits due to stroke, their responses were categorized into 'more', 'less', 'as much as before' or 'quit'.

Despite the relatively large number of statistical tests applied, we decided not to correct for 'multiple testing' (for instance by means of the Bonferroni method). Instead, the p-values are simply presented as an indication of the strength of the evidence. Furthermore, since all patients admitted to the two hospitals during the study period were included, no formal power analysis was performed.

3. RESULTS

3.1. Baseline characteristics

In total, two hundred and thirty-five patients were diagnosed with ischemic stroke, of which eighty-two patients received thrombolytic treatment. Ultimately, eighty-eight interviews were conducted, with the reasons for exclusion shown in Figure 1. In the TG there were seven patients who could not participate because one patient was admitted to the intensive care unit at time of interview, one patient was living in Germany, two patients could not be contacted and three patients did not want to participate. In the WTG six patients could not participate, because one patient was rehabilitating from a hip fracture and the five other patients did not feel it necessary to participate because they were doing fine.

Figure 1: Flow chart of selection of patients
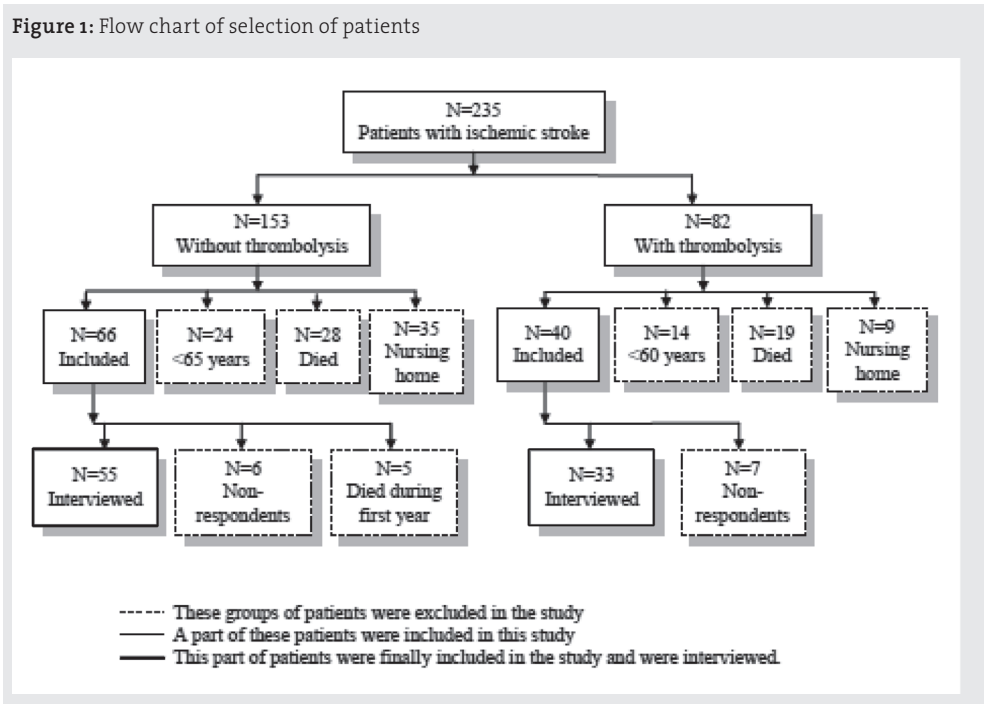
The detailed baseline characteristics of the study population are provided in Table 1. In the thrombolysis group there are significantly more men, the mean age is lower, the NIHSS is higher, more patients had strokes to the left hemisphere and more patients were living with a partner. In the following results we corrected for stroke severity and age.

Table 1: Baseline characteristics of the study population

Variables	Thrombolysis (%)	Without (%)	p
Patients included	33	55	
Gender*			0.008
- Men	24 (72.7)	32 (58.2)	
- Women	9 (27.3)	23 (41.8)	
Age, average (range)#	73.6 (61-85)	77.2 (65-91)	0.025
Living situation*			0.003
- Living alone	7 (21.2)	30 (55.5)	
- Living with a partner	26 (78.8)	25 (45.5)	
Brain hemisphere*			0.007
- Left side	20 (39.4)	16 (29.1)	
- Right side	13 (60.6)	34 (61.8)	
- Unknown		5 (9.1)	
NIHSS, average (range)#	9.97 (3-27)	2.6 (0-6)	<0.001
Length of hospital stay in days	7	7	1.000
Risk factors present before stroke/History*			
- No risk factors	1 (3.0)	6 (10.9%)	0.248
- Hypertension	23 (69.7)	27 (49.1)	0.076
- Hypercholesterolemia	13 (39.4)	6 (10.9)	0.003
- Diabetes	4 (12.1)	12 (21.8)	0.392
- Smoking	9 (27.3)	16 (29.1)	1.000
- Ischemic heart disease	9 (27.3)	14 (25.5)	1.000
- Stroke/TIA	9 (27.3)	13 (23.6)	0.801
- Atrial fibrillation	7 (21.2)	5 (9.1)	0.122
- Depression	1 (3.0)	2 (3.6)	1.000

* Fisher's exact test, #One-way ANOVA.

3.2. Health-related quality of life (RAND-36)

The primary outcome of this study was health-related quality of life. In Table 2 a comparison is made between the TG and the WTG with respect to HRQOL. HRQOL is nearly identical in these two groups, except for the scales 'Mental Health' and 'Vitality'. Patients in the thrombolysis group have a significantly better HRQOL for these two scales (p=0.024, p=0.024, resp.).

Table 2: Rand-36 comparison in the two study groups

Rand-36	Thrombolysis	Without	
	Median (range), [95% CI]	Median (range), [95% CI]	p*
Physical functioning	65 (0-100) [50-85]	62.5 (5-100) [55-80]	0.762
Social functioning	100 (0-100) [75-100]	100 (25-113) [75-100]	0.716
Role limitations – physical	50 (0-100) [25-75]	75 (0-100) [50-75]	0.346
Role limitations – emotional	100 (0-100) [100-100]	100 (0-100) [100-100]	0.467
Mental Health	88 (20-100) [80-96]	80 (16-100) [72-84]	**0.024**
Vitality	85 (5-100) [65-90]	65 (15-95) [60-70]	**0.024**
Bodily Pain	89.8 (0-100) [69.4-100]	89.8 (12-100) [69.4-100]	0.892
General Health	65 (0-100) [55-80]	65 (0-100) [55-75]	0.427

*Mann-Whitney test

In Table 3 the interaction effects between the groups and the change in activities with respect to the RAND-36 are given, to explore to what extent differences between the two treatment modalities are mediated by these variables. The results were corrected for differences in age and stroke severity. There are two significant interaction effects between physical activity and the treatment groups (TG and WTG) for the health scale 'Role limitations – emotional' (p=0.011) and between reading and the treatment groups for the health scale 'Vitality' (p=0.033).

Table 3: RAND-36 interactions between the TG and WTG and activities

HRQOL	Activities	p#
Physical functioning	Housekeeping	0.374
	Physical activity	0.465
	Hobbies	0.327
	Visiting	0.615
	Reading	0.077
Social functioning	Housekeeping	0.145
	Physical activity	0.308
	Hobbies	0.264
	Visiting	0.077
	Reading	0.227
Role limitations – physical	Housekeeping	0.469
	Physical activity	0.868
	Hobbies	0.062
	Visiting	0.397
	Reading	0.657
Role limitations – emotional	Housekeeping	0.678
	Physical activity	0.011
	Hobbies	0.877
	Visiting	0.089
	Reading	0.020
Mental health	Housekeeping	0.076
	Physical activity	0.057
	Hobbies	0.638
	Visiting	0.583
	Reading	0.089
Vitality	Housekeeping	0.518
	Physical activity	0.104
	Hobbies	0.602
	Visiting	0.806
	Reading	0.033
Bodily pain	Housekeeping	0.498
	Physical activity	0.355
	Hobbies	0.164
	Visiting	0.898
	Reading	0.200
General health	Housekeeping	0.386
	Physical activity	0.221
	Hobbies	0.053
	Visiting	0.880
	Reading	0.560

p# corrected for stroke severity and age
Interaction rank transform ANOVA.

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3.3. Level of dependence according to the Barthel Index

At discharge from hospital, 70% of TG and 98% of the WTG are not dependent or slightly dependent (p=0.001). One year after stroke this percentage is 88% (TG) and 96% (WTG) (p=0.022). Immediately after discharge, 13% of the TG was severely or totally dependent; after one year this percentage was 12%. In the WTG none of the patients were totally or severely dependent at discharge or after one year.

When we compare the mean Barthel Index after one year, there is no significant difference between the TG (M=18.03) and the WTG (M=18.76) (p=0.620). The mean Barthel Index in the TG after one year (M=18.03) is significantly higher than at discharge from hospital (M=15.97) (p=0.042) and significant lower (M=19.89 at discharge and M=18.76 after one year) (p<0.0005) in the WTG.

Being more dependent is related to diminishing daily occupations (significant for housekeeping in both groups (p<0.05). An experienced decline in QOL is not related to being more dependent (Table 4).

Using the Rank Transform ANOVA, we investigated whether there were any interaction effects between the treatment modality (TG or WTG) and demographic factors and changes in activities with respect to the BI scores, to explore to what extent differences between the two treatment modalities are mediated by these variables. Moreover, all analyses were corrected for age and stroke severity. There are only two significant interaction effects, namely for visiting family and friends (p=0.002) and vacation (p=0.001). Changes in these two factors led to higher BI scores for the T patients compared to the WT patients (Table 4).

3.4. Mood disorder (HADS)

In this study, 3% of the TG and 3.6% of the WTG had a history of depression.

One year after stroke, 9.1% of the TG and 5.3% of the WTG had probable depression. Additionally, depression is possible in 6.1% of the TG and 7% of the WTG. However, there is no significant difference in the prevalence of depression between the two groups (p=0.055).

According to the HADS scores, one year after stroke, 6.1% of the TG and 5.3% of the WTG probably had an anxiety disorder. About 12.1% of the TG and 3.5% of the WTG possibly had an anxiety disorder. However, no statistically significant difference in prevalence between the two groups could be found (p=0.634).

Table 4: Functioning according to demographic factors, change in activities and aftercare

Variables		Thrombolysis			Without			
		N	Median BI (range)	p*	N	Median BI (range)	p*	p #
Gender2	Male	24	20 (4-20)	0.310	23	20 (12-20)	0.155	0.227
	Female	9	19 (9-20)		32	19 (13-20)		
Social situation2	Living alone	7	18 (18-20)	0.355	30	19.5 (13-20)	0.405	0.419
	Living with partner	26	20 (4-20)		23	20 (12-20)		
Stroke location2	Left side	13	20 (9-20)	0.561	34	20 (13-20)	0.851	0.096
	Right side	20	20 (4-20)		16	19.5 (12-20)		
	Unknown	0			5	20 (18-20)		
Housekeeping1	More	1	20 (20-20)	0.005	5	20 (18-20)	<0.001	0.612
	As much as before	21	20 (18-20)		25	20 (13-20)		
	Less	7	20 (8-20)		16	18 (15-20)		
	Quit	4	9 (4-18)		8	17 (12-19)		
Physical activity1	More	1	20 (20-20)	0.107	2	20 (20-20)	0.003	0.139
	As much as before	16	20 (18-20)		18	20 (16-20)		
	Less	15	20 (8-20)		30	20 (12-20)		
	Quit	1	4 (4-4)		4	14 (12-17)		
Hobbies1	More	0		0.005	1	20 (20-20)	0.662	0.866
	As much as before	17	20 (18-20)		34	20 (13-20)		
	Less	7	20 (18-20)		18	20 (12-20)		
	Quit	9	18 (4-20)		1	18 (18-18)		
Visiting1	More	1	20 (20-20)	0.058	0		0.001	0.002
	As much as before	25	20 (9-20)		37	20 (15-20)		
	Less	5	20 (8-20)		14	18.5 (13-20)		
	Quit	2	6.5 (4-9)		3	15 (12-17)		
Vacation	More	0		0.182	2	20 (20-20)	0.007	0.001
	As much as before	18	20 (9-20)		25	20 (13-20)		
	Less	9	20 (9-20)		12	20 (18-20)		
	Quit	6	18.5 (4-20)		15	17 (12-20)		
Experienced quality of life2	Increased	2	20 (20-20)	0.107	0		0.505	0.169
	The same	16	20 (18-20)		37	20 (13-20)		
	Diminished	15	19 (4-20)		17	19 (12-20)		

p# corrected for stroke severity and age
* Kruskall-Wallis1 and Mann-Whitney2 test, # Interaction rank transform ANOVA

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3.5. Daily Occupations

The percentages of patients who had to stop or diminish different activities are given in Table 5. There are no statistically significant differences between the two groups, except for hobbies. Significantly more patients in the TG had to stop their hobbies after stroke.

Table 5: Change in the frequency of daily occupations

Daily Occupations		Thrombolysis (%)	No Thrombolysis (%)	p*
Housekeeping	More	3.0	8.8	0.434
	The same	63.6	43.9	
	Less	21.2	28.1	
	Quit	12.1	14.0	
Physical exercise	More	3.0	3.5	0.546
	The same	48.5	31.6	
	Less	45.5	52.6	
	Quit	3.0	7.0	
Hobbies	More	0.0	1.8	0.002
	The same	51.5	59.6	
	Less	21.2	31.6	
	Quit	27.3	1.8	
Visiting	More	3.0	0.0	0.463
	The same	75.8	64.9	
	Less	15.2	24.6	
	Quit	6.1	5.3	
Holidays	More	0.0	3.5	0.544
	The same	54.5	43.9	
	Less	27.3	21.1	
	Quit	18.2	26.3	
Reading	More	3.0	3.5	0.398
	The same	69.7	77.2	
	Less	24.2	10.5	
	Quit	3.0	3.5	

* Fisher's exact test

4. DISCUSSION AND CONCLUSION

4.1. Discussion

In this study we examined quality of life of ischaemic stroke patients one year after thrombolytic therapy compared to patients who had not undergone thrombolytic therapy.

Unfortunately, the two groups are not fully comparable. The severity of the stroke experienced by the patient group that underwent thrombolytic therapy was significantly greater than in the group without treatment. A possible explanation is that more severe stoke patients reach the hospital earlier and are eligible for thrombolysis [25,26]. The WTG was older and there were more women in this group, possibly because women may be less likely to reach hospital for thrombolysis treatment in time [27,28]. However, we corrected for the differences between the two groups. Risk factors present before stroke were approximately the same in both groups.

The primary outcome was health-related quality of life one year post-stroke. HRQOL in both groups was as high as in the Dutch elderly population [21] and is nearly identical in both groups, although patients in the thrombolysis group have a significantly better HRQOL for the 'Mental health' and 'Vitality' scales. Other studies report lower HRQOL after one year [29-31]. However, these studies included all patients with ischemic strokes, so they possibly studied more severely impaired stroke patients. It is known that higher ADL independence correlates to a worse HRQOL [29-32]. One possible explanation for the high scores on the RAND-36 is that a stroke has such an impact on life that patients one year post-stroke see quality of life in greater perspective. During their interviews, patients made comments such as: 'it could have been worse'.

We examined whether there was a difference between the two groups in stopping or diminishing different activities. There was only a significant difference with respect to hobbies. This is possibly due to the fact that patients in the TG are younger and had more hobbies that they could practise before their strokes. Patients who stopped or reduced various activities have a significantly worse HRQOL. To increase HRQOL further, brief psychosocial intervention and antidepressant treatment could reduce post-stroke depression and improve functional outcomes [6,33]. Starting community-based rehabilitation programmes could also help by increasing the patients' activity levels and give them greater satisfaction [34,35].

One year after stroke, more patients in the TG are ADL dependent. It is remarkable that one year after stroke, the average score on the BI in the TG has become higher than at discharge from hospital and lower in the WTG. This effect could be due to thrombolysis treatment [1,36]. Another explanation is that there are significantly more men in the TG. Some studies show that men are more likely than women to achieve functional independence [27,37].

Being more dependent is related to diminishing daily occupations in both groups [6,38]. It is important to pay attention to this in rehabilitation [6,39].

There were two significant interaction effects with respect to BI between the TG and WTG, namely for visiting family and friends and going on holiday. In the TG the level of dependence was of less influence on visiting family and friends and going on holiday. This could be because patients in the TG are younger. In the WTG there is a significant relationship between ADL independence and loss of social contacts. This has also been observed in other studies [6,40]. It is important to consider this in the rehabilitation of stroke patients because life satisfaction is significantly related to social activity and ADL independence [41,42].

After one year there is no significant difference in the prevalence of depression between the TG and the WTG. There is an indication of depression in about 12-15% for both groups. This is less than other studies indicate, namely 18-60% [43-45]. There also is no significant difference between the two groups with respect to anxiety disorder. About 9-18% have an anxiety disorder. This percentage is also less than was found in other studies, namely 25-50% [43]. It therefore seems that thrombolysis has no apparent effect on the prevalence of depression or anxiety disorder. It is nonetheless important to screen patients for depression or anxiety disorder because this significantly influences their quality of life [6,46]. By treating these diseases, HRQOL can be influenced positively.

In this study we used the HADS to measure depression and anxiety disorder, meaning that the percentages reported are only an indication. To diagnose these diseases, more extensive tests should be performed.

This study has several limitations. First, the study groups were relatively small because of the selection criteria. As a consequence, only large differences in the outcome variables resulted in statistically significant results. Another study also reported good health-related QOL for patients after thrombolysis [13]. Therefore, we expected minor differences in QOL after thrombolysis compared to those who did not receive this treatment. We may need to study a larger group of patients to detect a significant improvement in QOL after thrombolysis. Moreover, we only interviewed patients in the TG who went home immediately after discharge from hospital. They were probably good responders to thrombolytic therapy. We did not include those patients in the TG who were not discharged home and who were probably non-responders to thrombolytic therapy.

Secondly, the participants were distributed to two groups depending on which hospital they were admitted to, because the UMCG acts as a comprehensive stroke centre to which patients from the region eligible for thrombolytic treatment are transported. The Martini Hospital acts as a community hospital where stroke patients ineligible for thrombolytic treatment are admitted. Although the aftercare available to the two groups was the same, we could not completely rule out the confounding factor 'hospital'. For stronger generalizations, the study group should be larger and patients from multiple hospitals with and without thrombolytic treatment should be studied.

One of this study's strengths is the method of data acquisition. We visited patients at home to complete the questionnaires together. A lot of information was obtained through conversation, not only through the actual talking but also by being able to demonstrate.

Another strength is the fact that a single researcher visited all the patients and that we used standardized questionnaires. This avoided different interpretations of the results.

4.2. Conclusion

To conclude, this study found no essential differences in health-related quality of life between patients with or without thrombolytic therapy. Independence increased in the patients with thrombolytic therapy. We expected that patients with thrombolytic therapy (with initial worse stroke severity) would have worse HRQOL, functioning/mental functioning and participation. Therefore, thrombolytic therapy appears to be of great value to achieving good quality of life in ischemic stroke patients. Perhaps quality of life can be improved further for both groups if aftercare is more specific. This needs further investigation in stroke patients.

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REFERENCES

1. Wardlaw JM, Murray V, Berge E, Del Zoppo GJ: **Thrombolysis for acute ischaemic stroke.** *Cochrane Database Syst Rev* 2009, CD000213.
2. World Health Organization. **The world health report 2004 - changing history, Annex Table 2 Deaths by cause, sex and mortality stratum in WHO regions, estimates for 2002.** 2004.
3. Bots ML, van Dis SJ: *Factsheet Beroerte, Uitgave Nederlandse Hartstichting.* 2006.
4. Feigin VL, Lawes CM, Bennett DA, Anderson CS: **Stroke epidemiology: a review of population-based studies of incidence, prevalence, and case-fatality in the late 20th century.** *Lancet Neurol* 2003, **2**: 43-53.
5. Castilla-Guerra L, Fernandez-Moreno MC, Alvarez-Suero J: **Secondary stroke prevention in the elderly: new evidence in hypertension and hyperlipidemia.** *Eur J Intern Med* 2009, **20**: 586-590.
6. Weerd de L., Rutgers WA, Groenier KH, Meer van der K.: **Perceived wellbeing of patients one year post stroke in general practice - recommendations for quality aftercare.** *BMC Neurol* 2011, **11**: 42.
7. Donnan GA, Davis SM, Parsons MW, Ma H, Dewey HM, Howells DW: **How to make better use of thrombolytic therapy in acute ischemic stroke.** *Nat Rev Neurol* 2011, **7**: 400-409.
8. Liang BA, Lew R, Zivin JA: **Review of tissue plasminogen activator, ischemic stroke, and potential legal issues.** *Arch Neurol* 2008, **65**: 1429-1433.
9. Lingsma HF, Dippel DW, Hoeks SE, Steyerberg EW, Franke CL, van Oostenbrugge RJ et al.: **Variation between hospitals in patient outcome after stroke is only partly explained by differences in quality of care: results from the Netherlands Stroke Survey.** *J Neurol Neurosurg Psychiatry* 2008, **79**: 888-894.
10. Uyttenboogaart M, Schrijvers EM, Vroomen PC, De KJ, Luijckx GJ: **Routine thrombolysis with intravenous tissue plasminogen activator in acute ischaemic stroke patients aged 80 years or older: a single centre experience.** *Age Ageing* 2007, **36**: 577-579.
11. Kwiatkowski TG, Libman RB, Frankel M, Tilley BC, Morgenstern LB, Lu M et al.: **Effects of tissue plasminogen activator for acute ischemic stroke at one year. National Institute of Neurological Disorders and Stroke Recombinant Tissue Plasminogen Activator Stroke Study Group.** *N Engl J Med 1999, 340: 1781-1787.*
12. Bejot Y, Rouaud O, Jacquin A, Osseby GV, Durier J, Manckoundia P et al.: **Stroke in the very old: incidence, risk factors, clinical features, outcomes and access to resources--a 22-year population-based study.** *Cerebrovasc Dis* 2010, **29**: 111-121.
13. Fischer U, Anca D, Arnold M, Nedeltchev K, Kappeler L, Ballinari P et al.: **Quality of life in stroke survivors after local intra-arterial thrombolysis.** *Cerebrovasc Dis* 2008, **25**: 438-444.
14. CBO: **Richtlijn Beroerte.** *Utrecht*: CBO 2000.
15. Hochstenbach JB, Donders AR, Mulder T, van LJ, Schoonderwaldt H: **[Many chronic problems in CVA patients at home].** *Ned Tijdschr Geneeskd* 1996, **140**: 1182-1186.
16. National Institute of Neurological Disorders and Stroke. NIH Stroke Scale. 2-6-2008. Ref Type: Internet Communication
17. D'Olhaberriague L, Litvan I, Mitsias P, Mansbach HH: **A reappraisal of reliability and validity studies in stroke.** *Stroke* 1996, **27**: 2331-2336.
18. Mahoney FI, Barthel DW: **Functional evaluation: The Barthel Index.** *Md State Med J* 1965, **14**: 61-65.
19. Anderson C, Laubscher S, Burns R: **Validation of the Short Form 36 (SF-36) health survey questionnaire among stroke patients.** *Stroke* 1996, **27**: 1812-1816.
20. Untas A, Thumma J, Rascle N, Rayner H, Mapes D, Lopes AA et al.: **The Associations of Social Support and Other Psychosocial Factors with Mortality and Quality of Life in the Dialysis Outcomes and Practice Patterns Study.** *Clin J Am Soc Nephrol* 2010.
21. Zee van der KI, Sanderman R: **Het meten van de gezondheidstoestand met de RAND-36, Een handleiding.** *Noorderlijk Centrum voor Gezondheidsvraagstukken Rijksuniversiteit Groningen* 2006.
22. Bjelland I, Dahl AA, Haug TT, Neckelmann D: **The validity of the Hospital Anxiety and Depression Scale. An updated literature review.** *J Psychosom Res* 2002, **52**: 69-77.
23. Snaith RP, Zigmond AS: T**he hospital anxiety and depression scale.** *Br Med J (Clin Res Ed)* 1986, **292**: 344.
24. Akritas MG: **The rank transform method in some two-factor designs.** *J Am Stat Assoc* 1990, **85**.
25. Moser DK, Kimble LP, Alberts MJ, Alonzo A, Croft JB, Dracup K et al.: **Reducing delay in seeking treatment by patients with acute coronary syndrome and stroke: a scientific statement from the American Heart Association Council on Cardiovascular Nursing and Stroke Council.** *J Cardiovasc Nurs* 2007, **22**: 326-343.

26. Broadley SA, Thompson PD: **Time to hospital admission for acute stroke: an observational study.** *Med J Aust* 2003, **178**: 329-331.

27. Elkind MS, Prabhakaran S, Pittman J, Koroshetz W, Jacoby M, Johnston KC: **Sex as a predictor of outcomes in patients treated with thrombolysis for acute stroke.** *Neurology* 2007, **68**: 842-848.

28. Reed SD, Cramer SC, Blough DK, Meyer K, Jarvik JG: **Treatment with tissue plasminogen activator and inpatient mortality rates for patients with ischemic stroke treated in community hospitals.** *Stroke* 2001, **32**: 1832-1840.

29. Carod-Artal J, Egido JA, Gonzalez JL, Varela de SE: **Quality of life among stroke survivors evaluated 1 year after stroke: experience of a stroke unit.** *Stroke* 2000, **31**: 2995-3000.

30. Kauhanen ML, Korpelainen JT, Hiltunen P, Nieminen P, Sotaniemi KA, Myllyla VV: **Domains and determinants of quality of life after stroke caused by brain infarction.** *Arch Phys Med Rehabil* 2000, **81**: 1541-1546.

31. Shyu YI, Maa SH, Chen ST, Chen MC: **Quality of life among older stroke patients in Taiwan during the first year after discharge**. *J Clin Nurs* 2009, **18**: 2320-2328.

32. King RB: **Quality of life after stroke.** *Stroke* 1996, **27**: 1467-1472.

33. Mitchell PH, Veith RC, Becker KJ, Buzaitis A, Cain KC, Fruin M et al.: **Brief psychosocial-behavioral intervention with antidepressant reduces poststroke depression significantly more than usual care with antidepressant: living well with stroke: randomized, controlled trial.** *Stroke* 2009, **40**: 3073-3078.

34. Hartman-Maeir A, Eliad Y, Kizoni R, Nahaloni I, Kelberman H, Katz N: **Evaluation of a long-term community based rehabilitation program for adult stroke survivors.** *NeuroRehabilitation* 2007, **22**: 295-301.

35. Legg L, Langhorne P: **Rehabilitation therapy services for stroke patients living at home: systematic review of randomised trials.** *Lancet* 2004, **363**: 352-356.

36. Mishra NK, Lyden P, Grotta JC, Lees KR: **Thrombolysis is associated with consistent functional improvement across baseline stroke severity: a comparison of outcomes in patients from the Virtual International Stroke Trials Archive (VISTA).** *Stroke* 2010, **41**: 2612-2617.

37. Kapral MK, Fang J, Hill MD, Silver F, Richards J, Jaigobin C et al.: **Sex differences in stroke care and outcomes: results from the Registry of the Canadian Stroke Network.** *Stroke* 2005, **36**: 809-814.

38. Ekstam L, Uppgard B, von KL, Tham K: **Functioning in everyday life after stroke: a longitudinal study of elderly people receiving rehabilitation at home.** *Scand J Caring Sci* 2007, **21**: 434-446.

39. Kristensen HK, Persson D, Nygren C, Boll M, Matzen P: **Evaluation of evidence within occupational therapy in stroke rehabilitation.** *Scand J Occup Ther* 2010.

40. Chau JP, Thompson DR, Twinn S, Chang AM, Woo J: **Determinants of participation restriction among community dwelling stroke survivors: a path analysis.** *BMC Neurol* 2009, **9**: 49.

41. Boosman H, Schepers VP, Post MW, Visser-Meily JM: **Social activity contributes independently to life satisfaction three years post-stroke.** *Clin Rehabil* 2010.

42. Edwards DF, Hahn M, Baum C, Dromerick AW: **The impact of mild stroke on meaningful activity and life satisfaction.** *J Stroke Cerebrovasc Dis* 2006, **15**: 151-157.

43. Carota A, Staub F, Bogousslavsky J: E**motions, behaviours and mood changes in stroke.** *Curr Opin Neurol* 2002, **15**: 57-69.

44. Carod-Artal FJ, Egido JA: **Quality of life after stroke: the importance of a good recovery.***Cerebrovasc Dis* 2009, **27 Suppl 1**: 204-214.

45. Carod-Artal FJ: **[Post-stroke depression (I). Epidemiology, diagnostic criteria and risk factors]**. *Rev Neurol* 2006, 42: 169-175.

46. Kwok T, Lo RS, Wong E, Wai-Kwong T, Mok V, Kai-Sing W: **Quality of life of stroke survivors: a 1-year follow-up study.** *Arch Phys Med Rehabil* 2006, **87**: 1177-1182.

chapter 5

DAILY FUNCTIONING AND QUALITY OF LIFE OF PATIENTS ONE YEAR POST STROKE; A COMPARISON OF TWO DIFFERENT FOLLOW-UP CARE PROGRAMMES

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ABSTRACT

Background

An observational study to examine whether a new follow-up care programme (ATC) specifically aimed at conservation of daily functioning, quality of life and activities realizes better outcomes in stroke patients compared to conventional (ORP) follow-up care.

Methods

A total of 93 stroke patients who followed the ATC follow-up care programme or had conventional follow-up care were interviewed at home one-year post stroke using the Barthel Index and RAND-36 questionnaires and a questionnaire about their way of life and medication use. People aged under 60, Barthel <10 or with haemorrhage were excluded.

Results

In this study 25%(ATC) and 29%(ORP) of patients experienced more limitations in activities after one year. In the ATC group the decrease is related to ADL independence and loss of social contacts. ADL independence is correlated with a better quality of life. Health-related quality of life was identical in the two groups. It was observed in both groups that quitting or doing less activities is significantly related to a diminished quality of life. There is no significant difference between the groups in terms of medicine use or follow-up care. More patients visit day centres in the ATC group.

Conclusions

No major differences in outcome could be found between the two groups. A relationship between doing diverse activities and quality of life was found in both groups. Perhaps studying the individual needs of stroke patient would be more effective than a standard follow-up care programme. This needs further investigation.

1. BACKGROUND

Each year, 19.000 men and 22.000 women in the Netherlands have strokes[1,2]. Absolute lifetime risk of stroke is similar in men and women[3]. The average age of patients having a stroke is seventy years in men and seventy-five in women[4]. Twenty-five percent of all patients die in the first year after stroke[5].

The post-stroke period can be divided into three phases: the acute phase, the rehabilitation phase and the chronic phase. This distinction is important because treatment and patient support are different at each phase [6]. Our study concerns the chronic phase, which starts approximately six months after a stroke, where acceptance and coping with persistent disabilities plays a prominent role[6].

Strokes change patients' lives in many different ways, not only physically, but also emotionally, psychically, cognitively and socially [7]. This influences quality of life (QOL). As stroke mortality declines, more patients have to live with the consequences of stroke. Therefore, improving QOL and paying more attention to follow-up care is increasingly important[7].

After discharge from hospital, stroke patients return home or need rehabilitation in a nursing home or rehabilitation clinic. The present study is about patients who rehabilitated in a nursing home and returned home after rehabilitation. When patients finally return home a lot of things have changed. It is therefore important to also pay attention to follow-up care after discharge from a nursing home.

In Groningen, the Netherlands, we have developed a new follow-up care programme. Figure 1 provides the old follow-up care programme (ORP) and Figure 2 shows the new ATC programme (Ambulant Treatment team for CVA-patients). In the ATC programme there are two pathways, namely complex and non-complex. The complex pathway concerns patients who cannot be treated in general practice, patients who have invalidating cognitive or behavioural problems after stroke or those where there is no stable home environment, or where there is doubt whether the teached behaviours in rehabilitation will be applied at home. Patients in the complex pathway are guided for a year. Where there are problems, the ATC team tries to find a solution in cooperation with the patient or his/her GP. One of the professionals in the ATC team visits the patients regularly and the whole team gives advice on daily life and advice about the required follow-up care to the GPs. When necessary, the ATC team can treat certain conditions like depression, but also teach patients to go shopping, visiting or going on holidays again.

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Figure 1. The conventional follow-up care (ORP).
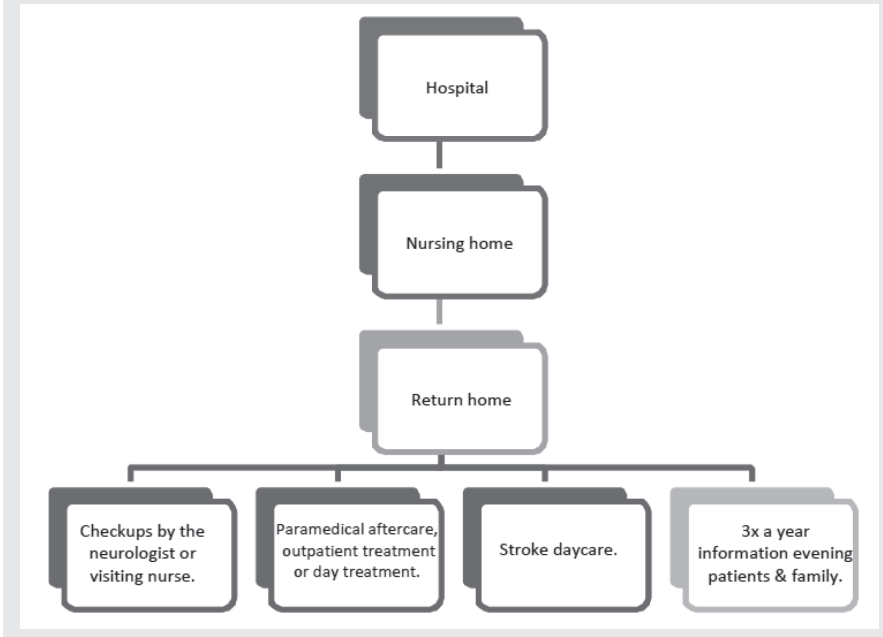
Figure 2. Follow-up care according to the ATC programme
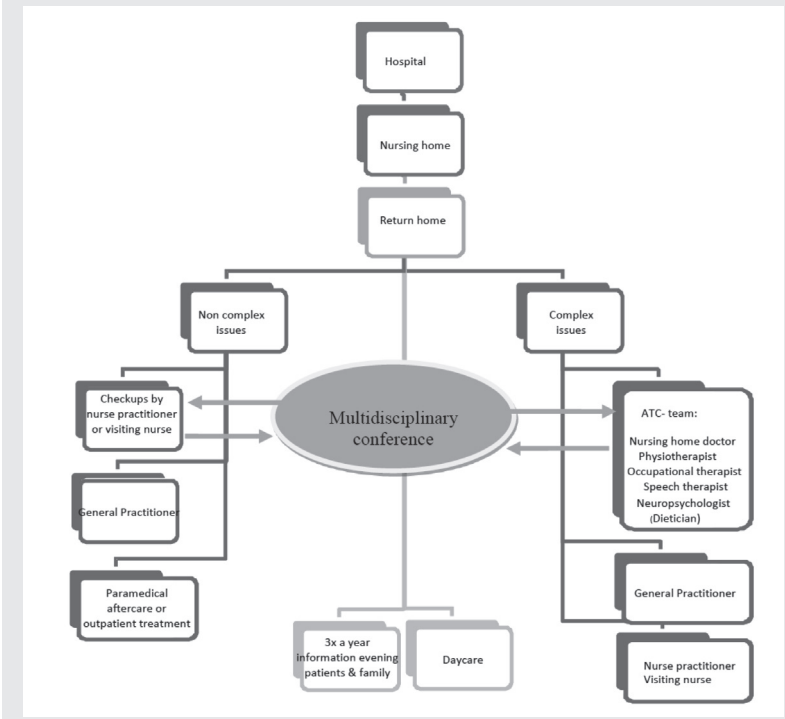
The ATC programme was designed because there were indications that when patients are finally at home they face other problems than with rehabilitation and that a lot of stroke patients were not seeking help for many of the problems they experienced at home. With ATC guidance these problems are made clear earlier and it is easier to give advice. Major difference between the two programmes is the frequency of follow up and contacts between patients and a professional in which support and treatment can be given.

The purpose of this study is to determine whether the ATC follow-up care programme realizes a better outcome compared to the ORP follow-up care. This was done by comparing the wellbeing of patients who were treated by the ATC team one year post stroke to patients who had followed the ORP. Wellbeing includes physical functioning, QOL, secondary prevention and changes in life habits.

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2. PATIENTS AND METHODS

2.1. Study design
The study includes all the ischemic stroke patients admitted to the Heymanscentrum nursing home in Groningen, between July 2005 and July 2006(the ORP group) and between November 2006 and November 2007(the ATC group). A total of 190 (93 ORP and 97 ATC) patients were included. The exclusion criteria for patients were: a)being under 60, to create a more homogenous group, because younger patients have different social life and the impact of diminished functioning is possibly much greater than in older patients; b)haemorrhagic stroke, because these patients have a worse prognosis[8] and different risk profile[9]; and c)patients with a Barthel score under 10. The MEC (medical ethical committees) of the Martini Hospital approved this study (17 January 2008). Informed consent was obtained from all patients.

After informed consent, clinical details – including stroke severity, co-morbidity, risk factors before stroke, use of medication and demographic information – were obtained from medical records. Stroke severity was determined by the National Institute of Health Stroke Scale examination at hospital admittance.

One year post stroke all patients were visited at home by a medical practitioner. Patients were interviewed in person by a trained medical practitioner and standardized questionnaires were administered.

2.2. Measures at 12 months
The Barthel Index (BI) was used to assess disability in our patients. The BI measures the level of independence in ADL and yields a score ranging from 0 (functionally dependent) to 20-21 (functionally independent). Patients are given three points for eating independently in this questionnaire, rather than two points. The sensitivity and reliability of the BI are high for stroke patients [10-12].

To measure health-related quality of life (HRQOL) we used the RAND-36. The RAND-36 consists of 36 questions and comprises 8 health-scales (physical function (FF), role limitations – physical (Rlf), social functioning (SF), role limitations – emotional(Rle), bodily pain(BP), general health(GH), vitality(Vit) and mental health(MH)). The health scales range from 0(poor HRQOL) to 100(good HRQOL). This is based on the summated ratings method. The RAND-36 is a reliable and valid measure for determining HRQOL in stroke patients [13-15]. The HRQOL in this study was compared to the HRQOL of the Dutch elderly population[15].

In addition, patients were asked about changes in habits and daily occupations because of stroke, such as smoking, alcohol consumption, housekeeping, physical exercise, hobbies, reading, visiting family and friends, membership of clubs or associations and going on holiday. We also asked about their use of medication, if they had contact with their GPs, neurologists, nurse practitioners or assistants, and their reason for this contact.

They were also asked about rehabilitation: whether they had any and how many times they had physiotherapy, speech therapy, occupational therapy, home help, day-centre care and admittance to hospital.

2.3. Statistical analysis

SPSS 15 for Windows was used for statistical analysis. Statistical significance was set at $p<0.05$ (2-sided). For comparisons between groups we used the non-parametric tests: Mann-Whitney, Kruskall-Wallis and Analysis of variance (ANOVA) using the Rank Transform method. The Rank Transform method consists of replacing the observations by their ranks in the combined sample and performing one of the standard analysis of variance procedures on these ranks[16]. Fisher's exact test was used for categorical variables.

To describe the number of patients who changed their habits due to stroke, their responses were categorized into 'more', 'less', 'as much as before' or 'quit'.

Despite the relatively large number of statistical tests applied, we decided not to correct for 'multiple testing' (for instance by means of the Bonferroni method). Instead, the p-values are simply presented as an indication of the strength of the evidence.

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3. RESULTS

3.1. Baseline characteristics

190 patients were found to have had an ischemic stroke. Eventually, ninety-three interviews (ATC N=45, ORP N=48) were conducted (Figure 3).

Detailed baseline characteristics of the study population are provided in Table 1. There are no significant differences in the characteristics of the two groups.

Table 1: Baseline characteristics of the study population

Variables	ATC (%)	ORP (%)	p*
Patients included	45	48	
Gender			
- *Men*	22 (49)	17 (35)	
- *Women*	23 (51)	31 (65)	
Age, average (range)	78 (61-92)	77 (60-89)	
Living situation			
- *Living alone*	21 (47)	30 (62.5)	
- *Living with a partner*	24 (53)	18 (37.5)	
Brain hemisphere			0.351
- *Left side*	19 (42)	27 (56)	
- *Right side*	22 (49)	21 (44)	
- *Unknown*	4 (9)	-	
NIHSS, average (range)	5 (0-23)	5 (0-22)	0.522
Risk factors present before stroke			
- *No risk factors*	7 (16)	3 (6)	0,189
- *Hypertension*	24 (53)	17 (43)	0,082
- *Hypercholesterolemia*	9 (20)	7 (14)	0,489
- *Diabetes*	5 (11)	8 (20)	0,440
- *Cardiac embolus*	11 (24)	12 (22)	0,951
- *Smoking*	10 (22)	-	
History			
- *No history*	7 (16)	3 (6)	0.189
- *Ischemic heart disease*	13 (29)	7 (15)	0.093
- *Stroke / TIA*	12 (27)	14 (29)	0.788
- *Atrial fibrillation*	7 (16)	12 (25)	0.259
- *Heart failure*	2 (4)	4 (8)	0.678
- *COPD*	4 (11)	9 (19)	0.303
- *Depression*	4 (9)	2 (4)	0.425

* Fisher's exact test.

Figure 3. Patient selection flow chart
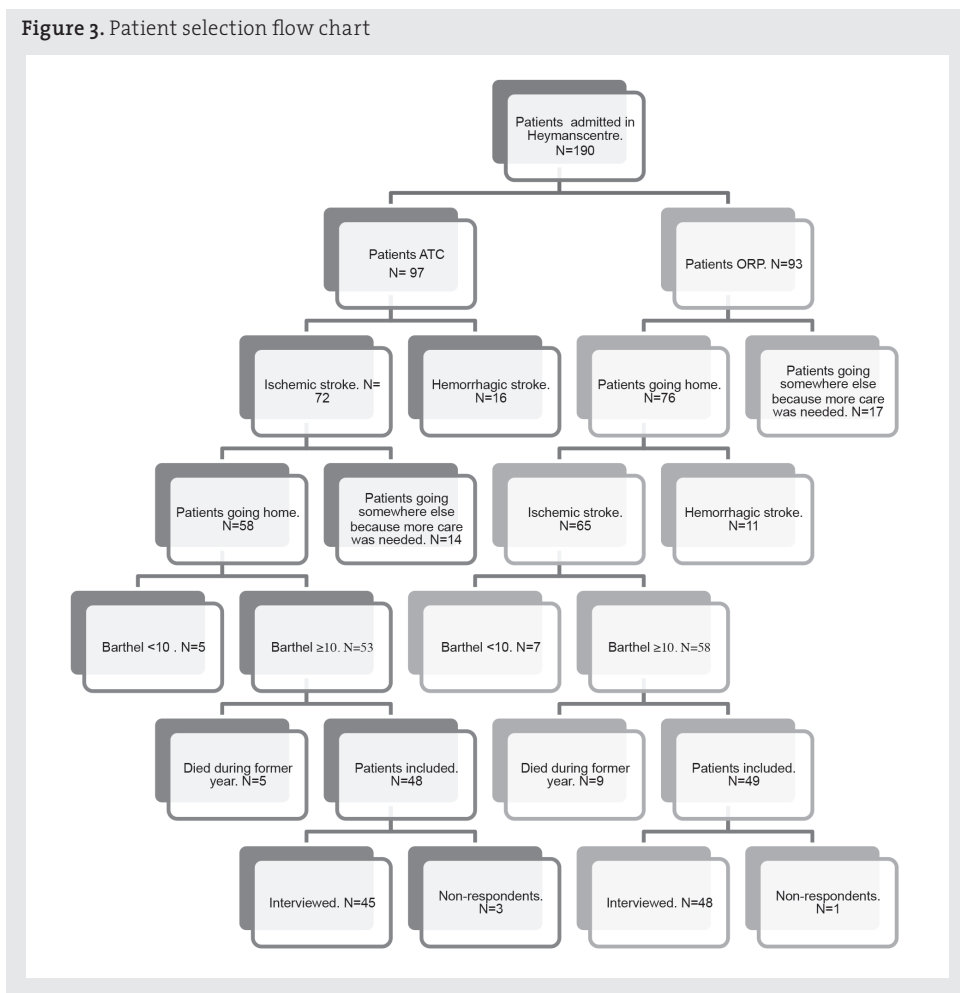
3.2. Level of dependence according to Barthel Index

When patients were admitted in the nursing home, 24% of the ATC group and 15% of the ORP group were severely till totally dependent (BI: 0 till 10). One year after discharge 3 patients of the ATC and 1 patient of the ORP were severely or totally dependent. Most patients were not dependent at all (BI>19) (ATC: 56%, ORP: 58%) or only slightly dependent (BI 15 till 20) (ATC: 38%, ORP: 35%).

Almost 38% of the ATC group and 40% of the ORP group scored the same at discharge and one year after discharge. Thirty-eight percent (ATC) and 31% (ORP) had better scores after one year. Twenty-five percent (ATC) and 29% (ORP) had worse scores. Progress in ADL independency after one year did not differ significantly between the two groups (p = 0.457).

Being more dependent was related to diminishing daily occupations. This was significant in housekeeping, physical activity and hobbies in both groups. An experienced decline in QOL is not related to being more dependent (Table 2).

There is no significant difference between follow-up care and BI (Table 2). Only ATC group patients with district nursing service experienced worse BI than patients without district nursing service.

The Rank Transform ANOVA was used to investigate whether there were any interaction effects between the ATC and ORP groups and gender, changes in habits, daily occupations, use of medication, the frequency of contact with GPs, neurologists or rehabilitation with respect to the BI scores. There were no significant interaction effects (Table 2)

Table 2: Functioning (BI), one year after discharge according to demographic factors, change in activities and follow-up care.

Variables		ATC group			ORP group			
		N	Median (range)	p*	N	Median (range)	p*	p #
Gender[2]	Male	22	20 (8-21)	0.467	17	19 (2-21)	**0.018**	0.434
	Female	23	20.5 (7-21)		31	21 (17-21)		
Social situation[2]	Living alone	21	20 (8-21)	0.820	18	20 (2-21)	0.834	0.619
	Living with partner	24	20.5 (7-21)		30	20 (16-21)		
Stroke location[2]	Left side	19	21 (8-21)	0.075	27	20 (11-21)	0.282	0.300
	Right side	22	19 (7-21)		21	20 (2-21)		
Housekeeping[1]	More	.	.	**0.000**	.	.	**0.014**	0.619
	As much as before	16	21 (18-21)		15	21 (17-21)		
	Less	19	19 (16-21)		26	20 (13-21)		
	Quit	10	17.5 (7-21)		7	17 (2-20)		
Physical activity[1]	More	.	.	**0.012**	.	.	**0.014**	0.407
	As much as before	16	21 (18-21)		17	21 (13-21)		
	Less	25	19 (15-21)		26	19 (11-21)		
	Quit	4	8 (7-21)		5	17 (2-20)		
Hobbies[1]	More	1	.	**0.014**	.	.	**0.043**	0.051
	As much as before	21	21 (16-21)		21	21 (13-21)		
	Less	18	20 (8-21)		16	19.5 (16-21)		
	Quit	5	17 (7-19)		11	20 (2-20)		
Visiting[1]	More	.	.	**0.000**	.	.	0.214	0.551
	As much as before	20	21 (18-21)		31	20 (13-21)		
	Less	19	20 (16-21)		16	20 (11-21)		
	Quit	6	11.5 (7-19)		1	2		
Experienced quality of life[2]	The same	22	21 (8-21)	0.079	21	19 (13-21)	0.367	0.331
	Diminished	22	19 (7-21)		27	20 (2-21)		
GP contact[2]	No	3	21 (19-21)	0.364				
	Yes	42	20 (7-21)					
	>10 times				26	20 (2-21)	0.864	
	<10 times				22	20 (11-21)		
Neurologist contact[2]	No	11	20 (17-21)	0.972	5	19 (13-21)	0.719	
	Yes	26	20.5 (8-21)		43	20 (2-21)		
Physiotherapy[2]	No	13	21 (15-21)	0.070	34	20 (2-21)	0.136	0.264
	Yes	32	19 (7-21)		14	18.5 (11-21)		
Speech therapy[2]	No	31	19 (7-21)	0.216	32	20 (2-21)	0.320	0.698
	Yes	14	21 (8-21)		16	20 (16-21)		
Occupational therapy[2]	No	28	21 (7-21)	0.105	34	20 (13-21)	0.127	0.160
	Yes	17	19 (8-21)		14	19 (2-21)		
District nursing services[2/3]	No	29	21 (8-21)	**0.000**	24	20 (2-21)	0.470	
	Yes				19	20 (11-21)		
	More	15	18 (7-21)					
	Less				5	21 (18-21)		
Local Authority home help[2]	No	19	19 (7-21)	0.766	18	20 (16-21)	0.374	0.780
	Yes	25	20 (8-21)		30	20 (2-21)		
Day center[2]	No	33	21 (7-21)	0.103	43	20 (2-21)	0.222	0.425
	Yes	12	19 (8-21)		5	20 (17-21)		
Hospital admittance[2]	No	38	20 (7-21)	0.780	38	20 (13-21)	0.496	0.316
	Yes	7	19 (17-21)		10	19.5 (2-21)		

* Kruskall-Wallis1 and Mann-Whitney2 test, # Interaction rank transform ANOVA

3.3. Health-related quality of life (RAND-36)

Table 3 presents the comparison between the HRQOL of the ATC and the ORP groups. HRQOL is nearly identical in these two groups, except for two health scales. The ATC group has significantly better HRQOL for the 'role limitations – physical' and 'general health' health scales.

Two aspects of the RAND-36 were related to level of dependence in personal activities of daily living (BI). There is a high correlation with the 'physical functioning' health scale (ATC: R=0.850; ORP: R=0.593) and a moderate correlation with 'role-limitations physical' health scale (R=0.329) in the ATC group.

Table 3: Rand-36 comparison in the two study groups

Rand-36	ATC	ORP	
	Median (range)	*Median (range)*	*p**
Physical functioning	45 (0-95)	55 (0-95)	0.301
Social functioning	87.5 (25-100)	100 (0-100)	0.836
Role limitations – physical	50 (0-100)	25 (0-100)	**0.012**
Role limitations – emotional	100 (33.3-100)	100 (0-100)	0.552
Mental Health	82 (12-100)	76 (24-100)	0.086
Vitality	65 (0-100)	65 (20-100)	0.727
Bodily Pain	100 (34.7-100)	100 (10.2-100)	0.673
General Health	65 (15-100)	50 (5-100)	**0.042**

*Mann-Whitney test

Tables 4 and 5 present the relationship between HRQOL and change in activities. Patients who stopped or reduced activities such as housekeeping, physical exercise, hobbies or visiting presented significantly worse HRQOL.

We also investigated whether there was an interaction effect between the groups and the change in activities in the RAND-36 (Table 6). There is only one significant interaction effect between housekeeping and the ATC and ORP groups for the RAND-36 (p=0.046).

Table 4: ATC group: relationship between HRQOL and change in activities

Variables		FF	p	SF	p	RLf	p	RLe	p	MH	p	Vit	p	BP	p	GH	p
House-Keeping[1]	As much	77.5	**<0.001**	75	0.244	75	0.071	100	0.421	78	0.704	75	0.593	100	0.102	70	0.939
	Less	45		100		50		100		84		65		89.8		65	
	Quit	10		75		25		100		84		60		94.9		65	
Physical activity[1]	As much	72.5	**<0.001**	100	0.120	87.5	**0.006**	100	0.808	84	0.615	67.5	**0.037**	100	**0.014**	75	0.075
	Less	35		81.3		37.5		100		82		67.5		89.8		65	
	Quit	2.5		62.5		25		100		62		32.5		100		32.5	
Hobbies[1]	As much	70	**0.003**	100	**0.005**	75	0.069	100	0.258	80	0.312	70	0.072	100	0.724	70	**0.006**
	Less	45		75		50		100		86		60		94.9		55	
	Quit	20		62.5		25		100		76		50		100		40	
Visiting[1]	As much	70	**<0.001**	100	0.220	75	**0.011**	100	0.782	84	0.890	70	0.245	100	0.864	70	0.168
	Less	45		75		50		100		80		65		100		65	
	Quit	7.5		75		0		100		80		60		100		45	
Day center[2]	Yes	40	0.246	75	0.436	50	0.568	100	0.601	84	0.643	60	0.558	100	0.877	60	0.558
	No	55		100		50		100		80		70		100		70	

Results of the Kruskal-Wallis1 or Mann-Whitney2 test.

FF: median physical functioning, SF: median social functioning, RLf: median role limitations – physical, RLe: median role limitations – emotional, MH: median mental health, Vit: median vitality, BP: median bodily pain, GH: median general health.

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Table 5: ORP group: relationship between HRQOL and change in activities

Variables		FF	p	SF	p	RLf	p	RLe	p	MH	p	Vit	p	BP	p	GH	p
House-Keeping[1]	As much	60	0.001	87.5	0.557	25	0.660	100	0.798	84	0.300	70	0.164	100	0.742	65	0.106
	Less	60		100		25		100		76		60		88.8		45	
	Quit	20		75		25		100		72		55		77.6		40	
Physical activity[1]	As much	70	0.045	100	0.009	50	0.008	100	0.153	80	0.104	70	0.179	100	0.352	65	0.208
	Less	52.5		75		25		100		72		60		88.8		42.5	
	Quit	25		75		25		100		72		65		100		50	
Hobbies[1]	As much	60	0.124	100	0.155	50	0.006	100	0.904	80	0.035	70	0.324	100	0.944	65	0.274
	Less	60		87.5		25		100		76		65		100		50	
	Quit	35		75		25		100		72		45		100		40	
Visiting[1]	As much	55	0.066	100	<0.001	25	<0.001	100	0.707	76	0.559	70	0.045	79.6	0.355	65	0.222
	Less	42.5		62.5		0		100		74		60		100		45	
	Quit	0		12.5		0		100		72		25		100		20	
Day center[2]	Yes	50	0.648	62.5	0.019	0	0.036	100	0.529	64	0.099	45	0.599	77.6	0.658	35	0.279
	No	55		100		25		100		76		65		100		50	

Results of the Kruskal-Wallis1 or Mann-Whitney2 test.

FF: median physical functioning, SF: median social functioning, RLf: median role limitations – physical, RLe: median role limitations – emotional, MH: median mental health, Vit: median vitality, BP: median bodily pain, GH: median general health.

Table 6: RAND-36 interactions between the ATC and ORP groups and activities

HRQOL	Activities	p#
Physical functioning	Housekeeping	0.046
	Physical activity	0.128
	Hobbies	0.164
	Visiting	0.870
	Day centre	0.695
Social functioning	Housekeeping	0.860
	Physical activity	0.256
	Hobbies	0.430
	Visiting	0.063
	Day centre	0.141
Role limitations – physical	Housekeeping	0.701
	Physical activity	0.804
	Hobbies	0.190
	Visiting	0.142
	Day centre	0.154
Role limitations – emotional	Housekeeping	0.564
	Physical activity	0.321
	Hobbies	0.367
	Visiting	0.892
	Day centre	0.847
Mental health	Housekeeping	0.218
	Physical activity	0.312
	Hobbies	0.607
	Visiting	0.808
	Day centre	0.131
Vitality	Housekeeping	0.732
	Physical activity	0.079
	Hobbies	0.718
	Visiting	0.412
	Day centre	0.882
Bodily pain	Housekeeping	0.634
	Physical activity	0.289
	Hobbies	0.847
	Visiting	0.565
	Day centre	0.622
General health	Housekeeping	0.351
	Physical activity	0.281
	Hobbies	0.424
	Visiting	0.834
	Day centre	0.471

Interaction rank transform ANOVA.

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3.4. Daily occupations

Quitting or doing less of certain activities such as housekeeping, physical activity, hobbies and visiting is significantly related to physical functioning and HRQOL for both groups. The percentages of patients who had to stop or diminish activities are presented in Table 7.

Table 7: Change in the frequency of daily occupations

Daily Occupations		ATC (%)	ORP (%)	p*
Housekeeping	The same	35.6	31.3	0.459
	Less	42.2	54.2	
	Quit	22.2	14.6	
Physical exercise	The same	35.6	35.4	1.000
	Less	55.6	54.2	
	Quit	8.9	10.4	
	More	2.2	0	
Hobbies	The same	46.7	43.8	0.328
	Less	40.0	33.3	
	Quit	11.1	22.9	
Visiting	The same	44.4	64.6	**0.041**
	Less	42.2	33.3	
	Quit	13.3	2.1	
Holidays	The same	62.2	45.8	**0.047**
	Less	17.8	10.4	
	Quit	20.0	43.8	

* Fisher's exact test

3.5. Medication

The use of medication is important in secondary prevention. One year post stroke, 51% (ATC) and 36% (ORP) used the same medication as at discharge from hospital.

One year post stroke, 60% of the ATC group used aspirin. On discharge from hospital, this percentage was 69%. Thirty-six percent used aspirin and dipyridamole in combination. Thirty-one percent of the ATC patients used acenocoumarol. Two percent used no blood-thinning medication at all.

In the ORP group, 8% used no blood-thinning medication at all. Sixty-nine percent used aspirin. Nineteen percent used aspirin and dipyridamole in combination. Twenty-one percent used acenocoumarol.

Another important group of drugs are the cholesterol-lowering medications. Use of simvastatin decreased over one year. No cholesterol-lowering medication was used in 33% of the ATC and 29% of the ORP group.

In both groups, 80% of patients use antihypertensive medication after stroke. The most frequently used medication is a thiazidediuretic (42% ATC and 38% of the ORP group). Forty-four percent of the patients said their blood pressure was never measured in the year preceding the interview.

There are no significant differences in medication use between the two rehabilitation groups.

3.6. Follow-up care

Patients were asked how often they visited their GPs. Seven percent (N=3) of the ATC group and no-one from the ORP group said they had no contact with their GP. Many patients would like their GP to visit them more often.

Seventy-one percent of the patients from the two groups received physiotherapy. In both groups 30% had occupational therapy and 30% had speech therapy.

In the ATC group 33% had district nursing service, as did 45% of the ORP. Forty-three percent of the ATC group and 38% of the ORP group did not receive local authority home help.

In the ATC group 27% of the patients visited day centres. Only 10% of the ORP group visited day centre. Fourteen percent (ATC) and 18% (ORP) had suffered from another stroke.

4. DISCUSSION AND CONCLUSION

The aim of this study was to compare the wellbeing one year post stroke of patients treated by the ATC team with patients who had followed the ORP to determine if the ATC follow-up care realizes better outcomes.

The two groups were readily comparable because there were no significant differences in their NIHSS, age, stroke location and risk factors.

This study has several limitations. The study groups were relatively small because of selection criteria. To make stronger generalizations, the study group should be larger and patients from multiple nursing homes should be studied. The participants were distributed to two treatments in the basis of time entering the study. Although the practitioners in the different programs were the same, we could not completely rule out the confounding factor time entering the rehabilitation programs. Furthermore, the study groups had a very high mean age, thus decline in functioning is possibly partially due to normal aging. Finally, patients who refused to participate in this study were not considered. These patients told us that they were doing fine and that a visit was not necessary. Theoretically, these patients could be those whose physical and psychological functioning is very bad.

One of this study's strengths is the method of data acquisition. We visited patients at home to complete the questionnaires together. A lot of information is obtained through conversation, not only through the actual talking but also by being able to demonstrate. Another strength is the fact that one researcher visited all the patients and that we used standardized questionnaires. This avoids different interpretation of the results.

Our research showed no significant difference in ADL independence after one year between the ATC group and the ORP group. Like other studies [17], there is a relationship between ADL independence and daily occupations in both groups. Paying attention to this in rehabilitation is important [18,19].

In the ATC group there is a relationship between ADL independence and loss of social contacts. This has also been observed in other studies [20,21]. In the ORP group no relationship was found. We expected the opposite because more attention is paid to this aspect in the ATC programme. A possible explanation is that when more attention is paid to this problem, people experience more loss of social contacts. Life satisfaction is significantly related to social activity and ADL independence [22-24], this should therefore receive extra attention in rehabilitation.

HRQOL was studied with the RAND-36. Unfortunately, the HRQOL was only measured one year post stroke. HRQOL was nearly identical in the two groups. The ATC group only had better HRQOL in 'role limitations – physical' and 'general health' health. HRQOL and ADL independence were correlated. Worse ADL independence correlates to worse 'physical functioning' and 'role-limitations physical'. Other studies also show such a relationship [25-28]. Physical impairment has a great impact on reintegration of stroke patients in society. HRQOL is raised with improvement in physical state, and patients are more easily reintegrated into society[27].

The HRQOL in both groups was high. The studies of Kauhanen et al.(2000) and Carod-Artal et al. (2000) report lower HRQOL after one year. They possible studied more severely impaired stroke patients, because they included all ischemic stroke patients. In contrast, in our study the mean age was higher [25,29]. In a study by Shyu et al.(2009), older ischemic stroke patients were interviewed at home, but these patients seem to have also had lower HRQOL[28].

There was a significant difference between the ATC group and ORP group with respect to holidays and visiting. Patients in the ATC group more frequently reported that their vacation habits were unchanged. This is possibly due to the fact that going on holidays was specifically trained in the ATC rehabilitation. Patients in the ORP group were more often able to continue visiting family and friends. We have no good explanation for this, because the ATC group specifically trained visiting in rehabilitation.

A diminished QOL is significantly related to quitting or doing less of certain activities such as housekeeping, physical activity, hobbies and visiting in both groups. HRQOL could possibly increase further were patients to receive even more support than was given in the ATC rehabilitation to resume different activities. Another option would be to start community-based rehabilitation programmes. This could increase stroke patients' activity levels and give them greater satisfaction [30-33], although this was not found in the ATC group,

There is no significant difference in medication use between the two rehabilitation groups. We would have expected a stricter use of medication in the ATC group because of more intensive assistance.

Although there are no significant differences in medication use, in the ATC group more patients were using the same medicine as they had done on discharge from their nursing homes compared to the ORP group. One year post stroke more patients from the ORP group used no blood-thinning medication at all. Of the ATC group, fewer patients used aspirin, but more used aspirin and dipyridamole in combination, or acenocoumarol. When patients use aspirin, the risk of further stroke decreases by 13-22%[34]. The use of aspirin is recommended to every stroke patient and patients with atrial fibrillation should use acenocoumarol[35]. When dipyridamole or clopidogrel is added to aspirin, it will result in a relative risk reduction of 16% for vascular death, stroke or heart attack[36]. All in all, there seems to be better use of blood-thinning medication in the ATC group. Some minor aspects can be adjusted, such as adding dipyridamole to aspirin. However, this only concerns small percentage of patients.

Use of simvastatin decreased over one year. This is possibly due to negative publicity. Less cholesterol-lowering medication is used by the ATC group, though these patients get more assistance in using medicine. Almost everyone should use cholesterol-lowering medication unless life expectancy based on comorbidity is minimal. The risk of cardiovascular disease is reduced by statins, regardless of cholesterol levels. With respect to fatal and non-fatal cardiovascular disease through statin use, an absolute risk reduction

of 5-6% is achieved. Treatment with statins even in elderly patients will reduce the risk of cardiovascular disease [34,35,37].

Eighty percent of patients from both groups used antihypertensive medication, but 44% said their blood pressure had never been measured in the year preceding the interview. It is important to check blood pressure regularly. A reduction of 5-6 mmHg in diastolic blood pressure or 10 mmHg in systolic pressure results in a 24% reduction in the chances of stroke recurrence[34].

Seven percent of the ATC group and 0% of the ORP group reported that they had received no post-stroke contact with their GPs. This could be explained by the fact that patients from the ATC group receive a lot of assistance from others, meaning that GPs are under the impression that contact with them is less necessary.

Turning to follow-up care, many patients (71% ATC and 71% ORP) received physiotherapy. Thirty percent of both groups received occupational therapy and 30% received speech therapy. Follow-up care is very important because early initiation of rehabilitation is related to improved functional outcome and physiotherapy based on different approaches has a greater impact on functional independence than no therapy at all [38-40]. Because patients from ATC group received more specific guidance and therapy we would expect that functioning would be much better than in the ORP group. However, in this study this was not found. Harrington (2009) showed that low-cost 'exercise and education' intervention was successful in improving physical integration, when compared with standard care [41].

The same percentage of patients in the ATC and ORP group received district nursing service and local authority home help. Although the assistance provided for the two groups is different, there is no difference in using these two services. A lot more patients from the ATC group visited a day centre. This is probably due to the fact that patients from the ATC group receive more information about day centre care and are encouraged use it.

Fourteen percent (ATC) and 18% (ORP) suffered from another stroke. In a study by Appelros et al. (2003), 9% of survivors experienced another stroke within one year[42]. This percentage is lower than our findings. The number of patients with stroke recurrence is too small to investigate whether there is a relationship between the quality of follow-up care and the occurrence of a second stroke.

Mortality differs slightly between the two groups (ATC 9.4%, ORP 16.6%), but is still relatively low. Mortality in other studies is about 30% [5,43,44]. Mortality is probably low because the severity of stroke was also low in terms of NIHSS score on admission to hospital. There is a relationship between higher NIHSS score and higher mortality [45,46].

All in all, no great difference in outcome between the two groups could be found. We expected that patients with better follow-up care specifically aimed at conservation of activities would ultimately result in better dependency in ADL, HRQOL and participation. Other research confirms this idea[47,48] but these studies used small groups and mainly explored physical activity and the resources required to reconstruct their lives. However, ATC follow-up care seems of little added value compared to conventional follow-up care. In

order to increase participation and improve QOL, a different type of follow up is required. Perhaps studying the individual needs of stroke patient would be more effective than a standard follow-up care programme. This needs further investigation in stroke patients.

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REFERENCES

1. Hoe vaak komt een beroerte voor en hoeveel mensen sterven eraan? Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid Bilthoven . 2010. RIVM.
    Ref Type: Electronic Citation
2. Bots ML, van Dis SJ: Factsheet Beroerte, *Uitgave Nederlandse Hartstichting.* 2006.
3. Hollander M, Koudstaal PJ, Bots ML, Grobbee DE, Hofman A, Breteler MM: **Incidence, risk, and case fatality of first ever stroke in the elderly population. The Rotterdam Study.** *J Neurol Neurosurg Psychiatry* 2003, **74**: 317-321.
4. Feigin VL, Lawes CM, Bennett DA, Anderson CS: **Stroke epidemiology: a review of population-based studies of incidence, prevalence, and case-fatality in the late 20th century.** *Lancet Neurol* 2003, **2**: 43-53.
5. Verhoeven S, Beusmans GHMI, van Bentum STB, van Binsbergen JJ, Pleumeekers HJCM, Schuling J: **NHG-standaard CVA.** *Huisarts Wet* 2004, **47**: 509-520.
6. Meyboom-de Jong B, Buis J: *Zorg na een beroerte.* Den Haag: Nederlandse Hartstichting; 1995.
7. Haacke C, Althaus A, Spottke A, Siebert U, Back T, Dodel R: **Long-term outcome after stroke: evaluating health-related quality of life using utility measurements.** *Stroke* 2006, **37**: 193-198.
8. Lee WC, Joshi AV, Wang Q, Pashos CL, Christensen MC: **Morbidity and mortality among elderly Americans with different stroke subtypes.** *Adv Ther* 2007, **24**: 258-268.
9. Pham TM, Fujino Y, Tokui N, Ide R, Kubo T, Shirane K et al.: **Mortality and risk factors for stroke and its subtypes in a cohort study in Japan.** *Prev Med* 2007, **44**: 526-530.
10. D'Olhaberriague L, Litvan I, Mitsias P, Mansbach HH: **A reappraisal of reliability and validity studies in stroke.** *Stroke* 1996, **27**: 2331-2336.
11. de HR, Limburg M, Schuling J, Broeshart J, Jonkers L, van ZP: **[Clinimetric evaluation of the Barthel Index, a measure of limitations in daily activities].** *Ned Tijdschr Geneeskd* 1993, **137**: 917-921.
12. MAHONEY FI, BARTHEL DW: **FUNCTIONAL EVALUATION: THE BARTHEL INDEX.** *Md State Med J* 1965, **14**: 61-65.
13. Anderson C, Laubscher S, Burns R: **Validation of the Short Form 36 (SF-36) health survey questionnaire among stroke patients.** *Stroke* 1996, **27**: 1812-1816.
14. Unalan D, Soyuer F, Ozturk A, Mistik S: **Comparison of SF-36 and WHOQOL-100 in patients with stroke.** *Neurol India* 2008, **56**: 426-432.
15. Zee van der KI, Sanderman R: **Het meten van de gezondheidstoestand met de RAND-36, Een handleiding.** *Noorderlijk Centrum voor Gezondheidsvraagstukken Rijksuniversiteit Groningen* 2006.
16. Akritas MG: **The rank transform method in some two-factor designs.** *J Am Stat Assoc* 1990, **85**.
17. Ekstam L, Uppgard B, von KL, Tham K: **Functioning in everyday life after stroke: a longitudinal study of elderly people receiving rehabilitation at home.** *Scand J Caring Sci* 2007, **21**: 434-446.
18. Kristensen HK, Persson D, Nygren C, Boll M, Matzen P: **Evaluation of evidence within occupational therapy in stroke rehabilitation.** *Scand J Occup Ther* 2010.
19. Wallenbert I, Jonsson H: **Waiting to get better: a dilemma regarding habits in daily occupations after stroke.** *Am J Occup Ther* 2005, **59**: 218-224.
20. Chau JP, Thompson DR, Twinn S, Chang AM, Woo J: **Determinants of participation restriction among community dwelling stroke survivors: a path analysis.** *BMC Neurol* 2009, **9**: 49.
21. D'Alisa S, Baudo S, Mauro A, Miscio G: **How does stroke restrict participation in long-term post-stroke survivors?** *Acta Neurol Scand* 2005, **112**: 157-162.
22. Boosman H, Schepers VP, Post MW, Visser-Meily JM: **Social activity contributes independently to life satisfaction three years post-stroke.** *Clin Rehabil* 2010.
23. Edwards DF, Hahn M, Baum C, Dromerick AW: **The impact of mild stroke on meaningful activity and life satisfaction.** *J Stroke Cerebrovasc Dis* 2006, **15**: 151-157.
24. Hartman-Maeir A, Soroker N, Ring H, Avni N, Katz N: **Activities, participation and satisfaction one-year post stroke.** *Disabil Rehabil* 2007, **29**: 559-566.
25. Carod-Artal J, Egido JA, Gonzalez JL, Varela de SE: **Quality of life among stroke survivors evaluated 1 year after stroke: experience of a stroke unit.** *Stroke* 2000, **31**: 2995-3000.
26. King RB: **Quality of life after stroke.** *Stroke* 1996, **27**: 1467-1472.
27. Murtezani A, Hundozi H, Gashi S, Osmani T, Krasniqi V, Rama B: **Factors associated with reintegration to normal living after stroke.** *Med Arh* 2009, **63**: 216-219.

28. Shyu YI, Maa SH, Chen ST, Chen MC: **Quality of life among older stroke patients in Taiwan during the first year after discharge.** *J Clin Nurs* 2009, **18**: 2320-2328.

29. Kauhanen ML, Korpelainen JT, Hiltunen P, Nieminen P, Sotaniemi KA, Myllyla VV: **Domains and determinants of quality of life after stroke caused by brain infarction.** *Arch Phys Med Rehabil* 2000, **81**: 1541-1546.

30. **Therapy-based rehabilitation services for stroke patients at home.** *Cochrane Database Syst Rev* 2003, CD002925.

31. Hartman-Maeir A, Eliad Y, Kizoni R, Nahaloni I, Kelberman H, Katz N: **Evaluation of a long-term community based rehabilitation program for adult stroke survivors.** *NeuroRehabilitation* 2007, **22**: 295-301.

32. Legg L, Langhorne P: **Rehabilitation therapy services for stroke patients living at home: systematic review of randomised trials.** *Lancet* 2004, **363**: 352-356.

33. Ryan T, Enderby P, Rigby AS: **A randomized controlled trial to evaluate intensity of community-based rehabilitation provision following stroke or hip fracture in old age.** *Clin Rehabil* 2006, **20**: 123-131.

34. Stalenhoef AF: **[Secondary prevention of recurrent stroke by lowering cholesterol levels and blood pressure].** *Ned Tijdschr Geneeskd* 2006, **150**: 2127-2130.

35. Giesen AGM, Franke CL, Wiersma TJ, Binsbergen van JJ, Boiten J, Flikweert S et al.: **Landelijke Transmurale Afspraak TIA/CVA.** *Huisarts Wet* 2004, 521-526.

36. CBO: **Richtlijn Beroerte.** *Utrecht: CBO 2000.*

37. Multidisciplinaire werkgroep aangesteld door CBO: **NHG-standaard Cardiovasculair risicomanagement.** *NHG-standaarden voor de huisarts* 2007.

38. Cifu DX, Stewart DG: **Factors affecting functional outcome after stroke: a critical review of rehabilitation interventions.** *Arch Phys Med Rehabil* 1999, **80**: S35-S39.

39. Pollock A, Baer GD, Langhorne P, Pomeroy VM: **Physiotherapy Treatment Approaches for Stroke.** *Stroke* 2008.

40. Pollock A, Baer G, Langhorne P, Pomeroy V: **Physiotherapy treatment approaches for the recovery of postural control and lower limb function following stroke: a systematic review.** *Clin Rehabil* 2007, **21**: 395-410.

41. Harrington R, Taylor G, Hollinghurst S, Reed M, Kay H, Wood VA: **A community-based exercise and education scheme for stroke survivors: a randomized controlled trial and economic evaluation.** *Clin Rehabil* 2010, **24**: 3-15.

42. Appelros P, Nydevik I, Viitanen M: **Poor outcome after first-ever stroke: predictors for death, dependency, and recurrent stroke within the first year.** *Stroke* 2003, 34: 122-126.

43. Bamford J, Sandercock P, Dennis M, Burn J, Warlow C: **A prospective study of acute cerebrovascular disease in the community: the Oxfordshire Community Stroke Project--1981-86. 2. Incidence, case fatality rates and overall outcome at one year of cerebral infarction, primary intracerebral and subarachnoid haemorrhage.** *J Neurol Neurosurg Psychiatry* 1990, **53**: 16-22.

44. Smajlovic D, Kojic B, Sinanovic O: **Five-year survival-after first-ever stroke.** *Bosn J Basic Med Sci* 2006, **6**: 17-22.

45. Nedeltchev K, Renz N, Karameshev A, Haefeli T, Brekenfeld C, Meier N et al.: **Predictors of early mortality after acute ischemic stroke.** *Swiss Med Wkly* 2010.

46. Wu B, Lin S, Hao Z, Yang J, Xu Y, Wu L et al.: **Proportion, risk factors and outcome of lacunar infarction: a hospital-based study in a Chinese population.** *Cerebrovasc Dis* 2010, **29**: 181-187.

47. Reed M, Harrington R, Duggan A, Wood VA: **Meeting stroke survivors' perceived needs: a qualitative study of a community-based exercise and education scheme.** *Clin Rehabil* 2010, **24**: 16-25.

48. Marsden D, Quinn R, Pond N, Golledge R, Neilson C, White J et al.: **A multidisciplinary group programme in rural settings for community-dwelling chronic stroke survivors and their carers: a pilot randomized controlled trial.** *Clin Rehabil* 2010, **24**: 328-341.

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CHAPTER 7

GENERAL DISCUSSION AND CONCLUSION

As the population ages and mortality due to CVA decreases, a growing number of people have to live with the consequences of a stroke (Liang 2008; Vaartjes 2013). That is one of the reasons why it is important to know what the quality of life is like for a longer period post stroke and that is a key component of this thesis.

AFTERCARE ACCORDING TO THE CURRENT GUIDELINES

Medical secondary prevention by GPs is important for preventing further strokes and ensuring a good quality of life. Guidelines for this were therefore developed (Giesen, 2004; Verhoeven 2004; CBO 2008). Compliance with these guidelines and whether their use has led to changes has not been properly studied. In **Chapters 2 and 3** different aspects of aftercare according to the Dutch guidelines were described. As a result of the guidelines, the GP has better support which could lead to better care and prevention and that would eventually be translated in a lower mortality (Giesen 2004).

In **Chapter 2** it was investigated whether survival improved after implementation of the Dutch Transmural Protocol TIA/CVA (LTA). No major changes in survival were apparent after introduction of the LTA. However, there was a small improvement in secondary prevention, for example some preventive medicine was prescribed more frequently.

In this study we found an increase in contacts with the nurse practitioner, but this was not the case for the number of GP contacts and visits. A possible explanation is the establishment of GP centres, which probably means that visits by the GP in the evenings/ weekends are no longer necessary (Scholten, 2007). Moreover, there is a tendency towards more telephone contacts and fewer home visits (van den Berg, 2003). Another explanation is that insufficient attention is paid to rehabilitation by GPs, implying the stricter implementation of the LTA may still be beneficial. Nurse practitioners also have an increasingly important role in the general practice, as a result of which a proportion of the contacts have shifted to the nurse practitioner instead of the GP.

We expected survival to improve after introduction of the LTA because the GPs could use the FAST test, i.e. a checklist in which patients are sent directly to hospital after telephone contact without causing any delay (Giesen, 2004; Wiersma, 2005). However, the results in **Chapter 2** reveal no major changes in survival although there is a better functional outcome. The situation envisaged with the LTA might have been insufficient due to problems still encountered in the implementation and organisation of thrombolysis. (Franke, 2004; Wimmers, 2005; Lahr, 2013).

The results from **Chapter 2** show that, even after introduction of the LTA, the ideal treatment has not yet been achieved. Improvements might be realised through a stricter compliance with the LTA in general practice. Future research should focus on using questionnaires to obtain more data on implementation of the LTA by GPs and the extent to

which this is effective. A longer follow-up period might also reveal a significant difference, as both curves tend to diverge progressively over time.

The kind of aftercare patients with ischaemic stroke receive and the extent to which this fulfils the criteria of the 'Dutch Transmural Protocol TIA/CVA were described in **Chapter 3**. Although compliance with the LTA is reasonable, continued attention needs to be paid to stroke aftercare and, in particular, secondary prevention. If the guidelines were followed more precisely, the result should be a better survival as described in **Chapter 2**.

SECONDARY PREVENTION

We also studied the secondary prevention and aftercare that patients actually received (**Chapter 3**). A lot of GPs did not initiate any specific form of secondary preventative care. Lifestyle advice was not always given by the GP. The nurse practitioner might compensate for this deficit to a certain extent. Interviews with patients revealed a lack of awareness of the risk factors for strokes. Other studies show that awareness of stroke risk factors is poor in those people at highest risk (Travis, 2003; Choi-Kwon, 2005). In addition, patients often want to have more information than doctors think they need. It is important to tailor the information provided and to encourage patients to actively seek information to supplement that already received from professionals. CVA cafes or peer contacts might be able to make a contribution to this (Wachters-Kaufmann, 2005; Travis, 2003; Choi-Kwon, 2005).

The 'Dutch Transmural Protocol' claims that annual therapy evaluation post stroke and the follow-up of changes in risk profile are necessary. This was only done in part, especially with respect to the measurement of cholesterol and glucose. Greater attention could also be paid to encouraging the use of different drugs by stroke patients. It is important that medical practitioners pay more attention to these aspects and convince patients of the benefits of medication, especially statins. Stricter and more effective monitoring is therefore desirable.

Implementation of the LTA was expected to increase the use of medication to treat risk factors. The increase in prescription rate of certain types of medication is not per se due to the introduction of the LTA, but also due to new pharmacotherapeutic insights. In both cohorts almost all medication is prescribed more frequently after stroke than before stroke. The increase in use of statins is probably because they are known to be effective in stroke patients, regardless of cholesterol levels (Unknown, 2003/8). Furthermore, significantly more ACE inhibitors are prescribed after stroke in Cohort 2 (**Chapter 3**); this might be because ACE inhibitors are known to very effective in the treatment of hypertension (Unknown, 2003/15; PROGRESS Collaborative Group, 2001).

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AFTERCARE

In terms of aftercare, it appears that 7% of the patients did not see their GP after their stroke. GPs report patient contact more frequently than their patients. This discrepancy is probably due to a different perception of the term 'contact' or because not all GPs participated. Most contacts between doctor and patient concerned complaints unrelated to stroke or to the measurement of blood pressure. There was also a group of patients who did not have contact with a medical specialist. It would be helpful if the GP were to visit the patient at least once after the stroke to discuss the stroke in particular.

Seven percent of the patients had a recurrent TIA or stroke over the study period. In a study by Appelros et al. (2003), 9% of the survivors experienced a recurrent stroke within one year. This percentage is very similar to our study. Unfortunately, the number of patients with stroke recurrence is too small to investigate whether there is a relationship between the quality of aftercare and the occurrence of a second stroke.

The need for rehabilitation is sometimes underestimated during hospitalisation, possibly because disabilities only become more obvious at home. It is important to attend to this because the early initiation of rehabilitation is related to improved functional outcome (Cifu, 1999). Previous research shows that physiotherapy based on different approaches has a greater impact on functional independence than no therapy at all (Pollock, 2008).

In terms of aftercare and secondary prevention, compliance with the 'Dutch Transmural Protocol TIA/CVA' is reasonable. Nevertheless, particular attention should be paid to secondary prevention. This mainly concerns information and advice about risk factors and regular monitoring of blood pressure and cholesterol levels. It would be helpful if this was stated in greater detail in the 'Dutch Transmural Protocol'.

QUALITY OF LIFE

In **Chapters 4, 5** and **6** the wellbeing and quality of life of patients one year after stroke who were living at home was investigated. In **Chapter 4** patients without any specific treatment or rehabilitation were investigated. The same study was repeated in **Chapter 5**, to compare patients with or without thrombolytic therapy. Whether a new aftercare programme (ATC) achieved better outcomes was studied in **Chapter 6**.

These studies showed that wellbeing e.g. quality of life and functioning of Dutch patients with minor stroke is comparable to the general population of the same age. Thrombolytic therapy seems to be of great importance in achieving better quality of life in ischaemic stroke patients who respond to this therapy. Since there is a high prevalence of anxiety and depression (5-9% and 5-13% respectively) we expected that wellbeing of these patients can be increased further if improvements in mental functioning and in

maintaining the patients' activities are made. However, despite intensive post-stroke care specifically aimed at the needs of stroke patients and the conservation of their activities, no major differences in outcome could be found between the two groups.

Other studies report lower HRQOL after one year (Zhang, 2012; Carod-Artal, 2012; Carod-Artal, 2000; Kauhanen, 2000; Shyu 2009). They possible studied more severely impaired stroke patients. However, in our study the mean age was higher (Carod-Artal, 2000; Kauhanen, 2000). In a study by Shyu et al. (2009), older ischaemic stroke patients were interviewed at home, but these patients also seemed to have a lower HRQOL. It is known that higher ADL dependence correlates with a worse HRQOL (Carod-Artal, 2000; Kauhanen, 2000; Shyu 2009). The high scores on the RAND-36 found in the present study could be because a stroke has such an impact on life that patients one year post-stroke see quality of life from a wider perspective or because of the down-to-earth attitude of the Northern Netherlands population. During their interviews, patients often made comments such as: 'it could have been worse'. Nevertheless, we expected at the start of this study that patients who underwent thrombolysis would have a worse quality of life due to the initial higher severity of stroke experienced. Although this is an observational study in which patients were treated with thrombolytic therapy without a control group, our results suggest that thrombolytic treatment is of great value (Chapter 5) even in old age. It can therefore be concluded that health-related quality of life in the Dutch elderly stroke population is quite high.

There are indications that specific rehabilitation and assistance to patients after a stroke would positively affect quality of life (Sturm, 2004; Legg, 2004; Hartman, 2007). In our study, specifically aimed at conservation of activities, we expected higher independency in ADL, higher HRQOL and better preservation of daily occupations. Other research confirms this idea (Reed, 2010; Marsden 2010) but these studies used smaller groups and mainly explored physical activity and the resources required to reconstruct their lives. The ATC study showed that this type of care seems to have little added value compared to conventional aftercare. A different type of follow up is required to increase participation in daily occupations and improve quality of life.

FUNCTIONING

The results reported in **Chapters 4, 5** and **6** show that quality of life is positively influenced by the level of physical functioning. Other studies confirm this. However, these studies were often performed shortly after the stroke (Almborg, 2010, Mackenzie 2002). Our studies show that the level of physical functioning also has a positive influence on patients' quality of life one-year post stroke.

Unfortunately, research shows that ADL after one year is stabilised. Improvements can nevertheless be made, for example, in mobility during the early post-stroke phase

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(Lo, 2008). By specifically focussing on this, ADL scores and eventually QOL scores should logically be higher after a year. However, this could not be verified in our study.

Depression and anxiety

There are a many indications for the existence of post-stroke depression and anxiety disorder (5-9% and 5-13% respectively, see also **Chapters 4** & **5**). This also appears to be related to the quality of life. Quality of life should, in principle, increase if psychological problems are recognised and treated. There are indications that brief psychosocial intervention and antidepressant treatment reduce post-stroke depression and improves functional outcomes (Mitchell, 2008; Mitchell, 2009). Alternatively, community-based rehabilitation programmes could be started. This could increase stroke patients' activity levels and provide greater satisfaction (Outpatient Service Trialists, 2003; Legg, 2004). This should be examined in future research.

SOCIAL ACTIVITIES / PARTICIPATION

There is evidence that maintaining social activities influences quality of life (Ekstam, 2007; Kristensen 2010). This also accounts for the Dutch stroke patients described in **Chapter 4, 5** and **6**. If greater attention is paid in rehabilitation to maintaining activities then more patients can keep on doing things, especially going on holiday. However, in our study this approach did not result in more visits to family and friends. We have no good explanation for this, because the ATC group specifically trained visiting in rehabilitation. It is possible that the ATC patients were more aware of a decline after the specific training.

A diminished quality of life is significantly related to quitting or doing less of certain activities such as housekeeping, physical activity, hobbies and visiting. Quality of life could possibly increase further were patients to receive even more support than was given in the ATC rehabilitation to resume different activities. Another option would be to start community-based rehabilitation programmes. This could increase stroke patients' activity levels and give them greater satisfaction (Hartman-Maeir, 2007; Legg, 2004; Ryan, 2006), although this was not found in the ATC group (**Chapter 6**).

PRACTICE IMPLICATIONS

Patient care

General practice care has changed considerably in recent years and GPs have assumed a wide range of responsibilities. To ease the burden on individual GPs, nurse practitioners are increasingly being employed to take on some of the tasks of the GP and GP out-of-hours services (Houweling, 2003; Scholten, 2010). In particular, this has led to changes in

the one-to-one contact patients have with their own GP. In our study, 7% of the patients indicated that there had been no contact with their GP after the stroke. However, this does not mean that no contact with the general practice has taken place. There might have been telephone contact or contact with one of the nurse practitioners, which the patient did not consider to be contact with the GP. GPs should pay attention to this, especially with respect to the patient's expectation patterns.

The GP's attitude towards a CVA patient has also changed considerably, from an expectant policy to a more active approach. Patients are no longer kept at home with a CVA because nothing can be done for them anyway. Instead they are often referred for a possible thrombolysis treatment based on the FAST test without necessarily being seen. At present, this is the only treatment available for CVA patients in the acute stage and it is clearly described in guidelines. The guidelines also provide clearer advice about secondary prevention and aftercare for patients with a CVA.

Chapter 3 reveals that many improvements can still be made in the area of secondary prevention. This might already be happening due to the broader use of nurse practitioners. However the general practitioner still needs to pay particular attention to advice, education and compliance with preventative medication/annual evaluation. Describing this more precisely in the guidelines and making general practitioners more aware of this could be worthwhile, as a stricter and more effective monitoring is desirable. A more comprehensive study should also be performed to gain a clearer view of GPs' prescribing behaviour.

In particular, patients who fell outside of the CVRM protocol prior to a stroke, risk falling out of view after a CVA because no routine check-ups are carried out. Chapters 4, 5 and 6 revealed that people with a CVA have a good quality of life. People with a better quality of life might also have less need for aftercare. However, this does not mean that they encounter no problems and do not need information about strokes. Indeed secondary prevention might be even more important for this group of patients. By means of regular check-ups, the general practitioner can also determine whether other forms of aftercare are needed, especially as this appears to be underestimated in hospitals.

Particular attention needs to be paid to secondary prevention. This mainly concerns information and advice about risk factors and regular monitoring of blood pressure and cholesterol levels. It would be helpful if this was stated in greater detail in the 'Dutch Transmural Protocol'.

In recent years a range of developments have taken place in the area of transmural care. This includes the ABC care for CVA patients. The idea was individualised care: therefore short lines of communication between care providers and ensuring that the problems of CVA patients were quickly tackled. This would make it easy to refer patients to different care providers (H. Loor, 1998). The GP had to be the care coordinator as he/she was aware of the patient's history, social context, wishes and expectations, and because the GP also keeps contact with the patient in the longer term. Nowadays, however, developments have gone so far that almost twenty different disciplines are involved in the care of CVA patients.

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This is almost impossible to coordinate and leads to a lack of clarity for patients. **Chapter 6** revealed no clear improvement in the quality of life and functioning of these patients supervised by a special team. It should therefore be considered whether it is not more important for a single case manager to determine the individual needs of the patient and by doing this to improve the patient's quality of life. The effectiveness of this and whether this should be the task of the GP or nurse practitioner is a subject for future research.

FUTURE RESEARCH

Study design
The studies described in this thesis examined patients from the northern part of the Netherlands. In the first study we used the RNG database, which uses information from groups of patients registered in general practices in the northern part of the Netherlands. The same applies to the other studies, where patients were selected from the Martini hospital and the UMCG. We think that the patient population in the northern part of the Netherlands can be regarded as reasonably representative for patients in other parts of the Netherlands. To ensure even greater representativeness, further research should focus on a larger group of patients from different general practices across the Netherlands.

In our studies, patients with cerebral haemorrhaging and patients younger than sixty years at time of stroke were excluded. The average age is high in all cohorts, so a part of the decrease in functioning is due to the normal aging process (Desrosiers, 2005). To discover which part is related to the stroke only, there should be a control group with healthy elderly. For our control group we used data from the general elderly population of the Netherlands. Maybe in future research we should use a control group from the northern part of the Netherlands.

Ischaemic stroke affects more women than men and several gender-related aspects of ischaemic stroke have been found. Stroke aetiology shows several gender differences, for example, due to hormones. Women are significantly older, tend to have less traditional stroke symptoms, possibly have more severe strokes and suffer from more co-morbidity and disability pre-stroke. Partly as a consequence of this, they experience significant longer pre- and in-hospital delays, receive less diagnostic tests and are less intensively treated. Ultimately this results in worse functional outcomes and more post-stroke disability (Lorenzano, 2013). More attention to this gender difference is desirable. Finally, we could only examine small groups of patients. Consequently, only large differences in the outcome variables resulted in statistically significant results. The study of Fischer (2008) on the other hand, also reported good health-related quality of life for patients after thrombolysis. A statistically significant improvement in quality of life after thrombolysis might be detected if a larger group of patients were studied.

Dropouts

Patients who refused to participate in this study were not investigated further, as the number of dropouts in the groups were very small (around seven percent). The patients who did not respond or refused to participate told us that they were doing fine and that a visit was not necessary. Theoretically, these patients could have been those whose physical and mental functioning was very poor. We could have asked these patients for permission to check medical records from their GP to gain more insight into this.

The mortality in our study was relatively low. Less then 16 percent of the patients died in the first year post stroke. Other studies report mortality around thirty percent (Smajlovic, 2006; Verhoeven, 2004). Mortality in our study is probably lower because the severity of stroke was also low in terms of NIHSS score on admission to hospital. There is a relationship between higher NIHSS score and higher mortality (Nedeltchev, 2010; Wu, 2010). Nevertheless, one would expect higher mortality in older people (like the patients described in this thesis).

In this study we determined aspects like the quality of life using standardised questionnaires. However, more qualitative research needs to be carried out to gain a better understanding of how the patient experiences the consequences of his disease and where he feels the greatest losses. This can then be taken into account in the care provided and that might lead to an improvement in the quality of life. A follow-up study could investigate this further.

Education

As previously stated it is important that the GP is more aware of the particular need for information and education as well as the importance of compliance with preventative medication/annual evaluation. A stricter description of these requirements in the guidelines might help, but continuing professional development courses should also focus on this more. At the same time patients indicate that they receive too little attention from their GP after a stroke and there are also indications that patients have a greater need for information than their GP realises (Wachters-Kaufmann, 2005; Travis, 2003; Choi-Kwon, 2005 (nog even referenties nakijken). This is also described in the PhD thesis of H. Loor. She states that the care for CVA patients should not solely consist of medical treatment but also provide opportunities for listening and empathising. Current medical courses devote too little attention to this and more specific training for these aspects therefore needs to be given.

In general, medical degrees need to provide more awareness about the problem of 'CVA'. Too little is taught about CVA despite the disease's enormous and growing social impact and the fact that it is now the second most important cause of mortality throughout the world.

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MAIN CONCLUSIONS

From this thesis it can be concluded that all Dutch stroke patients have quite a high quality of life and that primary care for these patients is in accordance with the recommendations of the primary care guidelines LTA and 'Dutch Protocol TIA/CVA'. Quality of life can almost certainly be improved even further still if more attention is paid to aspects such as psychological and physical functioning and the maintenance of activities in various areas. Further research must reveal how more attention should be given to these aspects. If the aftercare is optimised and the guidelines are more stringently complied with then this will only yield a small measurable improvement in the wellbeing of CVA patients. Nevertheless, these patients will feel better supervised and be highly appreciative of the fact that their care providers are more closely involved in their wellbeing.

REFERENCES

Almborg AH, Ulander K, Thulin A, Berg S. Discharged after stroke - important factors for health-related quality of life. J Clin Nurs. 2010 Aug;19(15-16):2196-206.

Appelros P, Nydevik I, Viitanen M. Poor outcome after first-ever stroke: predictors for death, dependency, and recurrent stroke within the first year. Stroke. 2003 Jan;34(1):122-6

Berg van den M: Workload of GPs (article in Dutch). Medisch Contact. 2003;26.

Carod-Artal J, Egido JA, Gonzalez JL, Varela de SE: Quality of life among stroke survivors evaluated 1 year after stroke: experience of a stroke unit. Stroke. 2000 Dec;31(12):2995-3000.

Carod-Artal FJ. Determining quality of life in stroke survivors. Expert Rev Pharmacoecon Outcomes Res. 2012 Apr;12(2):199-211).

CBO. Richtlijn Beroerte. Kwaliteitsinstituut voor de Gezondheidszorg CBO. 1999.

CBO. Diagnostiek, behandeling en zorg voor patiënten met een beroerte. Utrecht: CBO; 2008

Choi-Kwon S, Lee SK, Park HA, Kwon SU, Ahn JS, Kim JS. What stroke patients want to know and what medical professionals think they should know about stroke: Korean perspectives. Patient Educ Couns. 2005 Jan;56(1):85-92.

Cifu DX, Stewart DG. Factors Affecting Functional Outcome After Stroke: A Critical Review of Rehabilitation Interventions. Arch Phys Med Rehabil. 1999 May;80(5 Suppl 1):S35-9.

Desrosiers J, Bourbonnais D, Noreau L, Rochette A, Bravo G, Bourget A. Participation after stroke compared to normal aging. J Rehabil Med. 2005;37(6):353-57.

Ekstam L, Uppgard B, von KL, Tham K: Functioning in everyday life after stroke: a longitudinal study of elderly people receiving rehabilitation at home. Scand J Caring Sci. 2007;21:434-46.

Fischer U, Anca D, Arnold M, Nedeltchev K, Kappeler L, Ballinari P et al.: Quality of life in stroke survivors after local intra-arterial thrombolysis. Cerebrovasc Dis. 2008;25(5):438-44.

Franke CL, Stolker H, Verschoor E: Integrated care for stroke (article in Dutch). Medisch Contact. 2004;35:1361–1364.

Giesen AGM, Franke CL, Wiersma TJ, van JJ B, Boiten J, Flikweert S, et al: Dutch Transmural Protocol transient ischaemic attack/cerebrovascular accident (article in Dutch). Huisarts Wet. 2004:521–526.

Hartman-Maeir A, Eliad Y, Kizoni R, Nahaloni I, Kelberman H, Katz N. Evaluation of a long-term community based rehabilitation program for adult stroke survivors. NeuroRehabilitation. 2007;22(4):295-301.

Houweling ST. Verschuiven van taken is tegen de regels. Medisch Contact 2003;43.

Kauhanen ML, Korpelainen JT, Hiltunen P, Nieminen P, Sotaniemi KA, Myllyla VV. Domains and determinants of quality of life after stroke caused by brain infarction. Arch Phys Med Rehabil. 2000;81(12):1541-46.

Kristensen HK, Persson D, Nygren C, Boll M, Matzen P: Evaluation of evidence within occupational therapy in stroke rehabilitation. Scand J Occup Ther. 2011 Mar;18(1):11-25.

Lahr M. Organizational models for thrombolysis in acute ischemic stroke: a simulation exemplar; PhD thesis 2013, University of Groningen, the Netherlands.

Leenen LPH. Registreren verhoogt de kwaliteit. Medisch Contact. 2002;30.

Legg L, Langhorne P, Outpatient Service Trialists. Rehabilitation therapy services for stroke patients living at home: systematic review of randomized trials. Lancet. 2004; 363(9406):352-6

Liang BA, Lew R, Zivin JA. Review of tissue plasminogen activator, ischemic stroke, and potential legal issues. Archives of Neurology. 2008; 65: 1429-33.

Lo RS, Cheng JO, Wong EM, Tang WK, Wong LK, Woo J, Kwok T. Handicap and its determinants of change in stroke survivors: one-year follow-up study. Stroke. 2008 Jan;39(1):148-53.

Loor H. Leven na een beroerte. Een drie jaar durend observatie-onderzoek vanuit de huisartspraktijk, naar de gevolgen van een cerebrovasculair accident, PhD thesis 1998, University of Groningen, the Netherlands.

Lorenzano S, Ahmed N, Falcou A, Mikulik R, Tatlisumak T, Roffe C, Wahlgren N, Toni D; on behalf of the SITS Investigators. Does Sex Influence the Response to Intravenous Thrombolysis in Ischemic Stroke? Answers From Safe Implementation of Treatments in Stroke-International Stroke Thrombolysis Register. Stroke. Oct 30, 2013 [Epub ahead of print]

Outpatient Service Trialists. Therapy-based rehabilitation services for stroke patients at home. Cochrane Database Syst Rev. 2003;(1):CD002925.

Mackenzie AE, Chang AM. Predictors of quality of life following stroke. Disabil Rehabil. 2002 Mar;24(5):259-65.

Marsden D, Quinn R, Pond N, Golledge R, Neilson C, White J et al.: A multidisciplinary group programme in rural settings for community-dwelling chronic stroke survivors and their carers: a pilot randomized controlled trial. Clin Rehabil. 2010;24:328-41.

Mitchell PH, Teri L, Veith R, Buzaitis A, Tirschwell D, Becker K, Fruin M, Kohen R, Cain KC. Living well with stroke: design and methods for a randomized controlled trial of a psychosocial behavioral intervention for poststroke depression. J Stroke Cerebrovasc Dis. 2008;17(3):109-15.

Mitchell PH, Veith RC, Becker KJ, Buzaitis A, Cain KC, Fruin M, Tirschwell D, Teri L. Brief psychosocial-behavioral intervention with antidepressant reduces poststroke depression significantly more than usual care with antidepressant: living well with stroke: randomized, controlled trial. Stroke. 2009;40(9):3073-8.

Nedeltchev K, Renz N, Karameshev A, Haefeli T, Brekenfeld C, Meier N et al.: Predictors of early mortality after acute ischemic stroke. Swiss Med Wkly. 2010 May;140(17-18):254-9.

NHG (Nederlandse Huisartsen Genootschap): Richtlijn Adequate dossiervorming met het Elektronisch Patiëntendossier – ADEPD. November 2009

Pollock A, Baer GD, Langhorne P, Pomeroy VM (2008). Physiotherapy Treatment Approaches for Stroke. Stroke.

PROGRESS Collaborative Group: Randomised trial of a perindopril-based blood-pressure lowering regimen among 6105 individuals with previous stroke or transient ischaemic attack. Lancet. 2001 Nov;358(9292):1556.

Reed M, Harrington R, Duggan A, Wood VA: Meeting stroke survivors' perceived needs: a qualitative study of a community-based exercise and education scheme. Clin Rehabil. 2010 Jan;24(1):16-25.

Ryan T, Enderby P, Rigby AS: A randomized controlled trial to evaluate intensity of community-based rehabilitation provision following stroke or hip fracture in old age. Clin Rehabil. 2006 Feb;20(2):123-31.

Scholten GJM. Annual report 2006. Doctors Service Groningen 2007. http://www.doktersdienstgroningen.nl.

Schuling J. Stroke patients in general practice. Impact, recovery and the GP's management in the first six months post stroke. Thesis, 1993. University of Groningen, the Netherlands

Smajlovic D, Kojic B, Sinanovic O: Five-year survival-after first-ever stroke. Bosn J Basic Med Sci. 2006 Aug;6(3):17-22.

Shyu YI, Maa SH, Chen ST, Chen MC: Quality of life among older stroke patients in Taiwan during the first year after discharge. J Clin Nurs. 2009 Aug;18(16):2320-8.

Sturm JW, Donnan GA, Dewey HM, Macdonell RA, Gilligan AK, Srikanth V, Thrift AG. Quality of life after stroke: the North East Melbourne Stroke Incidence Study (NEMESIS). Stroke. 2004 Oct;35(10):2340-5.

Toole JF, Bhadelia R, Williamson JD, Veltkamp R. Progressive cognitive impairment after stroke. J Stroke Cerebrovasc Dis. 2004; 13(3):99-103

Travis LH, Flemming KD, Brown RD Jr, Meissner I, McClelland RL, Weigand SD. Awareness of stroke risk factors, symptoms, and treatment is poor in people at highest risk. J Stroke Cerebrovasc Dis. 2003 Sep-Oct;12(5):221-7.

Unknown: Statins can do more (article in Dutch). Medisch Contact. 2003;15.

Unknown: Hypertension: diuretics or ACE-inhibitors (article in Dutch). Medisch Contact. 2003;08.

Vaartjes I, O'Flaherty M, Capewell S, Kappelle J, Bots M. Remarkable decline in ischemic stroke mortality is not matched by changes in incidence. Stroke. 2013 Mar;44(3):591-7.

Verhoeven S, Beusmans GHMI, Van Bentum STB, Van Binsbergen JJ, Pleumeekers HJCM, Schuling J. NHG-standaard CVA. Huisarts Wet. 2004; 47:509-520.

Wachters-Kaufmann C, Schuling J, The H, Meyboom-de Jong B (2005). Actual and desired information provision after a stroke. Patient Educ Couns. 2005 Feb;56(2):211-7.

Wiersma TJ, Pleumeekers HJCM, Beusmans GHMI, Schuling J, Goudswaard AN: Summary of practice guideline 'CVA' from the Dutch College of General Practitioners. Ned Tijdschr Geneeskd. 2005 Dec 17;149(51):2850-6.

Wimmers RH, Loor de S, Ranke CL: Time pressure (article in Dutch). Medisch Contact. 2005, 40:1584-1586.

Wu B, Lin S, Hao Z, Yang J, Xu Y, Wu L et al.: Proportion, risk factors and outcome of lacunar infarction: a hospital-based study in a Chinese population. Cerebrovasc Dis. 2010 Jan;29(2):181-7.

Zhang X, Sun Q, Wu M, Xia G. Health-Related Quality of Life After Stroke: A 2-Year Prospective Cohort Study in Wuhan, China. Int J Neurosci. 2013 Feb;123(2):138-41.

CHAPTER 8

ENGLISH SUMMARY

ENGLISH SUMMARY

The incidence and prevalence of stroke increases with age. As the population is getting older, more and more people have to live with the consequences of a stroke. What is the quality of these people's lives a year or more after a stroke? And do Dutch general practitioners provide good prevention and aftercare? Guidelines have been compiled to guarantee care for stroke patients. Yet are these complied with and have they led to any changes in the care outcomes? This thesis will examine these questions in greater detail.

Chapter 2 describes a study that assesses whether the survival of patients with a stroke has increased since the implementation of the 'Dutch Transmural Protocol TIA/CVA (LTA)'. It also assesses whether the contact with the general practitioner, the registration of comorbidity and the prescription of medication have increased. The LTA advises general practitioners to provide qualitatively good care at the right moment in time, without compromising the continuity of the care provided.

Two cohorts were put together from the Registration Network Groningen, namely a cohort before and a cohort after the introduction of the LTA (Cohort 1: n = 131, first stroke 2001-2002 and Cohort 2: n = 132, first stroke 2005-2006). These cohorts were compared with each other in terms of survival and secondary outcomes, such as the number of contacts with the general practitioner. No significant increase in survival after a stroke was found. In Cohort 2 the number of contacts with the general practitioner was significantly lower than in Cohort 1, whereas the number of contacts with the practice assistant was significantly higher. All risk factors for a stroke were noted more often in Cohort 2, but this was only statistically significant for hypercholesterolemia. In Cohort 2 more medicines were prescribed as well. However this difference was only significant for antithrombotics, ACE inhibitors and statins.

From **Chapter 2** it can be concluded that no major changes in survival and secondary outcomes have occurred since the implementation of the LTA. A small improvement in secondary prevention has, however, occurred. Furthermore, a significant increase in survival might have been observed had the follow-up period been longer.

Chapter 3 describes the type of aftercare and rehabilitation that patients with an ischaemic stroke have received and to what extent this aftercare satisfies the LTA criteria. This was investigated by interviewing 57 patients and their general practitioners one year after the stroke.

Risk factors for the occurrence of a new stroke and the need for lifestyle changes were not always clear for patients. In addition, regular check-ups for blood pressure, cholesterol and glucose as well as the supervision of the use of various medications could be better. More attention should also be paid to visiting patients after a stroke. It is apparent that physicians underestimate the need for aftercare.

Although the LTA is reasonably well complied with, ongoing attention for the aftercare following a stroke is important, especially with respect to the aspects of secondary prevention.

Little is known about the late physical and psychological consequences of an ischaemic stroke among patients in primary care. Consequently it is difficult to say whether stroke patients in the chronic phase receive quality aftercare. Knowledge about outcomes after a stroke is important for improving the quality of life. **Chapters 4** and **5** show the results of studies into the outcomes and quality of life of Dutch stroke patients.

In **Chapter 4** patients without specific treatment and rehabilitation were interviewed at home one year after the stroke to investigate ADL independence (activities of daily living), quality of life, depression, anxiety, functioning and burden for the informal carer. This patient group assesses the quality of life as high. It is even comparable with the assessment of the quality of life for the Dutch elderly population in general. If patients can no longer fully participate in society they experience a lower quality of life. A higher ADL independence is associated with a higher quality of life. Many patients indicated that they had become more ADL dependent. However, the median Barthel score on discharge from hospital was the same as the Barthel score after one year. There was a high prevalence of depression and anxiety disorders. These have a negative influence on the quality of life assessment. A lower quality of life assessment corresponds with a higher burden for the informal carer. In this study the burden for the informal carer was generally low.

This study shows that the quality of life assessment and the functioning of Dutch patients with a minor stroke is comparable with that of the general population of the same age. We expect that the well-being of these patients could be further improved if more attention is paid to the mental functioning and to the various hobbies and activities of patients.

The same study was repeated in **Chapter 5** for patients who had undergone thrombolysis and were compared with patients who did not receive this treatment. As a result of this it could be determined whether this treatment results in better outcomes and a better quality of life one year after the stroke.

Quality of life is high in both groups of patients and they score almost the same as each other. However, the thrombolysis group indicates having a better quality of life with respect to mental health and vitality. Quality of life in this study is also related to the maintenance of hobbies and activities after a stroke. After a year more patients from the thrombolysis group were completely or largely ADL dependent than in the group who did not receive thrombolysis. The degree of ADL dependence in the thrombolysis group was, however, lower after one year compared to at discharge from hospital, whereas this increased in the group without thrombolysis. Greater ADL dependence is related to decreasing daily activities in both groups. However in the thrombolysis group, the degree of dependence had less influence on visits to family or friends and going on holiday. There was no difference in the prevalence of depression and anxiety between both groups.

From this chapter it can be concluded that thrombolysis in patients for whom the treatment is successful makes a clear contribution to achieving a better quality of life. This continues to be the case after the treatment has been completed.

chapter 8

In **Chapter 6** the effect of a new rehabilitation programme is described. This programme (ATC) was designed because there were indications that patients at home experienced more problems than became apparent during the rehabilitation in the nursing home. The ATC programme ensures that problems at home are picked up sooner and dealt with in a timely manner.

In this study a total of 93 patients were interviewed. Half of them had followed the new ATC rehabilitation route and the other half had received conventional rehabilitation. Once again, quality of life, ADL independence and functioning were determined and secondary prevention was also examined.

In both groups of patients the quality of life was assessed as the same. For these patients ADL independence and the maintenance of hobbies and activities also correlated with a better quality of life. Many patients experienced more limitations after one year. In the ATC group that was related to ADL dependence and the loss of social contacts. There was no striking difference between the groups with respect to the use of medication or aftercare received. In the ATC group, however, more people attended a day centre.

Despite more intensive aftercare specifically aimed at the needs of stroke patients and the maintenance of activities after a stroke, no large differences between the two groups were found.

In **Chapter 7** the results of this thesis are once again examined and several implications for future research are discussed. An effort was made to answer the question about what the quality of life is like one year or more after a stroke. Whether the guidelines developed for stroke care are complied with and whether this leads to a better quality of life for patients in primary care is also considered. All things being considered it appears that patients in primary care one year after a stroke have a high quality of life and that the general practice care complies with the guidelines 'Dutch Transmural Protocol TIA/CVA' and the 'NHG Practice Guideline TIA/CVA'. However, these new guidelines have not yet led to a measurable difference in survival.

CHAPTER 9

NEDERLANDSE SAMENVATTING

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De incidentie en prevalentie van een CVA (cerebrovasculair accident) nemen toe met de leeftijd. Door de toenemende vergrijzing zijn er steeds meer mensen die moeten leven met de gevolgen van een CVA. Het is dus belangrijk te weten hoe de kwaliteit van leven van deze mensen is langere tijd na het CVA. Daarnaast is het belangrijk om te weten of er goede preventie en nazorg wordt geleverd door Nederlandse huisartsen. Om de zorg voor CVA-patiënten te kunnen garanderen zijn er richtlijnen gemaakt. Of die worden nageleefd en tot veranderingen hebben geleid is onduidelijk. Dit proefschrift gaat in op deze vragen.

In **Hoofdstuk 2** wordt een studie beschreven die toetst of de overleving van patiënten met een CVA is toegenomen na de implementatie van de 'Landelijke Transmurale Afspraak TIA/CVA (LTA)'. Tevens wordt getoetst of het contact met de huisarts, de registratie van comorbiditeit en het voorschrijven van medicatie is toegenomen. De LTA adviseert huisartsen om op het juiste moment kwalitatief goede zorg te leveren, zonder afbreuk te doen aan de continuïteit van de zorg.

Uit het Registratie Netwerk Groningen werden twee cohorten samengesteld, namelijk een cohort voor en een cohort na de introductie van de LTA (cohort 1: n = 131, eerste CVA 2001-2002 en cohort 2: n = 132, eerste CVA 2005-2006). Deze cohorten werden met elkaar vergeleken qua overleving en secundaire uitkomsten, zoals het aantal contacten met de huisarts. Er werd geen significante toename van de overleving na een CVA gevonden. In cohort 2 was het aantal contacten met de huisarts significant lager dan in cohort 1, terwijl het aantal contacten met de praktijkondersteuner juist significant hoger was. Alle risicofactoren voor een CVA werden wel vaker genoteerd in cohort 2, maar dit was alleen statistisch significant voor hypercholesterolemie. In cohort 2 werden ook meer medicijnen voorgeschreven. Echter alleen voor de antitrombotica, ACE-remmers en statines was dit verschil statistisch significant.

Uit **Hoofdstuk 2** blijkt dus dat er geen grote veranderingen in overleving en secundaire uitkomsten zijn na invoering van de LTA. Echter, er was wel een kleine verbetering in de secundaire preventie. Daarnaast is het mogelijk dat uit een langere follow-up periode wel een significante toename in overleving zou zijn gebleken.

In **Hoofdstuk 3** wordt beschreven welke soort nazorg en revalidatie patiënten met een ischemisch CVA hebben gehad en in hoeverre deze nazorg aan de criteria van de LTA voldoet. Dit werd onderzocht door één jaar na het CVA, zevenenvijftig patiënten en hun huisartsen te interviewen.

De risicofactoren voor het optreden van een (nieuw) CVA en de noodzaak tot leefstijlveranderingen waren niet altijd duidelijk voor patiënten. Daarnaast zou regelmatige controle van bloeddruk, cholesterol en glucose en toezicht op het gebruik van verscheidene medicatie beter kunnen. Ook zou er meer aandacht moeten worden besteed aan het afleggen van visites na een CVA. Het blijkt dat de behoefte aan nazorg wordt onderschat door medici.

Alhoewel de LTA redelijk wordt nageleefd, is het wel belangrijk dat er aandacht blijft voor nazorg na een CVA, met name voor wat betreft secundaire preventie.

Er is weinig bekend over de late fysieke en psychische gevolgen van een ischemisch CVA bij patiënten in de eerstelijn. Daardoor is het moeilijk te zeggen of CVA-patiënten in de chronische fase goede nazorg krijgen. Kennis over uitkomsten na een CVA is belangrijk om de kwaliteit van leven te kunnen verbeteren. **Hoofdstukken 4** en **5** tonen de resultaten van studies naar de uitkomsten en kwaliteit van leven van Nederlandse CVA-patiënten.

In **Hoofdstuk 4** werden patiënten zonder specifieke behandeling en revalidatie één jaar na CVA thuis geïnterviewd om ADL-zelfstandigheid (Algemene Dagelijkse Levensverrichtingen), kwaliteit van leven, depressie, angst, functioneren en belasting van de mantelzorger te onderzoeken. Deze patiëntengroep beoordeelt de kwaliteit van leven hoog en is zelfs vergelijkbaar met de beoordeling van de kwaliteit van leven van de Nederlandse ouderenpopulatie. Wanneer patiënten niet meer volledig kunnen participeren in de samenleving ervaren zij een lagere kwaliteit van leven. Een hogere ADL zelfstandigheid gaat samen met een hogere kwaliteit van leven. Veel patiënten gaven aan meer afhankelijk te zijn geworden in de ADL. Echter de mediane Barthel bij ontslag uit het ziekenhuis was gelijk aan de Barthel na één jaar. Er is een hoge prevalentie van depressie en angststoornissen. Deze hebben een negatieve invloed op het oordeel over de kwaliteit van leven. Een lagere beoordeling van de kwaliteit van leven correspondeert met een hogere belasting van de mantelzorger. In dit onderzoek was de belasting voor de mantelzorger over het algemeen laag.

Deze studie toont dat het oordeel over de kwaliteit van leven en het functioneren van Nederlandse patiënten met een klein CVA, vergelijkbaar is met dat van de algemene bevolking van dezelfde leeftijd. We verwachten, overigens, dat het welzijn van deze patiënten verder kan worden verbeterd als er meer aandacht wordt besteed aan het mentaal functioneren en er aandacht wordt geschonken aan diverse hobby's en activiteiten van de patiënt.

Hetzelfde onderzoek is herhaald in **Hoofdstuk 5** bij patiënten die trombolyse hebben gehad en werd vergeleken met patiënten die deze behandeling niet kregen. Hierdoor kon worden bepaald of deze behandeling leidt tot betere uitkomsten en een betere kwaliteit van leven één jaar na het CVA.

De kwaliteit van leven is hoog in beide groepen patiënten en nagenoeg gelijk aan elkaar. Echter, de trombolysegroep geeft een betere kwaliteit van leven aan met betrekking tot de geestelijke gezondheid en vitaliteit. De kwaliteit van leven is ook in deze studie gerelateerd aan het behoud van hobby's en activiteiten na een CVA. Na een jaar zijn meer patiënten uit de trombolysegroep volledig of grotendeels ADL afhankelijk dan uit de groep die geen trombolyse hebben gehad. De mate van ADL afhankelijkheid in de trombolysegroep was echter lager na een jaar ten opzichte van bij ontslag uit het ziekenhuis, terwijl deze toenam in de groep zonder trombolyse. Grotere ADL afhankelijkheid is gerelateerd aan afnemende dagelijkse bezigheden in beide groepen. Echter bij de trombolyse groep was de mate van

afhankelijkheid minder van invloed op bezoek aan familie of vrienden en het op vakantie gaan. Er was geen verschil in prevalentie van depressie en angst tussen beide groepen.

Uit dit hoofdstuk kan geconcludeerd worden dat trombolyse bij patiënten waarbij de behandeling aanslaat van grote waarde is voor het bereiken van een betere kwaliteit van leven. Deze blijft ook na de behandeling voortbestaan.

In **Hoofdstuk 6** wordt het effect van een nieuw revalidatieprogramma beschreven. Dit programma (ABC) werd ontworpen omdat er aanwijzingen waren dat patiënten thuis meer problemen ondervonden dan tijdens de revalidatie in het verpleeghuis duidelijk werd. Het ABC programma zorgt ervoor dat problemen thuis eerder aan het licht komen en er tijdig aandacht aan de problemen wordt besteed.

In dit onderzoek werden in totaal 93 patiënten geïnterviewd waarvan ongeveer de helft het nieuwe ABC-revalidatie traject hebben gevolgd en de andere helft nog de conventionele revalidatie hebben gehad. Ook bij deze patiënten werd de kwaliteit van leven, de ADL-zelfstandigheid en het functioneren bepaald en werd gekeken naar secundaire preventie.

In beide groepen patiënten werd de kwaliteit van leven gelijk beoordeeld. Ook bij deze patiënten is zelfredzaamheid in de ADL en het behouden van hobby's en activiteiten gerelateerd aan een betere kwaliteit van leven. Veel patiënten ervaren na een jaar meer beperkingen. In de ABC-groep is dit gerelateerd aan afhankelijkheid in ADL en het verlies van sociale contacten. Er is geen opvallend verschil tussen de groepen wat betreft het gebruik van medicatie of ontvangen nazorg. In de ABC-groep gingen wel meer mensen naar een dagcentrum.

Ondanks intensievere nazorg speciaal gericht op de behoeften van CVA-patiënten en gericht op het behoud van activiteiten na een CVA zijn er geen grote verschillen gevonden tussen de twee groepen.

In **Hoofdstuk 7** worden de resultaten van dit proefschrift nog eens tegen het daglicht gehouden en worden een aantal implicaties voor toekomstig onderzoek besproken. Er wordt getracht antwoord te geven op de vraag hoe de kwaliteit van leven is een langere tijd na een CVA. Ook wordt beantwoord of de richtlijnen die zijn ontwikkeld voor CVA-zorg worden nageleefd en of dit leidt tot een betere kwaliteit van leven van patiënten in de eerstelijn. Al met al blijkt dat eerstelijns patiënten een jaar na CVA een hoge kwaliteit van leven hebben en dat de huisartsenzorg in overeenstemming is met de richtlijnen 'Landelijke Transmurale Afspraak TIA/CVA' en de 'NHG-standaard TIA/CVA'. Deze nieuwe richtlijnen hebben tot nu toe echter niet tot een meetbaar verschil in overleving geleid.

DANKWOORD

DANKWOORD

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CURRICULUM VITAE

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Leonie de Weerd was born on 2 January 1984 in Zevenaar.

In 2002 she gained her pre-university diploma from the Zernike college in Haren. Following this she was allocated a place to study medicine. In 2008 she passed her final year examinations in medicine cum laude. During the last phase of her studies she did her scientific elective internship at the Department of General Practice of the University Medical Center Groningen and the Department of Neurology of the Martiniziekenhuis in Groningen. During this period her interest in science grew and the foundation was laid for this PhD research.

In September 2008 she was accepted for the general practice medicine course combined with a PhD programme. In December 2011 she passed her general practice examinations. After that she worked in various practices as a locum general practitioner. Since 2014 she has worked as a general practitioner employed by a general practitioner in Medisch Centrum Gorecht in Hoogezand. In addition to these duties she has completed her PhD research.

Leonie lives together with Bjorn Dijk in Groningen and since November 2013 they have a daughter, Isa Sophie.