# TREATMENT OF AN ACUTE STROKE

## A literature review of current nursing methods

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Tiivistelmä

Akuutin aivohalvauksen hoito vaatii paljon taloudellisia ja henkilöstöllisiä resursseja. Aivohalvaus on kolmanneksi yleisin kuolinsyy Suomessa ja kaikissa länsimaissa. Tämän tutkimuksen tavoitteena oli kerätä jo olemassa oleva tieto akuutin aivohalvauksen viimeisimmistä hoitomenetelmistä. Tutkimus tehtiin kirjallisuuskatsauksena. Tuloksia ja teoreettista tietoa voi hyödyntää jokainen, joka työskentelee aivohalvauksen saaneen potilaan kanssa.

Tämä kirjallisuuskatsaus on kvantitatiivinen tutkimus, joka koostuu kahdeksasta tutkimuksesta. Materiaali kerättiin elektronisesti useasta tietokannasta Nelli-portaalin kautta. Materiaali kerättiin suomeksi ja englanniksi ja julkaisujen aikajanaksi asetettiin kymmenen vuotta (2000–2010), jotta löydettäisiin viimeisin ja ajantasallaan olevin aihetta koskeva tieto.

Tutkimusten aiheet vaihtelivat merkittävästi ja yhteys hoitotyöhön oli vähäinen. Suurin osa tutkimuksista, koskien akuutin aivohalvauksen hoitoa, kohdistui lääketieteellisiin hoitomenetelmiin. Tulokset antavat ymmärtää, että akuutin aivohalvauksen hoitotyö pitää sisällään potilaan perushoitoa sekä läheistä yhteistyötä hoitajien ja lääkärien välillä. Tuloksista voi myös päätellä, että hoitohenkilökunnalla tulee olla kohtuullinen näkemys lääketieteellisistä hoitomenetelmistä, jotta he voivat huomata komplikaatiot ja mahdolliset potilaaseen kohdistuvat vaaratilanteet. Yksi tehokkaimmista tavoista hoitaa aivohalvausta on ennaltaehkäisevä työ, jonka toteuttamisessa sairaanhoitajilla on merkittävä rooli. Sairaanhoitajien tulisi jakaa tietoa aivohalvauksen riskeistä ja tavoista vähentää aivohalvauksen riskiä ihmisen elinaikana.

| Avainsanat (asiasanat)<br>stroke, therapeutics, aivohalvaus, hoitomenetelmät |
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| Muut tiedot |
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Abstract

Treating an acute stroke demands a great amount of financial and human resources. Stroke is the third leading cause of death in Finland and in all Western countries. The aim of this study was to find out existing information about the latest nursing methods in treating an acute stroke. The study was conducted as a literature review. The results and the theoretical information can be utilised by anyone working with a patient who has had a stroke.

This literature review is a quantitative study which consists of eight studies. The material was collected electronically from several databases through the Nelli-portal. Material was collected in Finnish and English and the timeline of publication was set to ten years (2000-2010) in order to find the most recent and up-to-date information regarding the topic.

The topics of the studies varied greatly and their connection to nursing care was weak. Most of the studies concentrated on medical interventions regarding acute stroke treatment. The results indicate that nursing care of an acute stroke involves basic care of the patient and close collaboration between nurses and doctors. The results also indicate that the nursing personnel need to have a fair understanding of medical interventions in order to notice complications and possible threats for the patient. One of the most effective ways in treating a stroke is preventive work in which nurses have a major role. Nurses should share information about the risk factors of stroke and about how to minimize one's risk of having a stroke during one's lifetime.

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# 1 INTRODUCTION

A stroke is a cerebrovascular disorder that disrupts the normal blood supply to the brain causing functional abnormality of the central nervous system. It is the third leading cause of death after cancer and heart disease in Finland with 14000 cases annually. (Jäkälä 2009, 4-6.)

The financial impact of stroke is profound. In 2009 the estimated direct and indirect costs of strokes in United States were €53 billion. In Finland total economic costs of stroke were €187.2 million in 2003 and in Europe in the same year the costs were €21.2 billion. (AHA 2009; Petersen, S., Peto, V., Rayner, M., Leal, J., Luengo-Fernandez, R. & Gray, A. 2005, 95.)

# 2 ACUTE STROKE IN NURSING

Acute stroke or more precisely acute care of a stroke is usually three to seven days from initial symptoms and/or arrival to the hospital. Strokes are divided into two main categories: ischemic in which hypoperfusion and vascular occlusion occurs, and hemorrhagic in which blood extravasates into the brain or subarachnoid space. (ASA 2009; Jäkälä, P. 2009, 4-6; Kuisma, M., Holmström, P. & Porthan, K. 2008, 306-307; Smeltzer, Suzanne C., Bare, Brenda G., Hinkle, Janice L. & Ceever, Kerry H. 2008, 2206.)

## 2.1 Different types of strokes

Ischemic stroke is a sudden loss of function and it is caused by disruption of the cerebral blood flow. The usual symptoms are numbness or weakness of the face, arm, or leg, especially on one side of the body. Also person with an ischemic stroke can be confused, have trouble speaking or understanding speech, have visual disturbances, have loss of balance or coordination, and/or severe headache. (Kuisma et al. 2008, 306-307; Holmia, S., Murtonen, I., Myllymäki, H. & Valtonen, K. 2003, 300-302; Smeltzer et al. 2008, 2206-2207.)

Ischemic strokes can be divided into two different types: transient ischemic attack (TIA) or a stroke which is caused by an embolus or thrombus. Embolus or thrombus caused strokes can be divided into five different subtypes based on the cause of the stroke (see Figure 1). The percentage indicates the proportion of a certain stroke type from all ischemic strokes. (Kuisma et al. 2008, 306-307; Holmia et al. 2003, 300-302; Smeltzer et al. 2008, 2206-2207.)



- cryptogenic stroke
- small penetrating artery thrombotic stroke
- cardiogenic embolic stroke
- large artery thrombotic stroke
- other
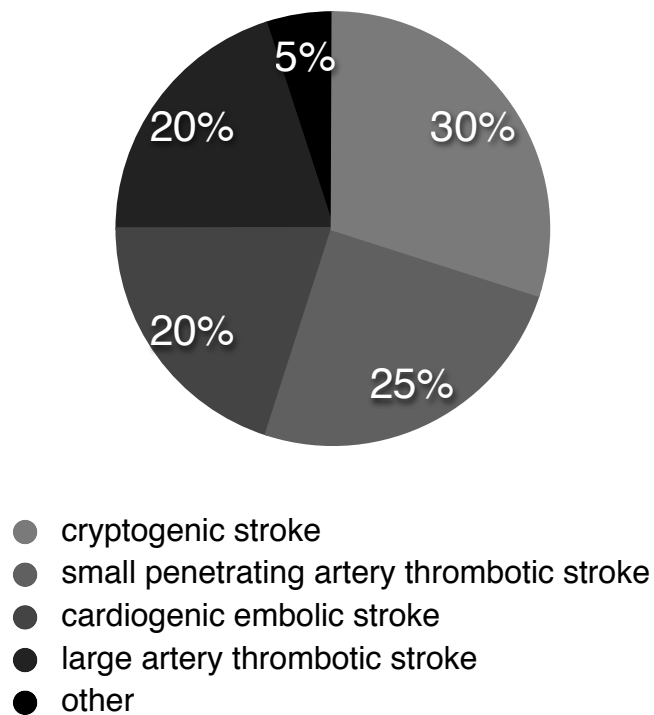
FIGURE 1. Ischemic stroke subtypes (Smeltzer et. al. 2008, 2206.)

Hemorrhagic stroke is caused by bleeding from a ruptured aneurysm or bleeding from a ruptured small vessel into the brain tissue, the ventricles, or the subarachnoid space. The symptoms are much the same as in ischemic stroke. In hemorrhagic stroke the changes in level of consciousness and exploding headache, which patients usually describe as "worst headache ever", are most common symptoms. The speed of the degradation of level of consciousness depends on how big and how severely a blood vessel has ruptured. (Kuisma, et al. 2008, 308-309; Holmia et al. 2003, 302-304; Smeltzer et al. 2008, 2223-2224.)

## 2.2 Risk factors

The risk factors of stroke are quite common and they can be easily affected by lifestyle changes such as eating habits and the amount of physical exercise. Three most important risk factors are high cholesterol, hypertension and smoking. Also the lack of physical exercise has become even more significant risk factor. Other risk factors are obesity, diabetes mellitus, excessive alcohol consumption, atrial fibrillation, asymptomatic carotid stenosis and hereditary factors. (Holmia et al. 2003, 296-297; Smeltzer et al. 2008, 2210.)

From a nursing point of view other risk factors concerning the treatment can also be found. Depending on the severity of a stroke the patient maybe unable to speak, eat, move or attain one's own bowel and bladder control. Being not able to speak the patient can't express his/her feelings and experiences. Thus an empathic nurse-patient relationship is needed. Stroke can result in swallowing problems which means that the patient's nutrition must be managed some other way to prevent aspiration. Nasogastric tube and elevating the head of the bead at least 30 degrees will help preventing aspiration. Also when patient is not able to move there is a risk of pressure sores and skin damage. Changing the patient's position and/or using pressure mattresses will greatly decrease the risk of developing these issues. (Smeltzer et al. 2008, 2216-2221.)

# 3 AIM AND PURPOSE OF THE STUDY

This research study is done as a literature review in order to determine what are the latest nursing methods in treating an acute stroke. The aim of the study is to find relevant studies on the subject, compare the results and assemble the received information together. The purpose is to improve patient care and professionalism by making the information available to healthcare professionals, students and any other who are working with patients with acute stroke.

RESEARCH QUESTION

What are the latest nursing methods in treating an acute stroke?

# 4 IMPLEMENTATION OF THE STUDY

## 4.1 Research method

The research method chosen for this thesis is a literature review. A literature review's purpose is to gather existing knowledge from scientific research, books, magazines and statistics concentrated on a specific topic which in this case is treatment of an acute stroke from nursing point of view. The gathered data is then analyzed and processed to find the relevant information and to produce a result concerning the chosen topic through synthesis. (Eskola, J. & Suoranta, J. 1998; Johansson, K., Axelin, A., Stolt, M. & Ääri, R-L. 2007; Paunonen, M. & Vehviläinen-Julkunen, K. 1998.)

## 4.2 Reliability and validity

A literature review is a quantitative study where the reliability of the study is evaluated through the whole research process by the researcher. Precise description of choosing the material and keywords is made in order to make it possible to repeat the study. The criteria for accepting and rejecting material is determined in detail. (Eskola, J. & Suoranta, J. 1998; Johansson et al. 2007; Paunonen, M. & Vehviläinen-Julkunen, K. 1998, 206-213.)

The most essential aspect of validity of a quantitative study is that does the collected and processed material answer to the declared research question. The validity has been evaluated during the whole process from theoretical background to analyzing the results in order to be confident that content of this study corresponds the title and set aims. (Eskola, J. & Suoranta, J. 1998; Johansson et al. 2007; Paunonen, M. & Vehviläinen-Julkunen, K. 1998, 206-213.)

## 4.3 Research material

Material was collected in English and Finnish. The material consists of scientific articles, studies and systematic literature reviews. The aim of this study is to gather recent information and therefor publication years were set between 2000 and 2010.

First the search keywords were defined in Finnish and then FinMeSH database was used to determine the corresponding keywords in English. The keywords were "aivohalvaus" and "hoitomenetelmät" in Finnish and the corresponding words in English were "stroke" and "therapeutics". A scientific criteria was determined that the articles would have to be published in a magazine that uses referee-peer review system. (Elsevier 2010; Wikipedia 2010.)

The material for this study was gathered electronically through the databases of the Nelli-portal during February 2010. The initial search was done with Nelli-portals metasearch which processes all the databases and the search category was health sciences. The following databases were found with relative articles and studies: Aleksi, BioMed Central, Ebrary, EBSCO Academic, EBSCO Business, Elsevier ScienceDirect, Highwire and Journals@Ovid. The amount of Finnish results was 27 from the Aleksi database whereas the amount of English references were 19036. Only articles having full text version available were searched. Table 1 demonstrates how many references were found from different English databases.

TABLE 1. Number of references in English databases

| Name of database | Number of references |
|---|---|
| BioMed Central | 197 |
| Cochrane | 3 |
| Ebrary | 1114 |
| EBSCO Academic | 3823 |
| EBSCO Business | 51 |
| Elsevier ScienceDirect | 4786 |
| Highwire | 13860 |
| Journals@Ovid | 58 |
| Libertas Academic | 19 |
| TOTAL | 19036 |

Four databases had a great amount of references. Therefor a more detailed search was done in these databases. In Ebrary database the keywords were searched with the options "nursing" OR "cerebrovascular disease" OR "treatment" and the results were narrowed down to 89. In EBSCO Academic the first search with keywords gave 1310 results and when narrowed with "abstract" option the amount was 451 and when further narrowed with "keywords" option the amount was five. In Elsevier ScienceDirect database options "title" AND "abstract" AND "keywords" were selected with subject narrowed to "Nursing and Health Professions" and only journals were searched. The result was 2. In Highwire database options "title" AND "abstract" were selected and the results were narrowed down to 63. Furthermore articles that required a payment before they could be viewed were left out of this study. Table 2 demonstrates the amount of references after the detailed search.

TABLE 2. Number of references in English databases after detailed search

| Name of database | Number of references |
|---|:---:|
| BioMed Central | 26 |
| Cochrane | 3 |
| Ebrary | 89 |
| EBSCO Academic | 5 |
| EBSCO Business | 51 |
| Elsevier ScienceDirect | 2 |
| Highwire | 29 |
| Journals@Ovid | 26 |
| Libertas Academic | 19 |
| TOTAL | 250 |

After the detailed search the amount of references in English was narrowed down to 250 results. Figure 2 demonstrates the material search results in Finnish keywords and Figure 3 demonstrates the corresponding search in English keywords.

Material search with Finnish keywords "aivohalvaus" AND "hoitomenetelmät"

↓

Altogether 27 results were found from database Aleksi
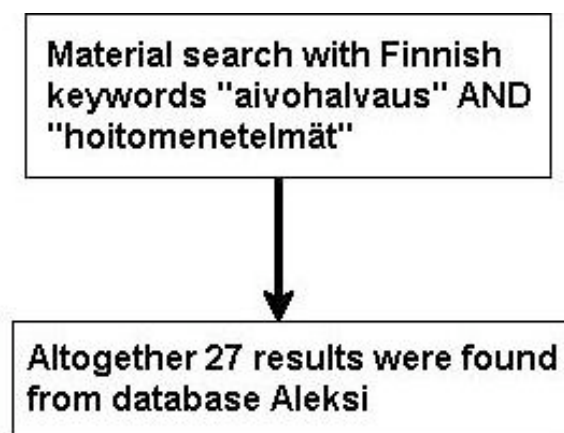
FIGURE 2. Results from Finnish databases
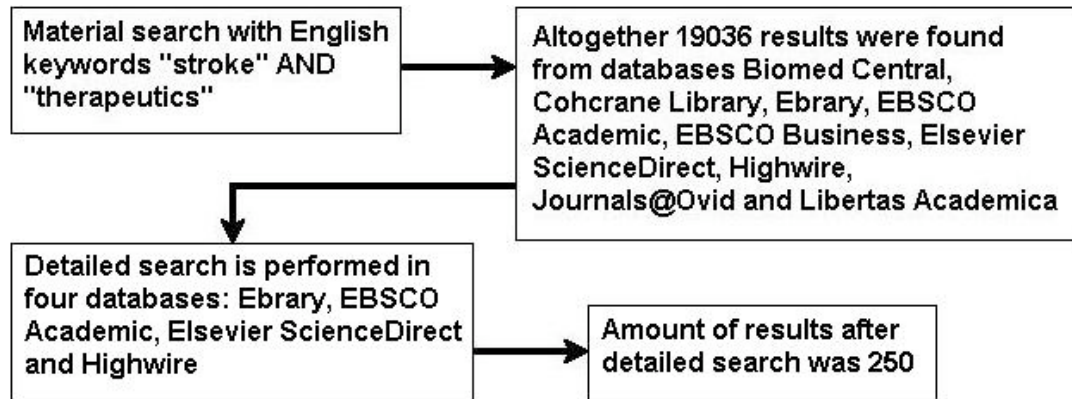
FIGURE 3. Results from English databases

After this all the 250 English and 27 Finnish results' headings were read
through to determine if the headings were enough related to the topic and if
they were scientific enough to be considered implementing to this study. The
number of rejected results on the grounds of heading was 262 which left 15
abstracts to be further studied. Seven articles were rejected for not being
scientific enough which left eight articles for final analysis. Figure 4
demonstrates how material was selected for final analysis.

```
┌─────────────────────────────────┐
│ Headings after detailed search  │
│ 1.1.2000-28.2.2010              │
│ - 277 from nine English         │
│ databases and one Finnish       │
│ database                        │
└─────────────────────────────────┘
```

```
                              ┌──────────────────────────┐
                              │ Rejection criteria:      │
                              │ - topic not related to   │
                              │ current research         │
                              │ - topic is not           │
                              │ scientifice enough       │
                              └──────────────────────────┘
```
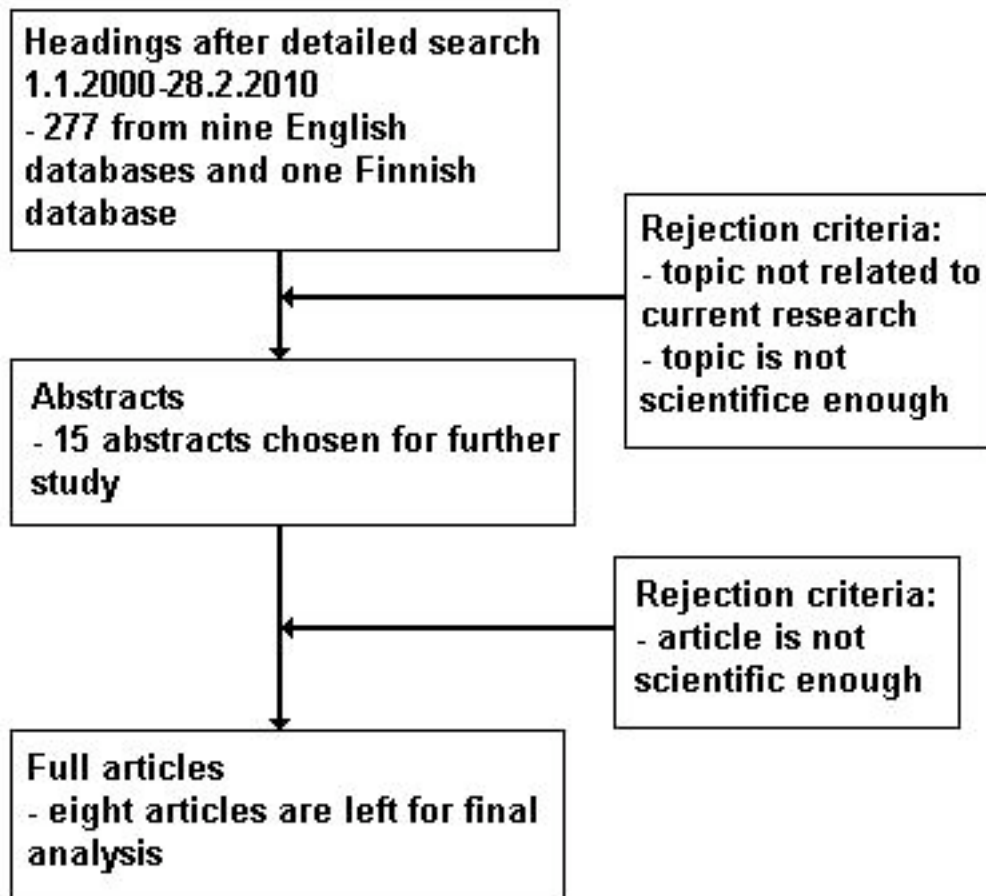
```
┌─────────────────────────────────┐
│ Abstracts                       │
│ - 15 abstracts chosen for further│
│ study                           │
└─────────────────────────────────┘
```

```
                              ┌──────────────────────────┐
                              │ Rejection criteria:      │
                              │ - article is not         │
                              │ scientific enough        │
                              └──────────────────────────┘
```

```
┌─────────────────────────────────┐
│ Full articles                   │
│ - eight articles are left for final│
│ analysis                        │
└─────────────────────────────────┘
```

FIGURE 4. Material selection for final analysis

## 4.4 Data analysis

Initially the English keywords "stroke" and "therapeutics" brought 19036 results where as the Finnish keywords "aivohalvaus" and "hoitomenetelmät" brought only 27 results. The English results were narrowed down with specific criteria and search options to 250 results. All the English results were found from electronic databases. Only one of the Finnish results was found from electronic databases. During material selection the other Finnish articles and abstracts were search and found manually from Tampere city main library Metso and Tampere University of Applied Science's library.

All the eight articles were chosen for final analysis by reading the abstracts. Some articles could have been left out but because of the small number of articles left after material selection all the eight articles were included. The

articles were published in the following journals and magazines: Australian Critical Care, Chest, Clinical and Experimental Hypertension, Current Neuropharmacology, Duodecim, Journal of Brain Disease, and Journal of Molecular Medicine.

# 5 RESULTS

The topics of the articles varied greatly and there was only a weak connection to nursing care. Four of the studies concentrated on a medical intervention (Bobrow et al. 2009; Leys & Deplanque 2006; Varon & Acosta 2008; Williams-Karnesky & Stenzel-Poore 2009), two of the studies concentrated on nursing practice (Davidson et al. 2004; Stephens & Fawcett 2005) and the remaining two studies concentrated on how acute stroke care is organized and conducted (Roine et al. 2006; Spencer et al. 2009). A list of the studies, their aims, methods and conclusions can be found in Appendix 1. Figure 5 shows how the studies were divided.

■ Concentration on medical intervetion
■ Concentration on nursing practice
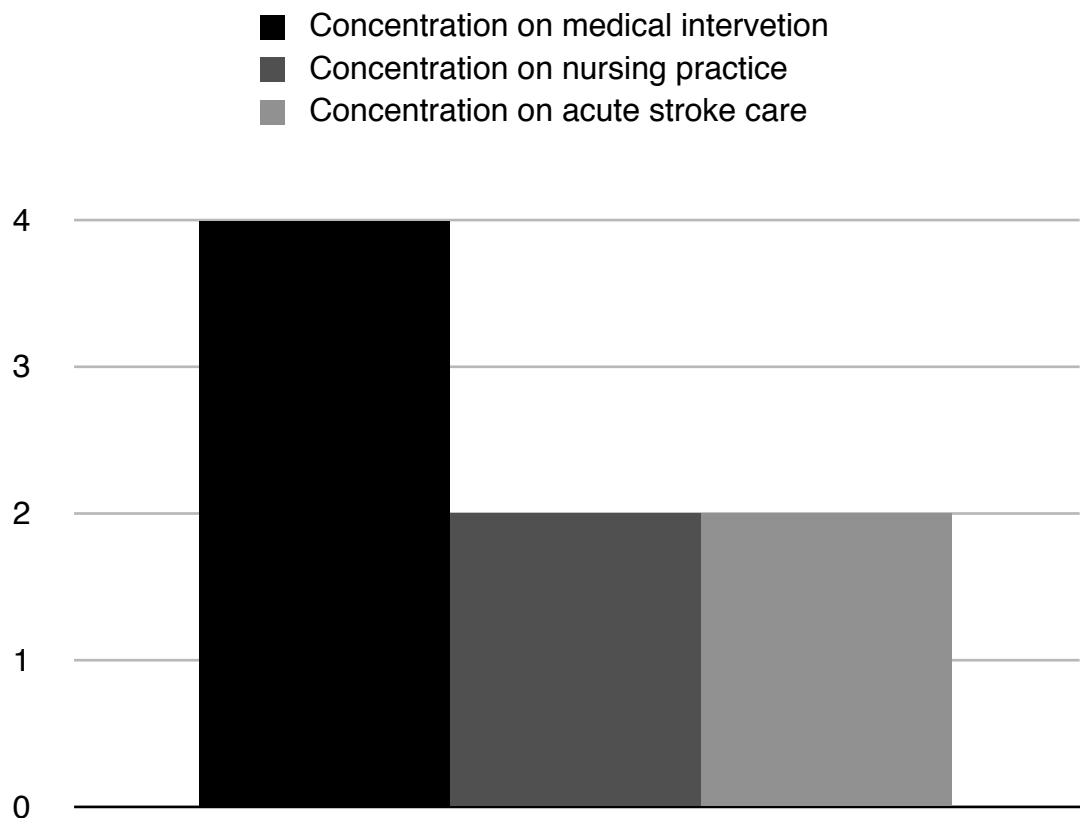■ Concentration on acute stroke care

FIGURE 5. Dividing of the studies

The four articles concentrated on medical interventions. Two of them were conducted as literature reviews (Varon & Acosta 2008; Williams-Karnesky & Stenzel-Poore 2009) in order to find relevant information about their topics. One of them was conducted as an internet survey (Bobrow et al. 2009) and the last one was conducted by using both meta-analysis of previously conducted trials and literature review (Leys & Deplanque 2006). They discussed about new ways of treating an acute stroke such as using therapeutic hypothermia as a neuroprotectant (Varon & Acosta 2008), finding alternatives for traditional intravenous thrombolysis such as adenosine based treatments (Williams-Karnesky & Stenzel-Poore 2009). They also discussed about using thrombolysis in an emergeny room setting (Bobrow et al. 2009) and that should thrombolysis be used beyond the three-hour time window (Leys & Deplanque 2006).

Two of the articles concentrated on nursing practice (Davidson et al. 2004; Stephens & Fawcett 2005). They both were conducted by finding information through electronic databases such as CINAHL, Medline, EMBASE and Cochrane. The other two articles concentrated on acute stroke care in general (Roine et al. 2006; Spencer et al. 2009). First of them used a questionnaire and a phone interview to accumulate material (Roine et al. 2006) and the other reviewed electronic copies of reports retrospectively (Spencer et al. 2009).

# 6 DISCUSSION

The research articles had a variety of topics and they discussed acute stroke care more or less. The results show clearly that acute stroke treatment is bound to medicine quite profoundly which raises some interesting thoughts about the nursing care and nurses role in acute stroke treatment. While acute stroke treatment is bound to medicine the patient needs a lot of nursing care in everyday activities. Stroke has a huge impact on a patient's life causing

discomfort and possible loss of many independent functions such as eating, talking, bowel and bladder control, and movement. The results indicate that nursing care is mainly basic care supporting the patient's everyday needs and following the set protocols and doctor's orders.

The results indicate also that nurses need to have a fair knowledge of medical treatment methods since nurses are the ones executing the doctor's orders. Having the knowledge will also help nurses to detect any threats to the patient and possible complications of the treatments. This knowledge can also help nurses when they do preventive work which is one of the most effective ways to treat a stroke. By sharing information about the risk factors and how to decrease one's risk of having a stroke nurses can effectively affect people's lives thus promoting health and wellbeing.

When thinking the validity of the study one can notice that the set research question was not fully answered. The research articles were not related to nursing care as much as they were related to medicine. Thus the results do not present any new methods in the nursing care of acute stroke treatment but they emphasize the importance of already known basic care and knowledge of medical treatments. The whole research process and the results of this study indicate that the aims and definition of the topic need to be determined very specifically in order to get reliable results and to ensure that the study answers to the set research question.

The whole process of doing this thesis and finding information on a certain topic has been very educational. It has taught the researcher the principles of scientific research and it has given many tools of how to find and analyze knowledge. It has also verified the importance of basic care and empathic nursing relationship with the patient. The researcher has also recognized the need for professional growth. In order to become a competent nurse one must be ready to make oneself familiar with the knowledge of medical information and one must also be ready to follow the development of nursing care through scientific journals and publications.

# 7 CONCLUSION

Stroke is the third leading cause of death in Finland and in all Western countries. The financial costs are profound and the they are estimated to rise every year. Nursing care is bound to medicine and the need for effective collaboration between nurses and doctor's is important. While this study did not fully answer the set research question it raised some questions which can be adapted to following few implications for future research.

1. how can the quality of nursing care be evaluated in acute stroke treatment

2. how satisfied the patients and their relatives are to the care they have received

3. how can the multiprofessional co-operation be improved

Acute stroke care will be a great challenge for the future because it has been predicted that more and more people will contract stroke during their lifetime. On going research for new and more effective medical interventions and nursing care will ensure that patients will have better changes of survival and recovery from a stroke.

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# APPENDICES

## Appendix 1. Research articles

| Research | Aim of research | Methods and material | Essential results & Conclusions |
|---|---|---|---|
| Roine et al. 2006, Finland | to survey the current situation of acute stroke care in Finland | questionnaire and phone interview to health centers (n=237), hospitals (n=36) and emergency response centers (n=24) | acute stroke care has great regional differences, geographically significant amount of the population has limited access to acute stroke care |
| Davidson et al. 2004, Australia | to review published literature about management of atrial fibrillation to prevent thrombotic events | electronic database search including CINAHL, Medline, EMBASE and Cochrane databases for the years 1966-2002 | increased understanding of atrial fibrillation and stroke have led to antithrombotic therapy recommendation to be used in nursing care and decreased mortality |
| Bobrow et al. 2009, USA | to evaluate attitudes and knowledge of emergency physicians about thrombolysis | internet survey (n=100) | significant proportion of emergency physicians do not endorse thrombolysis, a need for clear and effective collaboration model is imperative |
| Spencer et al. 2009, USA | to evaluate the Emergency Medical Services (EMS) component of thrombolysed acute ischemic stroke patient care | electronic copies of the EMS incident reports were collected retrospectively and evaluated (n=65) | overall EMS providers have a satisfactory understanding of acute stroke care, field assessment and diagnostic accuracy are good, documentation needs improvement |

| Research | Aim of research | Methods and material | Essential results & Conclusions |
|---|---|---|---|
| Williams-Karnesky & Stenzel-Poore 2009, USA | to review published literature about adenosine, its physiology and its use as a therapeutic intervention | a literature review | no adenosine-based therapies exist for stroke treatment, thrombolysis is an imperfect treatment due short application window and risk for hemorrhagic episodes |
| Varon & Acosta 2008, USA | to review published literature about therapeutic hypothermia and its use as a neuroprotecant | a literature review | the induction of mild therapeutic hypothermia is a useful method as a neuroprotectant, further studies are needed concerning therapeutic hypothermia and its applications |
| Leys & Deplanque 2006, France | to find out the possible use thrombolysis treatment beyond the three-hour time window | meta-analysis of eight randomized controlled trials, a literature review | patients should be treated as soon as possible, trials should be commissioned to find out the safety and effect of thrombolysis beyond three-hour time window |
| Stephens & Fawcett 2005, UK | to review published literature about the pharmacological exploitation of nitric oxide | electronic database search including Medline, CINAHL and Cochrane databases for the years 1970-2005 | knowledge of nitric oxide, its action and its possible hazards is relevant to nurses |