Sedentary behaviour during hospital stay in patients with acute stroke: A multi center cohort study

Kandidater: Kamilla Henny Giskegjerde, kull 16A & Ingunn Anette Halset, kull 16A
Hovedveileder: Torunn Askim
Medveileder: Katinka Alme
Tidspunkt og sted: Bergen, 18.03.2021

ABSTRACT

Background: Sedentary behaviour in the acute phase of stroke has been associated with unfavourable outcomes such as increased dependency, morbidity and mortality. The aim of this study was to investigate intrinsic (patient characteristics) and extrinsic (hospital ward) factors that might contribute to increased sedentary time and how sedentary behaviour was associated with outcomes.

Methods: The patients were included in the multicenter cohort study, the Norwegian Cognitive Impairment After Stroke Study (Nor-COAST), when admitted to one of five inclusion hospitals for acute stroke. Sedentary behaviour was measured using the body worn sensor, ActivPAL3, during hospital stay. Prestroke function was measured by the modified Rankin Scale (mRS), stroke severity by the National Institute of Health Stroke Scale (NIHSS), and physical function by the Short Physical Performance Battery (SPPB). Complications (infections and falls) and functional outcomes measured by the Barthels Index (BI) were assessed at day seven or at discharge.

Results: A total of 357 patients were included. Mean sedentary time was 12.3 hours the first day of recording. We found mRS and NIHSS to be positively associated with sedentary time, while SPPB was negatively associated. Increasing levels of sedentary time was significantly associated with the incidence of infections during hospital stay and reduced function at discharge. Haukeland University Hospital (HUH) had significantly less sedentary time compared to other hospitals.

Conclusions: Sedentary behaviour is abundant during hospital stay for acute stroke and is associated with unfavourable outcomes. Future research should focus on measures to reduce sedentary behaviour.

ABSTRAKT- NORSK

Bakgrunn: Inaktivitet i akuttfasen hos slagrammede er assosiert med ugunstige utfall som økt avhengighet, morbiditet og mortalitet. Målet med denne studien var å undersøke pasientrelaterte faktorer og faktorer relatert til omgivelsene (sykehusavdelingen) som kan bidra til mer inaktivitet, og hvordan inaktivitet er assosiert med komplikasjoner under oppholdet og funksjon ved utreise.

Metoder: Pasientene var inkludert i en multi-senter kohortstudie, «the Norwegian Cognitive Impairment After Stroke Study» (Nor-COAST), ved innleggelse for akutt slag på en av fem inklusjonssykehus. Inaktivitet ble målt ved hjelp av den kroppsbårne sensoren ActivPal3 under sykehusoppholdet. Funksjon før slaget ble målt med «modified Rankin Scale» (mRS), alvorligheten av slaget med «National Institute of Health Stroke Scale» (NIHSS), og fysisk funksjon med «Short Physical Performance Battery» (SPPB). Komplikasjoner (infeksjoner og fall) samt funksjon, målt med «Barthels Index» (BI), ble vurdert på dag syv eller ved utskrivelse.

Resultat: Totalt 357 pasienter ble inkludert. I gjennomsnitt var de inaktive 12,3 timer i løpet av den første målte dagen. Vi fant at mRS og NIHSS var positivt assosiert med inaktivitet, mens SPPB var negativt assosiert. Økende nivå av invaktivitet var signifikant assosiert med forekomst av infeksjoner under sykehusoppholdet og redusert funksjon ved utskrivelse. Haukeland Universitetssykehus (HUH) hadde signifikant mindre inaktivitet sammenlignet med de andre sykehusene.

Konklusjon: Pasienter innlagt for akutt hjerneslag er inaktive store deler av dagen, og inaktivitet er assosiert med ugunstige utfall. Fremtidig forskning bør fokusere på metoder for å redusere inaktivitet under sykehusopphold.

Content

Appendix:

- CRF-form Nor-COAST
- Form of consent Nor-COAST
- REC-approval main study
- REC-approval of amendment

1. Background

1.1 Stroke in Norway

Epidemiology and definitions

Stroke is one of the leading causes of morbidity and mortality, and in 2019 there were over 9000 patients treated for acute stroke in Norwegian hospitals(1). Acute stroke is caused by reduced oxygen delivery to a region of the brain, due to reduced blood flow (ischemic stroke) or bleeding (haemorrhagic stroke). In the official definition of acute stroke, the World Health Organization (WHO) definition, stroke is defined as "a focal (or at times global) neurological impairment of sudden onset, and lasting more than 24 hours (or leading to death) and of presumed vascular origin"(2). This definition has come under debate as the introduction of the magnetic resonance imaging (MRI) could diagnose acute stroke without overt neurological deficit and the term "silent infarction" has been introduced (3).

Stroke unit care

In Norway, 85% of the patients with acute stroke are admitted directly to a dedicated stroke unit and 94% are treated at stroke units during hospital stay (1). Stroke unit care is made up of three principles: dedicated wards, a multidisciplinary team, and effective and well organized patient pathways (4). The patient pathways includes acute treatment, routine assessments, rehabilitation including early mobilisation, and routines for secondary prevention. Stroke unit care has been found to be beneficial for patient outcomes, including dependency, complications and death (4, 5). In Norway, stroke unit care is based on the national guidelines for stroke treatment (6).

1.2 Mobilisation in the acute phase of stroke

Early mobilisation, starting between 24 and 48 hours after ictus, is part of stroke unit care and has been found to be favourable for stroke outcomes (7-10). Li et al. found that early mobilisation contributed to better functional outcomes, measured by the Barthel Index (BI) and a shortened hospital stay (7). Hence, mobilising the patient early in the acute phase is not only believed to be safe but also contributes to a successful rehabilitation. In contrast "very early mobilisation" within 24 hours has been found to be disadvantageous, contributing to

increased dependency and mortality (8, 11). According to the national guidelines, "early mobilisation" should occur within the first 48 hours if the patient is stable, and the patient should be mobilised 4 to 6 times a day, in periods of 15-20 minutes each time (6).

1.3 Sedentary behaviour

The impact of sedentary behaviour in stroke patients

Correspondingly to the benefits of early mobilisation, sedentary behaviour has been found to be associated with poorer outcomes after stroke, such as reduced functional abilities, and Askim et al. found that a high level of time spent in bed during the acute phase of stroke was associated with higher levels of dependency measured by the modified Rankin Scale (mRS) three months later, implying that sedentary behaviour should be limited (9). In Norway, 91% of the stroke patients were independent before the stroke compared to 74% after the stroke (1). Hence, saving function after stroke is imperative in the acute phase of stroke, and reducing sedentary behaviour during hospital stay could be an effective measure increasing functional outcomes (7-9, 12, 13).

Definition and methods of measuring sedentary behaviour

Sedentary behaviour is defined as "any waking behaviour characterized by an energy expenditure ≤1.5 metabolic equivalents (METs) while in a sitting, reclining or lying posture" (14). The preferred method of measuring sedentary behaviour is not defined, but body worn sensors are favoured (14).

There are two different types of body worn activity sensors: inclinometers and oscillometers, measuring inclination or oscillation frequency, respectively. There are also combined sensors available. The oscillometer, counts the frequency of the movement and the measured frequency is converted to metabolic equivalents (METs) as a measure of energy expenditure (15). The method for converting oscillation frequency counts to METs is based on healthy norms, and there are indications that stroke patients have a higher energy expenditure at the same frequency count compared to healthy adults (16). Hence, the method is not validated for the stroke population. The inclinometer identifies position transition and the method is validated in a stroke population (17). Also, even in the healthy population, standing is estimated to have an energy expenditure of 1.59 METs (18), hence reaching the threshold of non-sedentary behaviour. Based on this, position transition from lying/sitting to

standing/stepping can be used to differentiate between sedentary and non-sedentary behaviour in a stroke population.

Other methods of measuring sedentary behaviour are behavioural mapping (19, 20) and retrospective self reporting (21), the last being the most frequently used (22). Behavioural mapping is an objective observational method where the observer reports the patients behaviour at a specific location and at specific predefined time periods (19, 23, 24). The accuracy of this method has been discussed, in particular the possibility of under- or overestimating physical activity as a consequence of the non-continuous monitoring (19, 20, 23). This may suggest that other methods that allow continuous monitoring are more accurate (23), such as body worn sensors, as previously mentioned (14). Retrospective self-reporting has been found to underestimate the amount of sedentary time compared to objective measures such as behavioural mapping or body worn sensors (22).

1.4 Assessing patient characteristics in stroke trials

Different patient related (intrinsic) factors such as higher age, stroke severity, pre- and poststroke ADL-function, post stroke physical function and lack of motivation has been associated with increased levels of sedentary behaviour during hospital stay, and sedentary behaviour has been associated with patient outcomes (6, 13, 21, 25-27).

There are several validated tools available to ensure the validity and reliability of patient assessments. Stroke severity is most often measured by the National Institutes of Health Stroke Scale (NIHSS), which consists of 13 items identifying different neurological deficits such as level of consciousness, orientation, neglect, language and speech, visual loss, eye movements, power, coordination, sensibility and brain nerve status, a high score reflecting the severeness of the symptoms (28).

Assessing function in everyday tasks, or "activities of daily living" (ADL-function) is an important outcome in stroke studies, and low prestroke ADL-function has also been found to be associated with stroke severity and the risk of stroke recurrence (29, 30). MRS is a measure of global disability and is often used to assess prestroke function and outcomes after stroke (31). The scale ranges from 0-6, where a score of 0-2 defines a patient as independent, a score of 5 indicates that a patient suffers from severe disability and a score of 6 is "dead" (32). The definition of a "good outcome" has varied, but the cut-off is now most frequently

set at equal to or below 2 points (33). The use of mRS reported in retrospect by patients or their caregivers, has in some studies been found to be a valid method of assessing prestroke function in clinical stroke trials (31, 34). Amongst others, it has been found to coincide with the level of prestroke care, Charlson comorbidity index and living conditions (34). In contrast, a study by Fearon et al. argued that prestroke mRS had limited validity because of low correlation with the same factors (35). Barthels Index is another frequently used tool to assess ADL-function. It assesses activities of daily living on a scale from 0-20 where a higher score reflects more independence (36). BI is found to have a high intra- and interobserver reliability and is able to predict patient outcome post stroke (predictive validity), such as survival, how active the patients are in their own homes and in the communities and how social they are (37). However, BI is only measuring primary ADLs, and one can therefore achieve a high score even if the function in daily life is relatively unsatisfactory, known as the ceiling effect (37). To discriminate between the patients independent in primary ADL, assessment of cognitive function or instrumental ADL (I-ADL) can be added (38).

The BI and mRS are two of the most frequently used scoring systems assessing functional outcomes post stroke and in a meta-analysis by Quinn et al. investigating functional assessment methodology in stroke populations, they found mRS to be used in 64.3 % of the studies and Barthel in 40.5 %. (39). MRS is a simpler scale than the BI, and both tools are found to be valid for functional outcomes after stroke (40). To avoid inter-rater disagreement when using mRS, Wilson et al. proposed a structured interview and found that when using this method there were 81% agreement between raters compared to 43% when not using it (41).

Physical function can be assessed using several different tools. The Short Physical Performance Battery (SPPB) is a frequently used tool, validated to assess physical function among elderly, with a scoring system from 0-12 (42). A low score indicates a poorer physical function and is associated with an increased risk of functional decline, morbidity and mortality (42-44).

1.5 Intrinsic and extrinsic factors potentially affecting sedentary behaviour during hospital stay

The patient characteristics described above, are “intrinsic factors” that has been found to be associated with sedentary behaviour. Factors outside the patient, “extrinsic factors”, might also be important contributors to increased sedentary behaviour, and are more available for intervention (4, 5, 19, 45). One extrinsic factor is properties at the hospital ward, and it is important to identify any potential targets for optimisation.

1.6 Risk of complications following stroke

Complications, in particular infections and falls, are frequently seen during hospital stay for acute stroke (46-48). Complications occur more often among older patients, those with larger disabilities prestroke and more severe strokes(46). Out of bed mobilization in the acute phase of stroke has been found to be associated with reduced risk of complications, such as pneumonia, urinary tract infections (UTI’s) and pressure sores. It has not been found to increase the rate of falls (49).

1.6.1 Infections

Infections during hospital stay for acute stroke are associated with poorer functional outcomes (50) and mortality (47, 48, 51-53). A study by Indredavik et al. suggested that 16 % of patients suffered from urinary tract infections and 11.2% from pneumonia during the first week after stroke, but literature varies (47, 48, 53). A study by Heuschmann et al. found that 31.2 % of all deaths in the acute phase of stroke were caused by pneumonia (53). Another study done by Katzan et al. found that pneumonia tripled the risk of death within one month post stroke (52).

Age and stroke severity are the factors most strongly associated with the risk of infections during hospital stay (48). Sedentary behaviour has also been found to be associated with the risk of developing infections during hospital stay (49, 51, 54).

1.6.2 Falls

A fall is defined as an event where a person falls to the ground, floor or another level lower than starting position, independent of cause and if there are any damage following the fall (55).

Falls during hospital stay are a frequent and feared complication to acute stroke (47), and is reported in 15-37 % of all stroke patients (51, 56). The factors associated with an increased risk of falls during hospital stay in general, are high age (>85 years), male gender, impaired balance, recent falls, the use of multiple medications at the same time, dependence for daily activities, cognitive disorders that may involve confusion and/or agitation, neurocardiovascular instability and urinary incontinence (56, 57). It is found that physical activity on a regular basis significantly reduces the fall risk among elderly people (58).

1.7 Aims and hypothesis

Identifying factors associated with sedentary behaviour, enables us to a more targeted approach to reduce sedentary behaviour, in particular if there are structural factors at the ward. Sedentary behaviour associated with patient characteristics might be useful to focus our attention on these patients.

The primary aim of this study was to investigate the level of sedentary behaviour in patients admitted to Norwegian hospitals with acute stroke. The secondary aim was to investigate if there were regional differences and how sedentary behaviour was associated with patients characteristics, complication during stay and patient outcomes at discharge.

Our hypothesis was that differences in sedentary behaviour during hospital stay is driven by patient characteristics (intrinsic factors) and that sedentary behaviour increases the risk of complications and contributes to a poorer functional outcome.

We investigated this by answering the following three research questions:

1. Is sedentary behaviour associated with patients characteristics such as prestroke function, stroke severity and post stroke physical function?
2. Are there any regional differences in sedentary behaviour?
3. Is sedentary behaviour associated with an increased risk of complications and poorer functional outcomes at discharge?

2. Materials and methods

2.1 Patients and outcomes

2.1.1 Patient selection

The patients were included in the Norwegian Cognitive Impairment After Stroke (Nor-COAST) Study, which was a prospective cohort study recruiting acute stroke patients from five contributing hospitals in three regional health authorities, from May 2015 through March 2017 (59). Inclusion criteria were (1) acute stroke, defined by WHO, arriving at hospital within 1 week after symptom onset; (2) above 18 years of age; (3) ability to understand Norwegian; and (4) ability to give informed consent. For patients unable to provide consent for themselves, the next of kin may give oral consent. Exclusion criteria were (1) not living in the catchment area of one of the inclusion hospitals, (2) the symptoms explained by other diagnosis than stroke, (3) short life expectancy (<3 months) or a mRS score of 5, except for patients included at the main centre, St. Olavs Hospital. For this substudy the patients also had to have activity monitoring for at least one full day at baseline.

2.1.2 Patient characteristics

Demographic information, information about stroke severity, premorbid function, ADL-function and physical function post stroke was registered at day seven or at discharge if earlier. Stroke severity was measured by the NIHSS, and premorbid function by the mRS. Physical function post stroke was assessed by the SPPB.

2.1.3 Outcomes

Sedentary behaviour

Sedentary behaviour was measured using the body worn sensor activPAL3, attached to the unaffected thigh (activPAL3, Model 20.2; PAL Technologies, Glasgow, UK) during hospital stay. Day-time was defined as between 08:00 am and 10:00 pm and only patients with at least one full day were included. Sedentary events were divided if they crossed the day/night time boundaries. Manual inspection of the output to identify non-wear time was performed. Sedentary behaviour was defined as sitting or lying. The threshold for noise was 1.5 s and

sedentary events were merged if they were broken by events of standing of ≤3 s. The first whole day of registration was used in the estimation of sedentary time during stay.

Functional outcomes and complications

ADL-function post stroke was assessed by BI at day seven or at discharge if that came first. Infections were defined as infections in need of antibiotics treatment. Falls were registered by retrospective self report.

2.2 Statistics

Baseline characteristics and outcomes are given as a total value for the whole population and stratified by inclusion centra. The values are presented as numbers with percentages and means with standard deviations. The p-values for the differences between the inclusion centras are not given in the tables, but the differences are described in the results section.

Sedentary time per day is given in means with standard deviations, and the differences between the inclusion centras were analysed using a one-way ANOVA. Some of the patients had more than one day of recording, and to analyse any change in the level of sedentary behaviour during stay, a mixed model linear regression with robust standard errors, taking into account the clustered data using the cluster option in STATA was used. The cluster identifier was the patient ID and the observation identifier was the given day of recording (day 1, 2, 3 and 4). The dataset was transformed to long format. An additional regression model was made with the inclusion of the Barthel index at discharge. The results are shown as a figure and the results of the regression is shown in the legend.

For the analyses of the association between sedentary time and the outcomes and complications, regular linear regression models were fitted and covariates were included by forced entry based on literature or if there were additional differences between the groups were identified in the initial analyses. The regression method does not assume normality of the independent variables, so the NIHSS was added without transformation. The residuals of the regression were checked for normality and found to be satisfactory. The results were given in standardised beta coefficients, 95% confidence intervals and p-values. The value for sedentary behaviour was from the first day of recording only. In the first regression, sedentary behaviour was treated as the dependent variable and the inclusion hospital were treated as the

independent variable. In the second model the outcomes (falls, infection, function) were treated as dependent variables and sedentary behaviour as independent variable. The covariates age, gender, prestroke function, stroke severity and physical function were added to adjust for potential confounding factors in the analyses between the independent and dependent variable and to identify how they the contributed to the outcome. A correlation matrix for the correlation between prestroke function, stroke severity and physical function were made to identify any potential correlation between the explanatory variables before adding them to the regression, accepting correlation with correlation coefficients below 0.6.

The threshold for a significant p-value was 0.05. The analysis was performed in STATA/SE 16.1 (Stata Corp LLC).

2.3 Ethics

This study was conducted in accordance with the institutional guidelines and was approved by the Regional Committee of Medical and Health Research Ethics (REK no: 2015/171/REK Nord (main study), Ref 21880 (updated approval for this study). Due to Norwegian regulations and conditions for informed consent, the dataset is not publicly available. The study was registered in Clinicaltrials.gov.

3. Results

Patient characteristics

From a total of 815 patients, 357 patients were included in this study (Figure 1). The patients from St Olavs Hospital (SOH) were older than the patients from Vestre Viken (VV) and Haukeland University hospital (HUH) and had a higher mRS prestroke than VV, HUH and Ullevaal Hospital (UH). The patients at Aalesund Hospital (AH) had a higher NIHSS. There were no differences in BI at discharge or the incidence of infections or falls between the hospitals (table 1).

Sedentary behaviour

The mean amount of sedentary time the first day of recording was 12.3 (1.4) hours and there were no overall differences between the hospitals. There was an increase in sedentary time for each consecutive day of recording (β =0.11, $p<0.001$). The association was no longer

significant after adjusting for BI (Day: β =0.03 (p=0.197), BI: β =0.03, p=0.197)) (table 2, figure 2). Length of stay was associated with stroke severity (numbers not shown).

Regression analyses

We found that the admission to HUH (β =-0.65, p<0.001) was associated with lower levels of sedentary behaviour compared to the other hospitals (table 3) in the adjusted analyses. NIHSS at admission (β =0.03, p=0.003) and prestroke mRS (β =0.28, p<0.001) was positively associated with sedentary time, while SPPB (β =-0.17, p<0.001) was negatively associated.

In the adjusted analyses, sedentary behaviour (β =0.01, p=0.032) were significantly associated with the risk of infections during hospital stay, and function at discharge (β =-1.81, p<0.001). Sedentary behaviour was not significantly associated with the risk of falls.

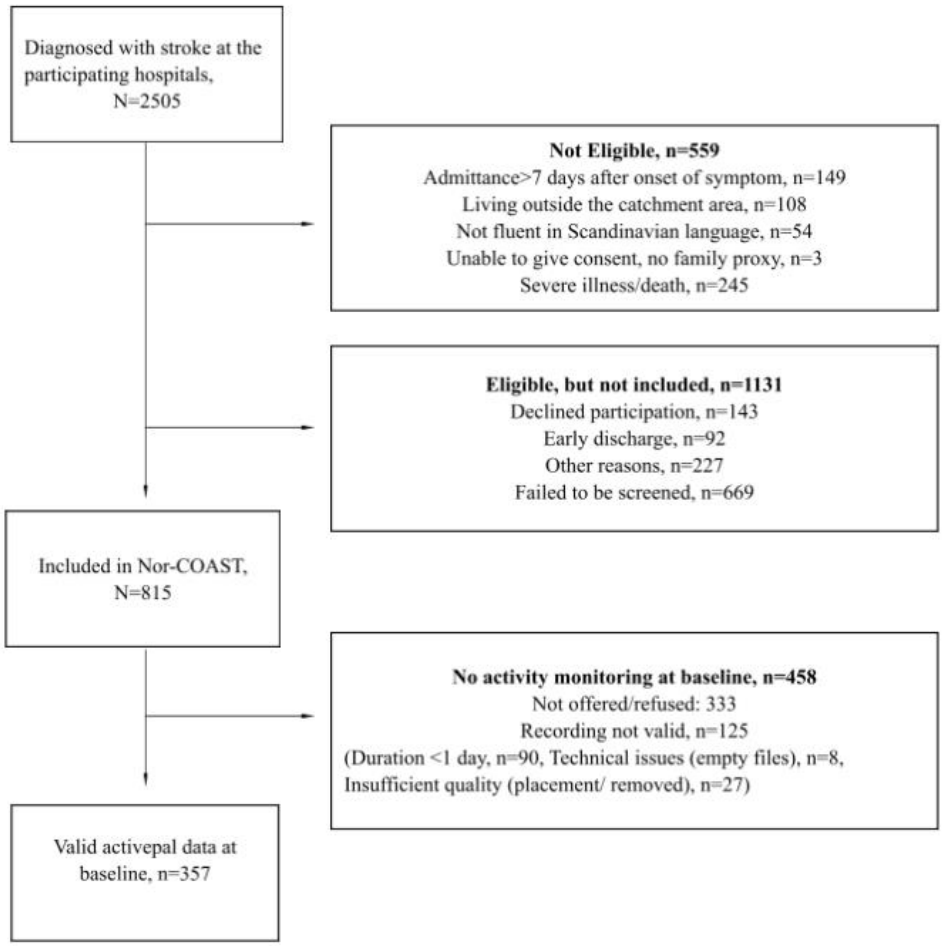


Figure 1: Patient selection

Table 1: Patient characteristics by admission hospital						
	All, N=357	SO, n=195	VV, n=59	Å, n=8	H, n=64	U, n=60
Gender, male n (%)	183 (51.3)	97 (49.7)	26 (44.1)	6 (75.0)	25 (55.6)	29 (58.0)
Age, mean (SD)	73.8 (12.1)	75.5 (11.0)	70.2 (12.4)	76.4 (16.4)	69.6 (13.3)	75.0 (12.3)
Lesion type, ischemic n (%)	322 (90.2)	175 (89.7)	53 (89.8)	8 (100.0)	40 (88.9)	46 (92.0)
mRS, mean (SD)	1.1 (1.2)	1.5 (1.2)*	0.4(0.7)	0.8 (1.4)	0.3 (0.8)	0.7 (0.9)
NIHSS, mean (SD)	5.1 (5.6)	5.4 (5.3)	4.8 (5.7)	14.5 (10.7)	4.4 (5.1)	3.6 (5.1)
SPPB	9.0 (2.6)	8.6	9.6	9.0	9.6	9.0
Onset to ActivPal, days (SD)	4.5 (2.5)	4.3	5.0	5.3	4.1	5.3
Infections,n (%)	66 (18.9)	39 (20.3)	7 (11.9)	2 (25.0)	11 (24.4)	7 (15.2)
Falls, n (%)	15 (4.3)	8 (4.1)	3 (5.1)	0(0.0)	2 (4.4)	2 (4.3)
Barthels Index, mean (SD)	80.8 (23.3)	78.6 (23.4)	86.9 (18.5)	87.5 (16.9)	82.6 (24.2)	79.6 (27.1)
SO=St. Olavs University Hospital. VV=Vestre Viken Hospital. Å=Ålesund Hospital. H=Haukeland University Hospital. U=Ullevål University Hospital. MRS=Modified Rankin Scale anamnestic prestroke, NIHSS=National Institute of Stroke Scale at admission. SPPB=Short Physical Performance Battery at discharge or day seven. Barthels Index at discharge or at day seven. SD=Standard deviation						

Table 2: Sedentary behaviour by day and inclusion hospital							
	All, n=357	SO	VV	Å	H	U	p
Day 1, mean h/day (SD).	12.3 (1.4)	12.5 (1.4)	12.0 (1.4)	12.4 (1.0)	12.0 (1.7)	12.3 (1.3)	0.085
Day 2, mean h/day (SD)	12.4 (1.5)	12.4 (1.4)	11.9 (1.8)	12.7 (0.8)	12.4 (1.5)	12.4 (1.3)	0.300
Day 3, mean h/day (SD)	12.5 (1.2)	12.6 (1.2)	12.2 (1.5)	12.4 (0.8)	12.4 (1.6)	12.4 (1.2)	0.675
Day 4, mean h/day (SD)	12.7 (1.1)	12.6 (1.2)	12.7 (0.9)	12.6 (0.7)	13.0 (1.1)	12.5 (1.1)	0.687
SO=St. Olavs University Hospital. VV=Vestre Viken Hospital. Å=Ålesund Hospital. U=Ullevål University Hospital. SD=Standard deviation							

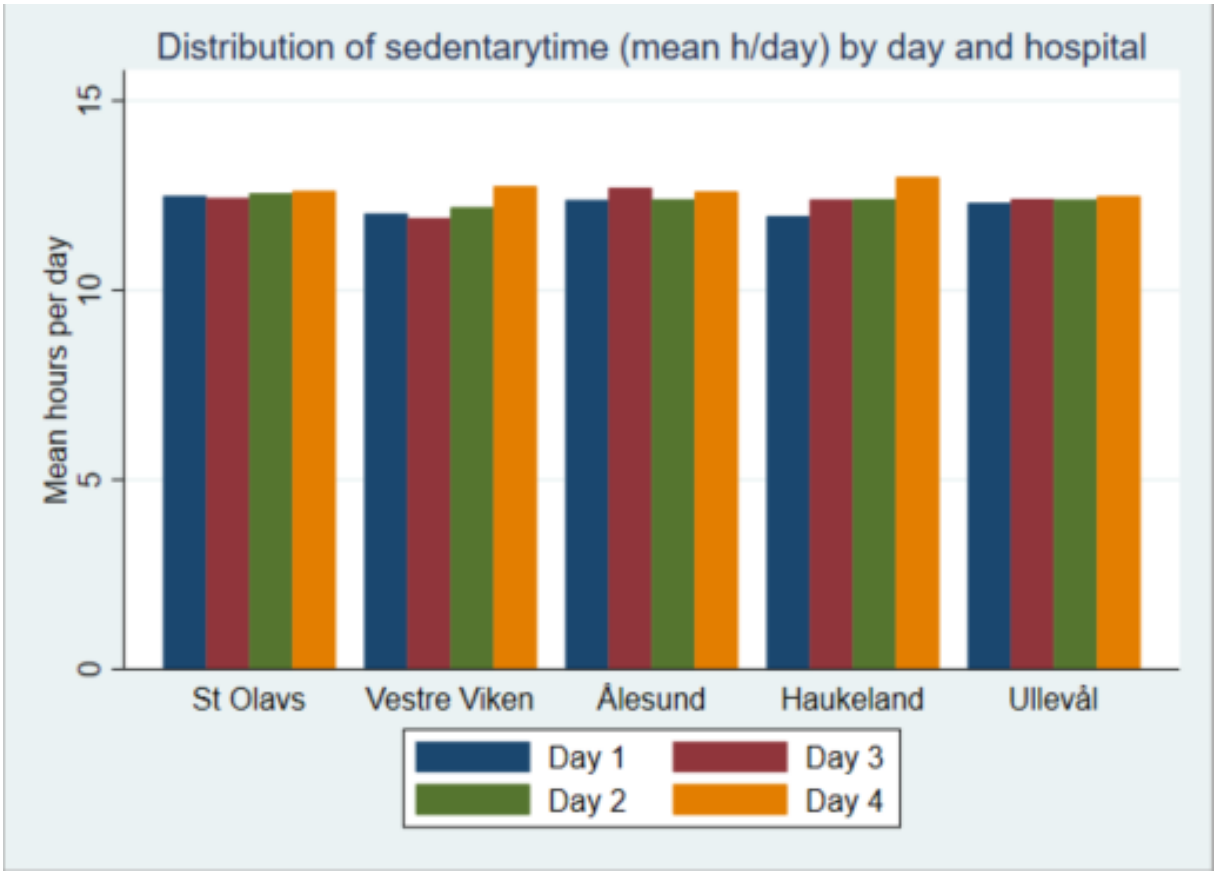


Figure 2: Sedentary behaviour in mean hour per day for each consecutive day. Difference over the 4 consecutive days:
Crude: Day: β =0.11 (p<0.001).
Adjusted for Barthels Index: Day: β =0.03 (p=0.197). Barthels index: -0.03, (p<0.001).

Table 3: The association between sedentary time the first day of registration and hospital

	Crude			Adjusted		
	β	CI	p	**β**	CI	p
Gender, male	-0.22	-0.37, 0.08	0.003	-0.11	-0.31, 0.08	0.261
Age	0.02	0.02, 0.03	<0.001	0.01	0.00, 0.02	0.055
Hospital*	ref.					
VV	-0.46	-0.66, -0.25	<0.001	-0.16	-0.42, 0.10	0.228
Å	-0.11	-0.60, 0.39	0.677	-0.12	-0.85, 0.61	0.750
H	-0.53	-0.76, -0.30	<0.001	-0.65	-0.96, -0.34	<0.001
U	-0.18	-0.40, 0.04	0.102	-0.13	-0.41, 0.15	0.374
NIHSS	0.06	0.05, 0.08	<0.001	0.03	0.01, 0.05	0.003
mRS	0.20	0.13, 0.26	<0.001	-0.28	-0.41, -0.15	<0.001
SPPB	-0.17	-0.20, -0.13	<0.001	-0.17	-0.21, -0.13	<0.001

*St Olavs University Hospital is the reference category. VV=Vestre Viken Hospital. Å=Ålesund Hospital. H=Haukeland University Hospital. U=Ullevål University Hospital. NIHSS= National Institutes of Health Stroke Scale at admission. MRS= Modified Rankin Scale anamnestic prestroke, SPPB= Short Physical Performance Battery at discharge or day seven.

Table 4: The association between sedentary time and the risk of infections and falls during stay and functional outcomes at discharge.

	Crude			Adjusted		
	β	CI	p	**β**	CI	p
Infections						
Sedentary behaviour	0.07	0.06, 0.08	<0.001	0.01	0.00, 0.03	0.032
Gender	-0.07	-0.11, 0.03	0.001	-0.06	-0.10, -0.02	0.004
Age	0.01	0.00, 0.01	<0.001	0.00	-0.00, 0.00	0.338
NIHSS	0.02	0.01, 0.02	<0.001	0.01	0.00, 0.01	0.001
mRS	0.06	0.05, 0.08	<0.001	0.01	-0.01, 0.03	0.451
SPPB	-0.03	-0.03, -0.02	<0.001	-0.01	-0.02, -0.01	0.001
Falls						
Sedentary behaviour	0.03	0.02, 0.04	<0.001	0.00	0.00, 0.01	0.270
Gender	0.01	-0.01, 0.04	0.263	-0.01	-0.03, 0.01	0.179
Age	0.00	-0.00, 0.00	0.373	0.00	0.00, 0.00	<0.001
NIHSS	0.00	-0.00, 0.01	<0.001	-0.00	0.00, 0.00	0.054
mRS	-0.01	-0.02, 0.01	0.278	-0.01	-0.02, 0.00	0.010
SPPB	-0.00	-0.01, 0.00	0.066	0.00	0.00, 0.00	0.562
Barthels Index						
Sedentary behaviour	-9.06	-9.77, -8,34	<0.001	-1.81	-2.26, -1.35	<0.001
Gender	2.49	0.06, 4.92	0.045	-1.43	-2.75, -0.12	0.033
Age	-0.47	-0.57, -0.37	<0.001	-0.12	-0.18, -0.06	<0.001
NIHSS	-1.72	-1.92, -1.52	<0.001	-0.22	-0.36, -0.08	0.002
mRS	-5.50	-6.53, -4.48	<0.001	-1.07	-1.86, -0.28	0.008
SPPB	2.43	2.17, 2.69	<0.001	1.75	1.47, 2.04	<0.001

NIHSS= National Institute of Health Stroke Scale at admission. MRS=Modified Rankin Scale anamnestic prestroke. SPPB= Short Physical Performance Battery at discharge or day seven.

4. Discussion

4.1 Level of sedentary behaviour

In this study we found that patients admitted to hospital for acute stroke spent 12.3 hours (87%) of the day, defined as between 8:00 am and 10:00 pm, in sedentary behaviour. This is slightly less but comparable to current literature (13, 19, 60).

We found that the amount of sedentary time per day increased during the consecutive days of measuring, but the differences were no longer significant when adjusting for function, measured by the BI. The number of days with recording depended on the duration of hospital stay, and length of stay has been found to be associated with stroke severity measured by the NIHSS (61). Hence, the observed increase in sedentary behaviour can be explained by differences in patient characteristics of those individuals with several days of recording compared to those with only one day. Also, Norvang et al. found a trend towards an increase in the time spent in upright and sitting positions during the hospital stay, while time spent lying decreased, implying there was a decrease in total sedentary time. Norvang et al. discussed that a possible explanation of the finding, that time spent sitting increased during the consecutive days, could be that patients staying longer at hospital were less fit and needed more help from the staff to change positions (13).

The level of observed sedentary behaviour during hospital stay might be explained by differences in (1) patient characteristics, (2) factors associated with the hospital ward and (3) methods of measuring and analysing sedentary behaviour. In the following, we will discuss the results in the context of these three factors separately.

4.1.1 Patient characteristics associated with sedentary behaviour

We found that patient characteristics like more severe strokes, measured by NIHSS, and lower physical function post stroke, measured by the SPPB, were independently associated with sedentary behaviour during hospital stay. These findings are in line with other studies (13, 21, 25, 62). However, we also found that poorer prestroke function, measured by mRS, was associated with sedentary behaviour, but it was difficult finding supporting literature, which we will discuss below.

Prestroke function

We found that prestroke function, measured by mRS, was associated with sedentary behavior post stroke. On the contrary, Norvang et al. found that mRS prestroke was not associated with time spent sitting during the hospital stay (13). There is a limited amount of literature investigating the association between prestroke mRS and sedentary behavior, and the mRS has often been used to assess poststroke function without taking into account the contribution of premorbid function. Many stroke patients do have premorbid disabilities, and researchers argue that there is an enhanced value of adding mRS prestroke to get the whole picture (34, 63).

Stroke severity

We found that stroke severity was associated with an increased level of sedentary behaviour. In a study by Norvang et al., they found that sedentary time accumulated through long bouts, but not total sedentary time, was associated with stroke severity (13). Strømmen et al. also found a significant association between stroke severity and sedentary behaviour (25). A higher level of physical activity prestroke has been found to be associated with less severe strokes, suggesting that sedentary behaviour might be associated with more severe strokes (21). Assuming a relationship between pre- and post stroke sedentary behaviour, this suggests that the association between stroke severity and post stroke sedentary level is not merely caused by the stroke per se, but that there are prestroke factors not accounted for, that in part is, confounding this relationship (21). We do not have data on prestroke sedentary behaviour.

Age

We did not find an association between age and sedentary time. In contrast, other studies have found age to be associated with sedentary behaviour, but they did not adjust for premorbid function (13, 25). The mRS is associated with age, and in a study by Lee at al. in a stroke population, the mean age increased for each category on the mRS. Hence, age being correlated with mRS and by adjusting for prestroke mRS we might have indirectly also captured the effect associated with age (64).

Physical function

In line with our finding of an association between a lower SPPB and sedentary time, Norvang et al. observed that more time spent standing or walking was associated with a better post

stroke function, measured by SPPB (13). Another study found that slower gait speed, which is accounted for in the SPPB assessment, was associated with an increased level of sedentary behaviour (62). In reference to the discussion above about prestroke sedentary behaviour, the same review found prestroke sedentary behaviour level to also be associated with poorer physical outcomes, highlighting the importance of prestroke function when interpreting stroke outcomes (21).

In our study we chose to adjust for physical function post stroke when analysing sedentary time during hospital stay, although this can be discussed methodologically. Physical function can be correlated with both premorbid function and stroke severity. Physical function could lead to sedentary behaviour and vice versa, hence physical function can serve both as an explanatory variable when analysing contributors to sedentary behaviour, and as an outcome when analysing the consequences of sedentary behaviour. Before adding SPPB to the regression we investigated if this measure was too highly correlated with the values for prestroke mRS and NIHSS on admission, which it was not. As physical function is important when investigating the outcomes chosen in this study, we chose to include SPPB as an explanatory variable.

4.1.2 The impact of the hospital ward on sedentary time

The level of sedentary behaviour can also be affected by extrinsic factors, and the most obvious extrinsic factor during hospital stay is the properties of the hospital ward. Therefore, one of the secondary aims of this study was to investigate if there were any regional differences in sedentary time, suggesting differences caused by ward properties that might be targets for intervention aiming at reducing sedentary time during hospital stay. We found that patients admitted to one of the hospitals (HUH) had significantly less sedentary time even after adjusting for premorbid function, stroke severity and physical function. This is in line with a prior study by Hokstad et al. where they also found differences between Norwegian hospitals in time spent sedentary (19). The patients at HUH had a shorter time from admission to registration. This might indicate that these patients also had a shorter time of stay, which in turn can indicate a higher functional level. Hence, the result might, in part, be explained by a selection bias not captured by the functional parameters included in the regression model and therefore not accounted for. In addition to nuances that might not have been captured by the tools used to assess function and stroke severity, other differences could be patient characteristics not assessed, such as cognitive function, motivation or mood. The differences

might also actually be explained by factors at the ward, and a study by Barret et al., they found sedentary time to be associated with institutional factors such as frequency and intensity of therapy sessions rather than patients characteristics like disability (measured by BI), mood and social support (45). We did not expect to find any regional differences, as all patients were treated at stroke wards, and that treatment at these wards are well structured within the frames defined by the national guidelines, and the routines for mobilisation should in principle not vary between the hospitals (5, 19, 23). In Norway, the quality of the stroke care is under surveillance by reporting to The Norwegian Stroke Registry. In 2019, 94% of all stroke patients, treated at Norwegian hospitals, were treated at dedicated stroke units (1). Being treated at a stroke unit is proven to reduce dependency, complications and death post stroke (5, 51). The registry does not include data concerning early mobilisation or sedentary behaviour. Factors such as the availability of staff and local organisational differences could explain some of the variation (5, 19, 23). Also, level of education of the treating staff, the size of the ward, number of beds per staff and the turnover of patients could affect mobilisation. Also, differences between hospital wards in the routine during meal time, differences between weekends, weekdays and holidays in general could also contribute to the differences and could have been adjusted for in the analysis (4, 19). In centres where some of the assessments are done in the outpatient clinic instead of during hospital stay, they might have less patients staying over the weekends, when staff is reduced and active training sessions are not as abundant. It is also possible that the lower level of sedentary behaviour is caused by better routines for mobilization. This should be further investigated in other studies, where the selection of patients is more uniform and the other factors described above are assessed and taken into account.

4.1.3 Methods of measuring and analysing sedentary behaviour

We used position transition measured by a body worn inclinometer to measure sedentary behaviour. The method has been used in several prior studies (13, 60, 65). In the following we will discuss the validity of body worn sensors in general, inclinometers in particular and the issues with separating sedentary behaviour from sleep and identifying non-wear time.

Validity of the measuring method

The definition of sedentary behaviour depends on position and energy expenditure (14). The inclinometer is validated for position transition in a stroke population (17), and in a healthy

population, the energy level used when standing has been found to reach beyond the threshold of sedentary behaviour (18). Hence, the method is valid for the outcome we are trying to measure. Validity, to what degree the method you are using is measuring what you are trying to measure, can be described in the terms of sensitivity and specificity. Sensitivity is a test's potential to actually find what we are looking for, while specificity is a test's potential to exclude negatives (66). Based on the studies of Tharaldsen and Mansoubi, the use of inclinometers should have high specificity for non-sedentary behaviour. As the measure is dependent on position it has reduced sensitivity for non-sedentary behaviour in persons with reduced mobility, i.e. patients mobilised by a wheel-chair, and other methods for measuring and analysing energy expenditure should be made for this patient group. We have not excluded patients with reduced mobility from our study.

An inclinometer does not measure the intensity of the activity. As discussed above, we have data supporting that the standing position is sufficient to be defined as non-sedentary. In our study we have investigated sedentary behaviour and not the corresponding physical activity. Hence, differentiating between type and intensity of the physical activity, as it might be important, was beyond the scope of this study, and will not be discussed further.

In this study we have investigated intrinsic and extrinsic factors associated with sedentary behaviour. When using a body worn sensor for identifying sedentary behaviour, we cannot make a distinction between active and passive mobilisation. In patients with a high level of passive mobilisation, the level of sedentary behaviour would be relatively more affected by extrinsic factors, such as those associated with the hospital wards, and less by the intrinsic factors such as stroke severity and prestroke function. By not making this distinction, and regarding all mobilisation as active, we might underestimate the impact of the hospital ward. By using diaries including information about mobilisation by the staff, this could be more thoroughly investigated.

Sleep

Sedentary behaviour is distinct from sleep (14), and in our study we made this distinction by defining daytime as being between 08:00 am and 10:00 pm, and made the assumption that inactivity during daytime is sedentary behaviour and inactivity during night time is sleep. By doing this we might have overestimated sedentary behaviour that is actually sleep, and underestimated sedentary behaviour that has been wrongly defined as sleep time. Hence,

reducing both the specificity and sensitivity of our measure respectively. In a study of sedentary behaviour using the same Nor-COAST cohort, Alme at al. analysed the full 24-hours data, registered at three months post stroke, and found that more than 80% of sedentary bouts <30 min happened in the time interval defined as daytime, suggesting that these time-boundaries were actually capturing the wake-time (67). However, the sleeping pattern during acute hospital stay can be different, reducing the transferability of this validation, such as in the study by Norvang et al. where they assumed that 50 % of the daytime bed rest in the acute phase of stroke, was sleep (13). There is no gold standard when it comes to identifying sleep-time, and to define sleep time as "prolonged duration of inactivity", has also shown to have validity issues (68).

Comparing our time-boundaries with other studies, we found that there has been a range of different time boundaries throughout different studies, ranging from 08:00 am to 05:00 pm. (19) to a full 24 hour period (13, 25, 60). In a study including stroke patients, Bernhardt et al. found that during hospital stay 59 % of the activity with the highest intensity, occurred between 09:00 am and 12:30 pm. (69). They also found that rest periods were more common in the afternoon (69). Matlage et al. found that the patients were least sedentary in the morning hours between 9:00 am and 11:00 am, and most sedentary during nighttime (60). A quantitative measure of activity in stroke patients by Strømmen et al. discovered that 49% of patients with ischemic stroke were totally inactive between 11:00 pm and 7:00, and between 7:00 am and 11:00 pm inactivity occurred 16% of the time (25). However these studies did not differentiate between sedentary behavior and sleep, and therefore one may suggest that a lot of the sedentary time during the night is sleep. All these observations indicate that our time boundaries give us a representative measure of a patient's sedentary time. In addition to the differences in sleep rhythm, it is important to acknowledge the large variation in sleep duration between stroke patients, which in one study has been found to vary between 6.6 to 11.6 hours (70). For patients with a sleep duration less than our 10 hour period, we will have underestimated time in sedentary behaviour.

Another possible deviation is non-wear-time. If a patient detaches his or hers inclinometer the inclinometer will still be registering, but in a constant position. However, in our study, we manually looked through all the files and excluded the recordings with patterns indicating non-wear time.

Time of assessment

In our study, it was 4.5 days between hospital admission until the activity monitoring was stated, and it was also a significant overall difference between the hospitals. Compared to other studies, which has found 2.6 days (13), 3.0 days (71) and within 48 hours (60), our patients were observed at a later time of the hospital stay. Length of stay has been found to be associated with stroke severity (61), and the long delay between admission and assessment, could suggest that our population has more severe strokes compared to the other studies, and the numbers might not be comparable. This being said, there are also other factors affecting length of stay, such as day of the week, holidays and the need of supplementary assessments. Also, some hospitals do the entire examination at the ward, while others do some of the examinations among the more fit patients in the outpatient clinic (6).

4.2 Complications and stroke outcomes

The last secondary aim of this study was to identify the association between sedentary behaviour and the risk of infections, falls and functional outcomes.

4.2.1 Infections

Infections in general

We found that sedentary behaviour was independently associated with the risk of infections during hospital stay, also after adjusting for age, gender, premorbid function, stroke severity and post stroke physical function. We also found that male gender, SPPB at discharge and stroke severity was independently associated with the risk of infections. This is in line with other studies, both in stroke populations and other populations (47, 48, 72-74). Furthermore, several studies report that infections during hospitalization after stroke increases mortality (72, 74, 75) and the risk of poorer physical outcome after discharge (50, 72, 75).

Govan et al. found that stroke patients admitted to a stroke unit had a reduced risk of death compared to stroke patients treated at general medical ward. The difference was explained by less complications such as pneumonia and urinary tract infections, in the intervention group (51). Hence, all measures that can reduce the risk of infections are important for stroke outcomes.

In our study infections were defined as “infection needing antibiotic treatment” and was predominantly either pneumonia or UTI, but we did not have enough power to do a stratified analysis to distinguish between them. In the following we will discuss pneumonia and UTI separately.

Pneumonia

In our study sedentary behaviour was found to be associated with infections even after adjusting for stroke severity, measured by the NIHSS. In the analysis we also corrected for gender, age, mRS and SPPB.

Stroke can lead to swallowing dysfunction, which is a risk factor for aspiration (76) and aspiration pneumonia (51, 73). Swallowing dysfunction is assessed as soon as possible after hospital admission (6). We do not have the results from the water swallowing test, but NIHSS has been found to be associated with swallowing dysfunction, and is 88% sensitive and 85% specific in predicting dysphagia, when using 12 points as the cut off (77). Stroke severity, in general might be a confounder in the relationship between sedentary behaviour and pneumonia (affecting both the exposure and the outcome), and swallowing dysfunction in particular could also be a confounder, as the patients with severe swallowing dysfunction might be more immobilised because of the need of tube feeding.

Aspiration rates have been found to be associated with increasing bouts lengths of time spent lying in a supine position (78). Also, being in a supine position is associated with stagnation of mucus and atelectasis (79, 80).

Urinary tract infections

UTIs have been found to be associated with sedentary behaviour (81), however this is not well documented. One might suspect that patients not able to mobilise to the toilet by themselves are more often dependent on diapers and catheters, and therefore more prone to infections. In this case the use of diapers and catheters might be a mediator of the effect of reduced physical function and the association to infections. Also, based on the observation that the catheter bag is often attached to the bed rail, one can suspect that this can also restrict movement, making the catheter a confounder that affects both the level of sedentary behaviour and the risk of infection. A case-control study by Kumar et al. from 2012, aimed to investigate the effect of urinary catheters on mobility among elderly hospitalized patients with

acute illness and found that the elderly who received a catheter were less mobile than the control group that did not have a catheter. The activity was measured by an activity monitor (82). Also, a study by Lepor et al. investigated use of urinary catheter amongst men who underwent radical retropubic prostatectomy, and the patients reported back significant limitations in mobilization as a consequence of the catheter (83). Based on this, one may argue that reducing the duration and use of urinary catheters could reduce both UTI (84) and sedentary behaviour (82, 83). The Norwegian guidelines recommends intermittent catheterization rather than permanent in those situations where the patient is in need of help emptying the bladder (6). There are reasons to believe that intermittent catheterization does not limit mobilisation at the same level as the use of permanent urinary catheters do (85).

We found that being male was associated with an increased risk of infection. Based on an assumption that there are no gender differences in the risk of pneumonia in hospitalized patients in general (86), we suspect that the gender differences might be associated with the risk of UTIs. In a study of patients with acute stroke, female gender was found to be independently associated with the risk of developing UTI in general (87), and we suspect that the association between male gender and infections might be mediated by the use of urine catheters. The use of urinary catheters are shown to increase the risk of UTI among both genders and is a major contributor to in-hospitalized UTI (84). We do not have information about the use of catheters in our study, but based on the prevalent problems with urine retention caused by prostate hyperplasia, one can suspect more use of catheters in the male population (88).

Age, mRS and risk of infection

In contrast to a study by Indredavik et al. we did not find an association between age and the risk of infections during stay in our population (48). In our study we adjusted for prestroke mRS, which may have captured the age-effect. Also, unlike a study by Sellars et al. investigating the risk of pneumonia the first three month post stroke, we did not find an association between mRS and the risk of infection. They found that both pre- and poststroke mRS were associated with pneumonia (73).

SPPB and infection

We found that physical function at discharge was negatively associated with the risk of infections during stay, even after adjusting for sedentary behaviour and stroke severity.

Hence, the association cannot be explained by reduced mobilisation which we have accounted for. In addition to being a tool to assess physical function, SPPB has an unspecified ability to predict future hospital stay and death and is believed to be a potential tool identifying frailty (43, 44).

The associations between sedentary behaviour and infections

Some authors argue that infections in the acute phase of stroke can be described as complication "due to immobility" (51, 89), because of the association to reduced ADL function (90), and early mobilisation has been found to be associated with a decreased risk of infections in the acute phase of stroke (51, 54). A retrospective observational study including a stroke population in the acute phase by Naito et al., where they retrospectively defined patients as being either ''mobilised'' or ''bedridden'', found that the patients in the bed-rest group had an increased incidence of pneumonia, but not UTI (49). This supports the importance of preventing infections, and the impact of reducing sedentary behaviour should be further investigated.

The explanations for the observed association between sedentary behaviour and infections are many, and the issue of "reverse causality", that the presence of an infection could have led to increased level of sedentary behaviour, and confounding are important to address here. Any causal relationship must be further investigated in a randomised clinical intervention trial.

4.2.2 Falls

We did not find an association between the risk of falls and sedentary behaviour. This is in contrast to a study by Rosenberg et al. that found that elderly who experienced recurrent falls, had a higher level of sedentary behaviour (91). The study adjusted for possible confounders like age, body mass index and SPPB in addition to the use of alcohol and sleep medication (91). A study by Mahoney et al. suggests that bed rest in a hospital setting can contribute to an increased risk of falling (92). In our study, only prestroke mRS and age were significantly associated with the risk of falling. This is in line with previous studies (46, 93). Surprisingly, SPPB was not associated with the risk of falling in the adjusted model. SPPB is correlated with prestroke mRS and stroke severity, but not to such extent that it should be excluded from the model. Interestingly, Rohweder et al. found that falls during the acute phase of stroke was associated with improved physical function at three months, which may imply that the amount of falls can be a consequence of a higher activity level (50).

The total percentage of the included patients that fell during the hospital stay, were 4.3 % in our study. This is a much lower number than reported in other studies (46, 93). Persson et al. found the incidence of falling in their study to be 13 %. The patients were admitted to a stroke unit in Sweden and had a median NIHSS score of 2 (93). This is comparable to our study population. The Davenport study reported a falling incidence of 22 %, but it is important to keep in mind that the study from 1996 and not all patients were treated at a dedicated stroke unit care (46). Indredavik et al. found in their study that falls after stroke was associated with moderate to severe strokes (48), while our study is only representative for mild strokes (94). In our study the falls were identified by asking the patient in retrospect, and incomplete reporting of falls as a consequence of the retrospective collecting of data might explain the low incidence in our study, and this reduced sensitivity of the method of measuring falls might also have led to a type II error, giving us a false negative result.

Falls are prevalent in patients admitted for stroke, and it is important to reduce the risk of this complication to increase patient outcomes (47). Fall prediction scales that are fitted to an inpatient stroke population is one tool that may reduce the risk of falling (56). It is also favourable for stroke outcome that all patients are treated at a stroke unit (5, 48, 51). Several interventions trying to prevent falls after stroke have been done, with varying results (95, 96). The role of exercise in reducing falls risk, are under debate (95, 96) and further research on the area are necessary.

4.2.3 Function

We found that sedentary behaviour was significantly negatively associated with functional outcomes after stroke measured at discharge or day seven after adjusting for age, gender, stroke severity, prestroke function and physical function post stroke. Early mobilisation in the acute phase of stroke has been found to be associated with better functional outcomes (7-9, 12, 13). This is indirectly similar to our results that suggested sedentary behaviour to be associated with poorer BI at discharge. Askim et al. found that bedrest was associated with poorer functional outcomes, measured by mRS 3 months post stroke (9). Also, a study by Kunkel et al. suggested that activity levels post stroke was associated with BI at discharge (65). Better post stroke function has been found to be associated with increased duration of bouts spent up-right, measured by the mRS (13). In our analyses we have adjusted for physical function, prestroke function and stroke severity. Other factors that may contribute to functional outcomes might be cognitive function and psychological factors (37), which we

have not accounted for in our study. To investigate the causal impact of sedentary behaviour on functional outcomes, intervention studies are needed.

We also found that the severity of the stroke and age was associated with reduced function at discharge. Our results regarding NIHSS are consistent with literature elsewhere (13, 47, 48, 75). The association between age and function, might be explained by patient properties associated with age not accounted for, such as cognitive function(97).

We found that prestroke mRS was significantly associated with BI at discharge. A study by Han et al found that prestroke mRS was significantly associated with an increased level of support needed at discharge post stroke, for instance help for activities of daily living and the amount of planned social care (63).

We found that being male was associated with reduced post stroke function. This is in contrast to a study by Phan et al. that found worse outcomes in women, but that this difference was strongly attenuated after adjusting for age, prestroke function and stroke severity (98). Furthermore, several studies have suggested that there is a trend towards worse functional outcomes among women (99-101).

We also found an association between SPPB and functional outcomes, measured by the BI. This is in line with literature (43, 44, 102, 103). Huang et al. found SPPB to be a good predictor for difficulties in activities in daily living measured by 7 items extracted from the National Health Interview Survey, and adjusted for age, comorbidity and gender, however this study was not done on a stroke population, but on community-dwelling elderly (102). Also, a study by Volpato found that poorer SPPB in hospitalized patients could be a predictor of more difficulties in activities of daily living after discharge measured by the modified Lawton and Brody scale (103).

4.3 Consequences of the findings

We found that sedentary behaviour was associated with increased risk of infection and reduced functional outcomes in the acute phase of stroke. Together with the known benefits of early mobilisation and physical activity in general (8, 10, 12, 50, 52, 62, 65, 72, 73, 75), the results indicate that reducing sedentary behaviour should be a part of stroke unit care. It is important to be aware of and keep an extra eye on the patients who are at greater risk of sedentary behaviour during hospital stay, such as those with reduced premorbid function,

severe strokes and reduced physical function. Our findings also indicate that external factors associated with the wards might contribute to the level of sedentary behaviour. This should be further investigated.

Enhancing the patient's self-efficacy has been found to promote physical activity in hospitalized stroke patients (71). This may stress the importance of motivation and self-believe in addition to traditional physical therapy. Lynch et al. investigated the current existing literature regarding the use of activity monitors as an intervention to decrease sedentary behaviour, but concluded that there is not enough proof that this is a good approach to increase activity. However, recently published research by Abbasi suggests that wearable fitness devices and health applications with an aim to increase physical activity, have a small to moderate beneficial impact on physical activity (104). And, as Hokstad et al. pointed out in their study, the amount of trained staff present as well as the environment are important factors to increase activity in hospitalized patients post stroke (19).

4.4 Strength and weaknesses

This study had several strengths. The study had a large sample size with patients from multiple hospitals, all of them admitted to stroke units, operating with clear guidelines. We used objective measures for sedentary behaviour and information about important potential confounders assessed by validated tools.

This study was observational in nature and we cannot say anything about causality. The differences in the timing of the registration and the potential selection bias are some factors that may contribute to weaken the results.

Selection bias

Based on the inclusion criteria the Nor-COAST study has not included the most severe strokes and the patients with a low premorbid function for ethical reasons. In a study by Kuvås et al., they found that the Nor-COAST population was representative for the majority of the stroke population which suffers from mild strokes in Norway (94). We found that there were some differences in baseline characteristics between the inclusion centras, and even though we have adjusted for these in the regressions, there might be differences between the groups not accounted for. The range in mRS between the hospitals are narrow, and the different study populations have an overall low score. Regarding the severity of the stroke,

AH has more severe strokes than the rest of the hospitals. This can be explained by the fact that AH provided a much smaller study population than the other hospitals that contributed to the study, as well as the participants being older. There was a variety between the amount of included patients at each hospital, with AH being the hospital with the fewest patients (N=8), and this could potentially contribute to the risk that some of the results being due to coincidences. It was, among those who met the inclusion criteria, optional to participate in the study. It is reason to believe that these patients might be more fit compared to the whole population. Because of the nature of the investigation, there might have been a selection of patients with relatively good physical function. Patients who were expected to be discharged soon also might not have been included. Once given consent, it was expected that the patients should wear the activity monitor the whole time and it is believed that periods without monitoring are due to practical reasons.

4.5 Conclusion

Sedentary behaviour during hospital stay is abundant in patients admitted for acute stroke and is associated with unfavourable outcomes. Measures to reduce sedentary behaviour in patients during hospital stay should be reduced, and further studies investigating any causal relationship between sedentary behaviour and the risk of complications and reduced functional outcomes should be initiated. Studies investigating factors associated with the hospital wards that might also have an impact on the level of sedentary behaviour should also be investigated.

References

1. Fjærtoft H, Skogseth-Stepani R, Indredavik B, Bjerkvik TF, Varmdal T. Norsk Hjerneslagregister Årsrapport 2019 Med plan for forbedringstiltak

kvalitetsregistre.no: Seksjon for medisinske kvalitetsregistre, St. Olavs hospital HF, Seksjon for medisinske kvalitetsregistre SOhH; 2020 10.01.20.
2. Truelsen T, Begg S, Mathers C. The global burden of cerebrovascular disease The World Health Organization (WHO). 2000.
3. Sacco RL, Kasner SE, Broderick JP, Caplan LR, Connors JJ, Culebras A, et al. An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2013;44(7):2064-89.
4. Ringelstein EB, Chamorro A, Kaste M, Langhorne P, Leys D, Lyrer P, et al. European Stroke Organisation recommendations to establish a stroke unit and stroke center. Stroke. 2013;44(3):828-40.
5. Langhorne P, Ramachandra S. Organised inpatient (stroke unit) care for stroke: network meta-analysis. Cochrane Database Syst Rev. 2020;4(4):Cd000197.
6. Helsedirektoratet. Hjerneslag Helsedirektoratet.no2017 [updated April 27, 2020. Available from: https://www.helsedirektoratet.no/retningslinjer/hjerneslag.
7. Li Z, Zhang X, Wang K, Wen J. Effects of Early Mobilization after Acute Stroke: A Meta-Analysis of Randomized Control Trials. J Stroke Cerebrovasc Dis. 2018;27(5):1326-37.
8. Coleman ER, Moudgal R, Lang K, Hyacinth HI, Awosika OO, Kissela BM, et al. Early Rehabilitation After Stroke: a Narrative Review. Curr Atheroscler Rep. 2017;19(12):59.
9. Askim T, Bernhardt J, Salvesen O, Indredavik B. Physical activity early after stroke and its association to functional outcome 3 months later. J Stroke Cerebrovasc Dis. 2014;23(5):e305-12.
10. Bernhardt J, Churilov L, Ellery F, Collier J, Chamberlain J, Langhorne P, et al. Prespecified dose-response analysis for A Very Early Rehabilitation Trial (AVERT). Neurology. 2016;86(23):2138-45.
11. Fure B, Holte HH, Hov L, Vist GE, Kateraas LH, Indredavik B. [Very early mobilisation in cases of acute stroke]. Tidsskr Nor Laegeforen. 2018;138(17).
12. Veerbeek JM, van Wegen E, van Peppen R, van der Wees PJ, Hendriks E, Rietberg M, et al. What is the evidence for physical therapy poststroke? A systematic review and meta-analysis. PLoS One. 2014;9(2):e87987.
13. Norvang OP, Hokstad A, Taraldsen K, Tan X, Lydersen S, Indredavik B, et al. Time spent lying, sitting, and upright during hospitalization after stroke: a prospective observation study. BMC Neurol. 2018;18(1):138.
14. Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, et al. Sedentary Behavior Research Network (SBRN) - Terminology Consensus Project process and outcome. Int J Behav Nutr Phys Act. 2017;14(1):75.
15. Arvidsson D, Fridolfsson J, Börjesson M. Measurement of physical activity in clinical practice using accelerometers. J Intern Med. 2019;286(2):137-53.
16. Kramer S, Johnson L, Bernhardt J, Cumming T. Energy Expenditure and Cost During Walking After Stroke: A Systematic Review. Arch Phys Med Rehabil. 2016;97(4):619-32.e1.
17. Taraldsen K, Askim T, Sletvold O, Einarsen EK, Bjåstad KG, Indredavik B, et al. Evaluation of a body-worn sensor system to measure physical activity in older people with impaired function. Phys Ther. 2011;91(2):277-85.
18. Mansoubi M, Pearson N, Clemes SA, Biddle SJ, Bodicoat DH, Tolfrey K, et al. Energy expenditure during common sitting and standing tasks: examining the 1.5 MET definition of sedentary behaviour. BMC Public Health. 2015;15:516.
19. Hokstad A, Indredavik B, Bernhardt J, Ihle-Hansen H, Salvesen Ø, Seljeseth YM, et al. Hospital differences in motor activity early after stroke: a comparison of 11 Norwegian stroke units. J Stroke Cerebrovasc Dis. 2015;24(6):1333-40.
20. Bernhardt J, Dewey H, Thrift A, Donnan G. Inactive and alone: physical activity within the first 14 days of acute stroke unit care. Stroke. 2004;35(4):1005-9.

21. Kramer SF, Hung SH, Brodtmann A. The Impact of Physical Activity Before and After Stroke on Stroke Risk and Recovery: a Narrative Review. Curr Neurol Neurosci Rep. 2019;19(6):28.
22. Prince SA, Cardilli L, Reed JL, Saunders TJ, Kite C, Douillette K, et al. A comparison of self-reported and device measured sedentary behaviour in adults: a systematic review and meta-analysis. Int J Behav Nutr Phys Act. 2020;17(1):31.
23. Bernhardt J, Chitravas N, Meslo IL, Thrift AG, Indredavik B. Not all stroke units are the same: a comparison of physical activity patterns in Melbourne, Australia, and Trondheim, Norway. Stroke. 2008;39(7):2059-65.
24. Lincoln NB, Gamlen R, Thomason H. Behavioural mapping of patients on a stroke unit. Int Disabil Stud. 1989;11(4):149-54.
25. Strømmen AM, Christensen T, Jensen K. Quantitative measurement of physical activity in acute ischemic stroke and transient ischemic attack. Stroke. 2014;45(12):3649-55.
26. Rosenberg DE, Bellettiere J, Gardiner PA, Villarreal VN, Crist K, Kerr J. Independent Associations Between Sedentary Behaviors and Mental, Cognitive, Physical, and Functional Health Among Older Adults in Retirement Communities. J Gerontol A Biol Sci Med Sci. 2016;71(1):78-83.
27. Tam-Seto L, Weir P, Dogra S. Factors Influencing Sedentary Behaviour in Older Adults: An Ecological Approach. AIMS Public Health. 2016;3(3):555-72.
28. Kwah LK, Diong J. National Institutes of Health Stroke Scale (NIHSS). J Physiother. 2014;60(1):61.
29. Khanevski AN, Bjerkreim AT, Novotny V, Naess H, Thomassen L, Logallo N, et al. Recurrent ischemic stroke: Incidence, predictors, and impact on mortality. Acta Neurol Scand. 2019;140(1):3-8.
30. Capistrant BD, Wang Q, Liu SY, Glymour MM. Stroke-associated differences in rates of activity of daily living loss emerge years before stroke onset. J Am Geriatr Soc. 2013;61(6):931-8.
31. Wang M, Rajan SS, Jacob AP, Singh N, Parker SA, Bowry R, et al. Retrospective collection of 90-day modified Rankin Scale is accurate. Clin Trials. 2020;17(6):637-43.
32. Banks JL, Marotta CA. Outcomes validity and reliability of the modified Rankin scale: implications for stroke clinical trials: a literature review and synthesis. Stroke. 2007;38(3):1091-6.
33. Hagberg G. Optimal slagbehandling – et felles ansvar. Indremedisineren 2016.
34. Quinn TJ, Taylor-Rowan M, Coyte A, Clark AB, Musgrave SD, Metcalf AK, et al. Pre-Stroke Modified Rankin Scale: Evaluation of Validity, Prognostic Accuracy, and Association with Treatment. Front Neurol. 2017;8:275.
35. Fearon P, McArthur KS, Garrity K, Graham LJ, McGroarty G, Vincent S, et al. Prestroke modified rankin stroke scale has moderate interobserver reliability and validity in an acute stroke setting. Stroke. 2012;43(12):3184-8.
36. Duffy L, Gajree S, Langhorne P, Stott DJ, Quinn TJ. Reliability (inter-rater agreement) of the Barthel Index for assessment of stroke survivors: systematic review and meta-analysis. Stroke. 2013;44(2):462-8.
37. Kasner SE. Clinical interpretation and use of stroke scales. Lancet Neurol. 2006;5(7):603-12.
38. Cornelis E, Gorus E, Beyer I, Bautmans I, De Vriendt P. Early diagnosis of mild cognitive impairment and mild dementia through basic and instrumental activities of daily living: Development of a new evaluation tool. PLoS Med. 2017;14(3):e1002250.
39. Quinn TJ, Dawson J, Walters MR, Lees KR. Functional outcome measures in contemporary stroke trials. Int J Stroke. 2009;4(3):200-5.
40. Uyttenboogaart M, Luijckx GJ, Vroomen PC, Stewart RE, De Keyser J. Measuring disability in stroke: relationship between the modified Rankin scale and the Barthel index. J Neurol. 2007;254(8):1113-7.
41. Wilson JT, Hareendran A, Hendry A, Potter J, Bone I, Muir KW. Reliability of the modified Rankin Scale across multiple raters: benefits of a structured interview. Stroke. 2005;36(4):777-81.
42. Bergh S. Short Physical Performance Battery (SPPB). 2013.
43. O'Hoski S, Bean JF, Ma J, So HY, Kuspinar A, Richardson J, et al. Physical Function and Frailty for Predicting Adverse Outcomes in Older Primary Care Patients. Arch Phys Med Rehabil. 2020;101(4):592-8.

44. Veronese N, Stubbs B, Fontana L, Trevisan C, Bolzetta F, Rui M, et al. A Comparison of Objective Physical Performance Tests and Future Mortality in the Elderly People. J Gerontol A Biol Sci Med Sci. 2017;72(3):362-8.
45. Barrett M, Snow JC, Kirkland MC, Kelly LP, Gehue M, Downer MB, et al. Excessive sedentary time during in-patient stroke rehabilitation. Top Stroke Rehabil. 2018;25(5):366-74.
46. Davenport RJ, Dennis MS, Wellwood I, Warlow CP. Complications after acute stroke. Stroke. 1996;27(3):415-20.
47. Langhorne P, Stott DJ, Robertson L, MacDonald J, Jones L, McAlpine C, et al. Medical complications after stroke: a multicenter study. Stroke. 2000;31(6):1223-9.
48. Indredavik B, Rohweder G, Naalsund E, Lydersen S. Medical complications in a comprehensive stroke unit and an early supported discharge service. Stroke. 2008;39(2):414-20.
49. Naito Y, Kamiya M, Morishima N, Ishikawa T. Association between out-of-bed mobilization and complications of immobility in acute phase of severe stroke: A retrospective observational study. J Stroke Cerebrovasc Dis. 2020;29(10):105112.
50. Rohweder G, Ellekjær H, Salvesen Ø, Naalsund E, Indredavik B. Functional outcome after common poststroke complications occurring in the first 90 days. Stroke. 2015;46(1):65-70.
51. 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(9):2536-40.
52. Katzan IL, Cebul RD, Husak SH, Dawson NV, Baker DW. The effect of pneumonia on mortality among patients hospitalized for acute stroke. Neurology. 2003;60(4):620-5.
53. Heuschmann PU, Kolominsky-Rabas PL, Misselwitz B, Hermanek P, Leffmann C, Janzen RW, et al. Predictors of in-hospital mortality and attributable risks of death after ischemic stroke: the German Stroke Registers Study Group. Arch Intern Med. 2004;164(16):1761-8.
54. Ingeman A, Andersen G, Hundborg HH, Svendsen ML, Johnsen SP. Processes of care and medical complications in patients with stroke. Stroke. 2011;42(1):167-72.
55. I trygge hender Np. Forebygging av fall i helseinstitusjoner 2015 [Available from: https://pasientsikkerhetsprogrammet.no/om-oss/innsatsomrader/forebygging-av-fall-i-helseinstitusjoner.
56. Yang C, Ghaedi B, Campbell TM, Rutkowski N, Finestone H. Predicting Falls Using the Stroke Assessment of Fall Risk Tool. Pm r. 2020.
57. Morris R, O'Riordan S. Prevention of falls in hospital. Clin Med (Lond). 2017;17(4):360-2.
58. Thibaud M. Impact of physical activity and sedentary behaviour on fall risks in older people: a systematic review and meta-analysis of observational studies 2011 [Available from: https://eurapa.biomedcentral.com/articles/10.1007/s11556-011-0081-1.
59. Thingstad P, Askim T, Beyer MK, Bråthen G, Ellekjær H, Ihle-Hansen H, et al. The Norwegian Cognitive impairment after stroke study (Nor-COAST): study protocol of a multicentre, prospective cohort study. BMC Neurol. 2018;18(1):193.
60. Mattlage AE, Redlin SA, Rippee MA, Abraham MG, Rymer MM, Billinger SA. Use of Accelerometers to Examine Sedentary Time on an Acute Stroke Unit. J Neurol Phys Ther. 2015;39(3):166-71.
61. Mohamed W, Bhattacharya P, Shankar L, Chaturvedi S, Madhavan R. Which Comorbidities and Complications Predict Ischemic Stroke Recovery and Length of Stay? Neurologist. 2015;20(2):27-32.
62. Simpson DB, Breslin M, Cumming T, de Zoete SA, Gall SL, Schmidt M, et al. Sedentary time and activity behaviors after stroke rehabilitation: Changes in the first 3 months home. Top Stroke Rehabil. 2021;28(1):42-51.
63. Han TS, Fry CH, Gulli G, Affley B, Robin J, Irvin-Sellers M, et al. Prestroke Disability Predicts Adverse Poststroke Outcome: A Registry-Based Prospective Cohort Study of Acute Stroke. Stroke. 2020;51(2):594-600.
64. Lee SY, Kim DY, Sohn MK, Lee J, Lee SG, Shin YI, et al. Determining the cut-off score for the Modified Barthel Index and the Modified Rankin Scale for assessment of functional independence and residual disability after stroke. PLoS One. 2020;15(1):e0226324.
65. Kunkel D, Fitton C, Burnett M, Ashburn A. Physical inactivity post-stroke: a 3-year longitudinal study. Disabil Rehabil. 2015;37(4):304-10.

66. Parikh R, Mathai A, Parikh S, Chandra Sekhar G, Thomas R. Understanding and using sensitivity, specificity and predictive values. Indian J Ophthalmol. 2008;56(1):45-50.
67. Alme KN, Knapskog AB, Næss H, Naik M, Beyer M, Ellekjaer H, et al. Is long-bout sedentary behaviour associated with long-term glucose levels 3 months after acute ischaemic stroke? A prospective observational cohort study. BMJ Open. 2020;10(11):e037475.
68. Edwardson CL, Winkler EAH, Bodicoat DH, Yates T, Davies MJ, Dunstan DW, et al. Considerations when using the activPAL monitor in field-based research with adult populations. J Sport Health Sci. 2017;6(2):162-78.
69. Bernhardt J, Chan J, Nicola I, Collier JM. Little therapy, little physical activity: rehabilitation within the first 14 days of organized stroke unit care. J Rehabil Med. 2007;39(1):43-8.
70. Ezeugwu VE, Manns PJ. Sleep Duration, Sedentary Behavior, Physical Activity, and Quality of Life after Inpatient Stroke Rehabilitation. J Stroke Cerebrovasc Dis. 2017;26(9):2004-12.
71. Kanai M, Nozoe M, Izawa KP, Takeuchi Y, Kubo H, Mase K, et al. Promoting physical activity in hospitalized patients with mild ischemic stroke: a pilot study. Top Stroke Rehabil. 2017;24(4):256-61.
72. Suda S, Aoki J, Shimoyama T, Suzuki K, Sakamoto Y, Katano T, et al. Stroke-associated infection independently predicts 3-month poor functional outcome and mortality. J Neurol. 2018;265(2):370-5.
73. Sellars C, Bowie L, Bagg J, Sweeney MP, Miller H, Tilston J, et al. Risk factors for chest infection in acute stroke: a prospective cohort study. Stroke. 2007;38(8):2284-91.
74. Hamidon BB, Raymond AA, Norlinah MI, Jefferelli SB. The predictors of early infection after an acute ischaemic stroke. Singapore Med J. 2003;44(7):344-6.
75. Johnston KC, Li JY, Lyden PD, Hanson SK, Feasby TE, Adams RJ, et al. Medical and neurological complications of ischemic stroke: experience from the RANTTAS trial. RANTTAS Investigators. Stroke. 1998;29(2):447-53.
76. Steele CM, Cichero JA. Physiological factors related to aspiration risk: a systematic review. Dysphagia. 2014;29(3):295-304.
77. Okubo PC, Fábio SR, Domenis DR, Takayanagui OM. Using the National Institute of Health Stroke Scale to predict dysphagia in acute ischemic stroke. Cerebrovasc Dis. 2012;33(6):501-7.
78. Drakulovic MB, Torres A, Bauer TT, Nicolas JM, Nogué S, Ferrer M. Supine body position as a risk factor for nosocomial pneumonia in mechanically ventilated patients: a randomised trial. Lancet. 1999;354(9193):1851-8.
79. Button BM, Button B. Structure and function of the mucus clearance system of the lung. Cold Spring Harb Perspect Med. 2013;3(8).
80. Toyoshima M, Maeoka Y, Kawahara H, Maegaki Y, Ohno K. [Pulmonary atelectasis in patients with neurological or muscular disease; gravity-related lung compression by the heart and intra-abdominal organs on persistent supine position]. No To Hattatsu. 2006;38(6):419-24.
81. Park HJ, Park CH, Chang Y, Ryu S. Sitting time, physical activity and the risk of lower urinary tract symptoms: a cohort study. BJU Int. 2018;122(2):293-9.
82. Kumar F. Effect of Indwelling Urinary Catheter on Mobility Among Older Patients During Hospitalization 2012 [Available from: Effect of Indwelling Urinary Catheter on Mobility Among Older Patients During Hospitalization.
83. Lepor H, Nieder AM, Fraiman MC. Early removal of urinary catheter after radical retropubic prostatectomy is both feasible and desirable. Urology. 2001;58(3):425-9.
84. Parida S, Mishra SK. Urinary tract infections in the critical care unit: A brief review. Indian J Crit Care Med. 2013;17(6):370-4.
85. Lamin E, Newman DK. Clean intermittent catheterization revisited. Int Urol Nephrol. 2016;48(6):931-9.
86. Teh WH, Smith CJ, Barlas RS, Wood AD, Bettencourt-Silva JH, Clark AB, et al. Impact of stroke-associated pneumonia on mortality, length of hospitalization, and functional outcome. Acta Neurol Scand. 2018;138(4):293-300.
87. Karlinski MA, Bembenek JP, Baranowska A, Kurkowska-Jastrzebska I, Czlonkowska A. Infections Diagnosed after Admission to a Stroke Unit and Their Impact on Hospital Mortality in Poland from 1995 to 2015. J Stroke Cerebrovasc Dis. 2018;27(7):1775-82.

88. Selius BA, Subedi R. Urinary retention in adults: diagnosis and initial management. Am Fam Physician. 2008;77(5):643-50.
89. Bamford J, Dennis M, Sandercock P, Burn J, Warlow C. The frequency, causes and timing of death within 30 days of a first stroke: the Oxfordshire Community Stroke Project. J Neurol Neurosurg Psychiatry. 1990;53(10):824-9.
90. Silver FL, Norris JW, Lewis AJ, Hachinski VC. Early mortality following stroke: a prospective review. Stroke. 1984;15(3):492-6.
91. Rosenberg DE, Rillamas-Sun E, Bellettiere J, LaMonte M, Buchner DM, Di C, et al. Accelerometer-Measured Sedentary Patterns are Associated with Incident Falls in Older Women. J Am Geriatr Soc. 2020.
92. Mahoney JE. Immobility and falls. Clin Geriatr Med. 1998;14(4):699-726.
93. Persson CU, Kjellberg S, Lernfelt B, Westerlind E, Cruce M, Hansson PO. Risk of falling in a stroke unit after acute stroke: The Fall Study of Gothenburg (FallsGOT). Clin Rehabil. 2018;32(3):398-409.
94. Kuvås KR, Saltvedt I, Aam S, Thingstad P, Ellekjær H, Askim T. The Risk of Selection Bias in a Clinical Multi-Center Cohort Study. Results from the Norwegian Cognitive Impairment After Stroke (Nor-COAST) Study. Clin Epidemiol. 2020;12:1327-36.
95. Denissen S, Staring W, Kunkel D, Pickering RM, Lennon S, Geurts AC, et al. Interventions for preventing falls in people after stroke. Cochrane Database Syst Rev. 2019;10(10):Cd008728.
96. Cheng PT, Wu SH, Liaw MY, Wong AM, Tang FT. Symmetrical body-weight distribution training in stroke patients and its effect on fall prevention. Arch Phys Med Rehabil. 2001;82(12):1650-4.
97. Murman DL. The Impact of Age on Cognition. Semin Hear. 2015;36(3):111-21.
98. Phan HT, Blizzard CL, Reeves MJ, Thrift AG, Cadilhac DA, Sturm J, et al. Factors contributing to sex differences in functional outcomes and participation after stroke. Neurology. 2018;90(22):e1945-e53.
99. Santalucia P, Pezzella FR, Sessa M, Monaco S, Torgano G, Anticoli S, et al. Sex differences in clinical presentation, severity and outcome of stroke: results from a hospital-based registry. Eur J Intern Med. 2013;24(2):167-71.
100. Di Carlo A, Lamassa M, Baldereschi M, Pracucci G, Basile AM, Wolfe CD, et al. Sex differences in the clinical presentation, resource use, and 3-month outcome of acute stroke in Europe: data from a multicenter multinational hospital-based registry. Stroke. 2003;34(5):1114-9.
101. Gargano JW, Reeves MJ. Sex differences in stroke recovery and stroke-specific quality of life: results from a statewide stroke registry. Stroke. 2007;38(9):2541-8.
102. Wennie Huang WN, Perera S, VanSwearingen J, Studenski S. Performance measures predict onset of activity of daily living difficulty in community-dwelling older adults. J Am Geriatr Soc. 2010;58(5):844-52.
103. Volpato S, Cavalieri M, Sioulis F, Guerra G, Maraldi C, Zuliani G, et al. Predictive value of the Short Physical Performance Battery following hospitalization in older patients. J Gerontol A Biol Sci Med Sci. 2011;66(1):89-96.
104. Abbasi J. Phone Apps and Wearable Trackers Modestly Improve Activity. Jama. 2021;325(6):522.

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

☐ Intervju av pasient ☐ Intervju av pårørende ☐ Intervju av helspersonell ☐ Sykejournal ☐ Telefonintervju

Opplysninger ikke tilgjengelig:

BAKGRUNNSINFORMASJON

Tidspunkt for symptomdebut:
dag/måned/år/timer/minutter

| | | | | 2 | 0 | | | | | | |

Oppvåkningsslag

☐ Ja ☐ Nei ☐ Ukjent

Tidspunkt for innleggelse:
dag/måned/år/timer/minutter

| | | | | 2 | 0 | | | | | | |

Utskrivingsdato: *dag/måned/år*

| | | | | 2 | 0 | | |

Boligforhold før slaget:
dag/måned/år

☐ Egen bolig uten hjemmesykepleie
☐ Egen bolig med hjemmesykepleie
☐ Omsorgsbolig
☐ Sykehjem
☐ Ukjent

Bosituasjon:

☐ Alene
☐ Sammen med noen (f.eks ektefelle/samboer, søsken, barn)
☐ Institusjon
☐ Ukjent

Sivil status:

☐ Gift eller samboer
☐ Enslig
☐ Enke eller enkemann
☐ Ukjent

Kjønn:

☐ Kvinne
☐ Mann

Dominant hånd:

☐ Høyre
☐ Venstre
☐ Ingen dominant side
☐ Ukjent

Etnisitet:

☐ Kaukasisk ☐ Afrikansk ☐ Asiatisk ☐ Latinamerikansk

Fødeland: _____

Utdanningsnivå:
(Kurs og internopplæring teller ikke som utdanning)

Formell skolegang (antall år) | |

Utdanning

☐ Ufaglært
☐ Fagbrev
☐ Høyskole/universitet

Yrke/tidligere yrke: _____

Har noen i familien symptomer som kan tyde på demens?

	Ja	Nei	Ukjent
a) Førstegangsslektning *(foreldre, søsken, barn)*	☐	☐	☐
b) Andregradsslektning *(besteforeldre, foreldres søsken, søskenbarn, halvsøsken)*	☐	☐	☐

Hva lever du av?

☐ Arbeidsinntekt ☐ Uførepensjon
☐ Sykepenger ☐ Ektefelles inntekt
☐ Alderspensjon ☐ Annet

LEVEVANER FØR SLAGET

1) Røykestatus:

☐ Aldri ☐ Røyker ☐ Eksrøyker (røykfri > 1 mnd.) ☐ Ukjent

2) Alkoholforbruk:

1 alkoholenhet = En flaske (33 cl) pils på 4,5 vol % = Et lite glass vin (12,5 cl) på 12 vol % = Et enda mindre glass sterkvin (7,5 cl) 20 vol % = Et svært lite glass brennevin (4 cl) 40 vol %

Glassene rommer ofte mer. Skal du telle antall alkoholenheter, så vurder også størrelsene på glassene: En halvliter øl = 1,5 enhet alkohol, et stort glass vin (17,5 cl) = 1,5 enhet alkohol

Hvor mange enheter øl, vin eller brennevin drikker du vanligvis i løpet av 2 uker? (Regn ikke med lettøl) (Sett 0 hvis du ikke drikker alkohol)

	øl	vin	brennevin
Antall enheter	☐☐	☐☐	☐☐

Hvor ofte drikker du 5 enheter eller mer av øl, vin eller brennevin ved samme anledning?

☐ Aldri ☐ Månedlig ☐ Ukentlig ☐ Daglig

3) Kosthold før slaget

Tar du omega-3 eller tran?

☐ Ja

☐ Nei

	Aldri	1-2 ganger pr uke	3-4 ganger pr uke	5-6 ganger pr uke	Daglig
Hvor ofte har du spist fisk de siste 6 måneder?	☐	☐	☐	☐	☐
Hvor ofte har du spist grønnsaker de siste 6 måneder?	☐	☐	☐	☐	☐

4) Fysisk aktivitet før slaget

Hvor ofte drev du mosjon/fysisk aktivitet før slaget?
Med mosjon mener vi at du f. eks. går tur, går på ski, svømmer eller driver med trening/idrett
(Ta et gjennomsnitt av de siste 6 måneder)

☐ Aldri
☐ Sjeldnere enn en gang i uka
☐ En gang i uka
☐ 2-3 ganger i uka
☐ Omtrent hver dag

Dersom du driver slik mosjon, så ofte som en eller flere ganger i uka; hvor hardt mosjonerer du? (Ta et gjennomsnitt)

☐ Tar det rolig uten å bli andpusten eller svett
☐ Tar det så hardt at jeg blir andpusten og svett
☐ Tar meg nesten helt ut

Hvor lenge holder du på hver gang?
(Ta et gjennomsnitt)

☐ Mindre enn 15 min ☐ 30 min - 1 time
☐ 15-29 min ☐ Mer enn 1 time

Har du vanligvis minst 30 minutter fysisk aktivitet daglig på arbeid og/eller i fritida?

☐ Ja ☐ Nei

FUNKSJON FØR SLAGET

Kunne du gå 200 meter før slaget?

☐ Ja ☐ Nei

Kunne du gå opp/ned trapp en etasje

☐ Ja ☐ Nei

Har du i løpet av de siste 12 månedene hatt noen fall, inkludert om du har snublet eller glidd, slik at du har mistet balansen og havnet i bakken eller på gulvet uten å ville det?
Uavhengig av årsak eller om du har skadet deg.

☐ Ja ☐ Nei

Hvis ja, hvor mange fall? ☐ Ett fall ☐ To fall ☐ Flere fall

Skader ved fall ☐ Ja ☐ Nei

Hvis ja, evt.kommentar:

Fatigue før slaget

Var du plaget med utmattelse før slaget?

☐ Ja ☐ Nei

Hvor lenge var du plaget med utmattelse?

☐ < 1 uke ☐ < 3-6 måneder ☐ Vet ikke
☐ < 3 måneder ☐ > 6 måneder

Har du hatt ufrivillig vekttap de siste 6 måneder før slaget? ☐ Ja ☐ Nei Hvis ja: antall kilogram ☐☐

Har du hatt urinlekkasje eller problemer med å tømme blæra før slaget?

☐ ingen problemer
☐ lekkasje
☐ problemer med å tømme blæra
☐ annet, f. eks. RIK eller permanent kateter

Hvis annet, spesifiser:

Hvor alvorlig har vannlatingsproblemet vært?

☐ Mildt
☐ Moderat
☐ Alvorlig

TIDLIGERE SYKDOMMER

Tidligere cerebrovaskulær sykdom

☐ Ingen tidligere cerebrovaskulær sykdom
☐ Hjerneinfarkt
☐ TIA
☐ Hjerneblødning
☐ Hatt cerebrovaskulær sykdom, men ukjent om blødning, infarkt eller TIA
☐ Usikker

Alder for første hjerneslag: (infarkt/blødning) ☐☐

Tidligere TIA

☐ Ingen tidligere TIA
☐ TIA i løpet av siste uke
☐ TIA 1-4 uker før slaget
☐ TIA 4-12 uker før slaget
☐ TIA over 12 uker før slaget
☐ Usikkert om pasienten har hatt TIA

Hjerte-karsykdom

☐ Ingen tidligere hjerte-karsykdom
☐ Hjerteinfarkt
☐ Angina pectoris
☐ Atrieflimmer bekreftet med EKG nå eller tidligere (også paroksystisk atrieflimmer)
☐ Hjertesvikt
☐ Gjennomgått karkirurgi (halskar, aorta, arterier i underekstremiteter)
☐ Hypertensjon før debut av slag
☐ Claudicatio intermittens (perifer vaskulær sykdom)
☐ Usikker

Hvis hjerteinfarkt eller angina: gjennomgått kardiologisk intervensjon?

☐ PCI (innsettelse av stent)
☐ CABG (koronar bypass)
☐ Nei
☐ Usikker

Hvis PCI eller CABG; måned og år for (første) kardiologiske intervensjon

☐☐☐☐☐☐

Hvis gjennomgått karkirurgi; måned og år for karkirurgisk intervensjon

☐☐☐☐☐☐

Thyroideasykdom ☐ Ja ☐ Nei

Vitamin B12-mangel, folatmangel ☐ Ja ☐ Nei

Hyperkolesterolemi før debut av slag (behandlet med kolesterolsenkende eller påvist totalkolesterol ≥ 6 mmol/l) ☐ Ja ☐ Nei

Diabetes mellitus (nyoppdaget eller tidligere diagnostisert) ☐ Ja ☐ Nei

Hvis diabetes mellitus: kjente komplikasjoner

☐ Ingen kjente komplikasjoner ☐ Øyne ☐ Nyrer ☐ Nevropati

Pasienten har betydelig nedsatt:

- ☐ Syn
- ☐ Hørsel
- ☐ Både syn og hørsel
- ☐ Ingen
- ☐ Usikker

Psykiatrisk lidelse

- ☐ Ingen behandlingstrengende psykiatrisk lidelse
- ☐ Tidligere behandlingstrengende depresjon
- ☐ Pågående behandlingstrengede depresjon
- ☐ Demens (også ikke behandlingstrengende)
- ☐ Annen behandlingstrengende psykisk sykdom
- ☐ Usikker

Andre sykdommer

- ☐ Ingen andre sykdommer
- ☐ Alvorlig kronisk lungesykdom
- ☐ Nyresykdom (er det påvist nedsatt nyrefunksjon?)
- ☐ Systemsykdom (revmatiske sykdommer, betennelsestilstander)
- ☐ Leversykdom
- ☐ Ulcus pepticum
- ☐ Paraplegi
- ☐ HIV
- ☐ Kreftsykdom med eller uten spredning
- ☐ Tidligere anmerket alkoholmisbruk i pasientjournal
- ☐ Tidligere opplysninger om narkotikabruk i journal
- ☐ Annen sykdom av betydning for funksjonsnivå
- ☐ Usikker

Hvis leversykdom, alvorlig? (cirrhose)

☐ Ja ☐ Nei

Hvis kreftsykdom, spredning?

☐ Ja ☐ Nei

Hvis narkotikabruk, hvilket/hvilke?

_____

Andre opplysninger

_____

STATUS I AKUTTFASEN

Sidelokalisasjon av symptomer

☐ Høyre ☐ Venstre ☐ Bilateralt

☐ Ikke relevant ☐ Ukjent

Trombolytisk behandling ☐ Ja ☐ Nei

Starttidspunkt for trombolyse (dag/måned/år/timer/minutter)

☐☐☐☐ 2 0 ☐☐ ☐☐☐☐

Klassifisering av slaget

Oxfordshire klassifikasjon

☐ TACI ☐ PACI ☐ LACI

☐ POCI ☐ Blødning ☐ Uklassifiserbar

Trombektomi ☐ Ja ☐ Nei

Starttidspunkt for trombolyse (dag/måned/år/timer/minutter)

☐☐☐☐ 2 0 ☐☐ ☐☐☐☐

TOAST klassifikasjon, hvis hjerneinfarkt

☐ Aterosklerose (storkarsykdom) ☐ Kardial emboli ☐ Småkar-sykdom

☐ Annen årsak ☐ Ukjent årsak/ flere mulige årsaker

Annen sannsynlig årsak (tillegg til TOAST – velg én)

☐ Disseksjon ☐ Protrombotisk tilstand ☐ Graviditet

☐ Atrieflimmer ☐ PFO

☐ Hjerteinfarkt ☐ Endokarditt ☐ Storkarsykdom

☐ Småkarsykdom ☐ Klaffefeil

UNDER SYKEHUSOPPHOLDET

Blodtrykk og puls ved innkomst ☐☐☐/☐☐☐ ☐☐☐

Blodtrykk og puls dag 1 ☐☐☐/☐☐☐ ☐☐☐

Oksygenmetning i % i løpet av første 24 t. ☐☐☐

Blodtrykk og puls dag 7/utreisedag ved utreise før dag 7. ☐☐☐/☐☐☐ ☐☐☐

Aktivitetsbrikke under oppholdet

☐ Ja ☐ Nei

Årsak hvis nei:

_____

Vekt i kg ☐☐☐

Høyde i cm ☐☐☐

Midjeomkrets i cm ☐☐☐

Hofteomkrets i cm ☐☐☐

Hvis det ikke er mulig å veie/måle, angi årsak:

_____

Komplikasjoner

Kramper

☐ Ja ☐ Nei ☐ Usikker

Nevrologisk progresjon

☐ Ja ☐ Nei ☐ Usikker

Infeksjon behandlet med antibiotika

☐ Ja ☐ Nei ☐ Usikker

Hvis ja: ☐ UVI ☐ Luftveisinfeksjon ☐ Annet

Fall

☐ Ja ☐ Nei ☐ Usikker

Har pasienten kliniske tegn på neglekt?

☐ Ja ☐ Nei ☐ Usikker

Fremstår pasienten som skrøpelig?

☐ Ja ☐ Nei ☐ Usikker

BLODPRØVER

Elektrolytter

Natrium (Na) ☐☐☐

Kalium (K) ☐,☐

Kalsium (Ca) ☐,☐☐

Hematologi

Hemoglobin (Hb) ☐☐,☐

Leukocytter (Leuk) ☐☐,☐

Trombocytter (Tromb) ☐☐☐

Lipider

Total kolesterol ☐☐,☐

LDL ☐,☐

HDL ☐,☐

Triglycerider ☐,☐

Annet

Glucose ☐☐,☐

TSH ☐☐,☐

Fritt T4 ☐☐,☐

HbA1c ☐☐,☐

INR ☐,☐

Kreatinin ☐☐☐

CRP ☐☐☐

Høy-sensitiv CRP ☐,☐☐

Troponin T ☐☐☐☐

Vitamin B12 ☐☐☐

Folat ☐☐

Homocystein ☐☐,☐

Blodprøver tatt til biobank?

☐ Ja ☐ Nei

Hvis ja, løpenummer i biobank:

☐

BILDEDIAGNOSTIKK OG ANDRE MEDISINSKE UNDERSØKELSER

EKG ☐ Ja ☐ Nei

Rytme:

Sinusrytme ☐ Ja ☐ Nei

Atrieflimmer/flutter ☐ Ja ☐ Nei

Ventrikkeltachykardi ☐ Ja ☐ Nei

EKG-kompleks:

Normalt ☐ Ja ☐ Nei

Tidligere hjerteinfarkt ☐ Ja ☐ Nei

Akutt infarkt ☐ Ja ☐ Nei

Venstre-ventrikkel hypertrofi ☐ Ja ☐ Nei

ST-depresjon eller T-inversjon i minst 2 tilgrensende avledninger ☐ Ja ☐ Nei

Telemetri ☐ Ja ☐ Nei

Hvis ja:

Sinus ☐ Ja ☐ Nei

Atrieflimmer/flutter ☐ Ja ☐ Nei

Ventrikkeltachykardi ☐ Ja ☐ Nei

CT utført ☐ Ja ☐ Nei

Hvis ja:

Ferskt infarkt ☐

Gamle infarktforandringer ☐

Kronisk iskemi ☐

Blødning ☐

Tumor ☐

Negativt ☐

MR utført ☐ Ja ☐ Nei

Hvis ja:

Ferskt infarkt ☐

Gamle infarktforandringer ☐

Kronisk iskemi ☐

Blødning ☐

Tumor ☐

Negativt ☐

☐ Evt. Fazekas grad

Ultralyd ekstrakranielle kar ☐ Ja ☐ Nei

Hvis ja:

Stenose ☐ Ja ☐ Nei

Stenosegrad: _____ %

Okklusjon ☐ Ja ☐ Nei

Disseksjon ☐ Ja ☐ Nei

Plakk ☐ Ja ☐ Nei

Hvis plakk: ☐ harde ☐ bløte ☐ begge deler ☐ uspesifisert

Ekstrakraniell CT/MR angio utført? ☐ Ja ☐ Nei

Hvis ja:

Stenose ☐ Ja ☐ Nei

Stenosegrad: _____ %

Okklusjon ☐ Ja ☐ Nei

Disseksjon ☐ Ja ☐ Nei

Plakk ☐ Ja ☐ Nei

Annet (evt. funn, f.eks. aneurismer):

_____

Intracerebral CT/MR angio utført? ☐ Ja ☐ Nei

Hvis ja:

Stenose ☐ Ja ☐ Nei

Stenosegrad: _____ %

Okklusjon ☐ Ja ☐ Nei

Disseksjon ☐ Ja ☐ Nei

Plakk ☐ Ja ☐ Nei

Annet (evt. funn, f.eks. aneurismer, karmalformasjoner):

_____

Bildediagnostikk hjerte ☐ Ja ☐ Nei

Evt. hvilke patologiske funn:

_____

☐ Transthorakal ekkokardiografi

☐ Transøsofagal ekkokardiografi

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

☐ Intervju av pasient ☐ Intervju av pårørende ☐ Intervju av helsepersonell ☐ Sykejournal ☐ Telefonintervju

Opplysninger mangler:

Hvordan håndteres legemidlene? ☐ selvhjulpen ☐ vha. pårørende ☐ hjemmesykepleie ☐ ingen faste medikamenter

MEDIKAMENTLISTE

FASTE MEDIKAMENTER preparatnavn		Dose ved innkomst	ATC-KODE							
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

MEDIKAMENTER VED UTREISE preparatnavn		Dose	ATC-KODE							
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

☐ Intervju av pasient ☐ Intervju av pårørende ☐ Intervju av helsepersonell ☐ Sykejournal ☐ Telefonintervju

Opplysninger ikke tilgjengelig:

MODIFIED RANKIN SCALE

	Før hjerneslaget	**Dag 7** / Utreise hvis utskriving før dag 7
Dato		
Skår		

0. **Ingen symptomer i det hele tatt.**
Pasienten skal ikke ha noen begrensninger eller symptomer.

1. **Ingen betydningsfull funksjonssvikt til tross for symptomer; klarer å utføre alle oppgaver og aktiviteter som før.**
Pasienten har noen symptomer, enten fysiske eller kognitive, f. eks affeksjon av språk/tale, evne til å lese/skrive, fysisk mobilitet, sensibilitet, syn, svelg, humør, men kan fortsette å ta del i alt tidligere arbeid, sosial- eller fritidsaktiviteter. Det avgjørende spørsmålet for å skille mellom 1 og 2 kan være: Klarer pasienten alle aktiviteter som han før gjorde mer enn månedlig?

2. **Lett funksjonssvikt; klarer ikke å utføre alle aktiviteter som før, men klarer sine daglige gjøremål.**
Pasienten kan ikke lenger gjøre en del av de aktivitetene som han/hun tidligere vanligvis har gjort. (F. eks kjøre bil, danse, lese, arbeide), men klarer fortsatt å ta vare på seg selv uten hjelp fra andre fra dag til dag. Pasienten kan klare påkledning, forflytning, matlaging/spisesituasjon, toalettbesøk, lage enkle måltider, handle og reise i lokalmiljøet uten å måtte motta hjelp eller tilsyn fra andre. Pasienten skal kunne være overlatt til seg selv alene hjemme i en uke eller mer uten bekymring.

3. **Moderat funksjonssvikt; trenger noe hjelp, men går uten hjelp.**
Pasiebten trenger ikke hjelp til forflytning/gange (selvstendig forflytning med og uten hjelpemiddel som stokk, rullator). Klarer påkledning, toalettbesøk og å spise etc, men trenger hjelp til mer komplekse aktiviteter. Noen andre må handle, lage mat, vaske – og må besøke pasienten oftere enn ukentlig for å sørge for at disse aktivitetene er gjennomført. Assistansen kan være fysisk eller rådgivende, f. eks pasienten trenger tilsyn eller motivering for å klare finansielle gjøremål.

4. **Alvorlig funksjonssvikt; klarer ikke å gå uten hjelp og klarer ikke å ivareta sine grunnleggende behov uten hjelp.**
Pasienten må ha hjelp fra andre til noen daglige aktiviteter, f. eks gange, påkledning, toalett, spise. Pasienten blir besøkt minst en og vanligvis to eller flere ganger daglig, eller må bo i nærheten av en hjelper. For å skille 4 fra grad 5 – ta stilling til om pasienten kan bli latt alene for moderate perioder i løpet av dagen.

5. **Svært alvorlig funksjonssvikt; sengeliggende og trenger konstant tilsyn og hjelp.**
Noen andre må alltid være tilgjengelig på dagtid og noen ganger i løpet av natten – denne trenger ikke være en sykepleier.

6. **Død**.

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

- ☐ Intervju av pasient
- ☐ Intervju av pårørende
- ☐ Intervju av helsepersonell
- ☐ Sykejournal
- ☐ Telefonintervju

☐ Testbar ☐ Ikke testbar

Årsak til ikke testbar:

☐ Afasi ☐ Redusert bevissthet ☐ Medisinsk ustabil

☐ Forstår ikke norsk ☐ Redusert kognitiv funksjon ☐ Demens

Annen årsak: _____

BARTHEL INDEX

	Dag 7 / utreise hvis utskriving før dag 7
DATO	
SPISING **10.** Helt selvhjulpen. Kan bruke nødvendige hjelpemidler og spiser innen rimelig tid **5.** Må ha hjelp til enkelte funksjoner, f. eks å skjære **0.** Totalt avhengig av andre for å kunne spise	
BADING/DUSJ **5.** Helt selvhjulpen **0.** Trenger hjelp	
PERSONLIG HYGIENE **5.** Selvhjulpen. Klarer å vaske ansikt, kamme hår, børste tenner og barbering **0.** Trenger hjelp til en eller flere funksjoner	
PÅKLEDNING **10.** Selvhjulpen. Klarer å knyte sko, kneppe knapper **5.** Trenger hjelp, men klarer halvparten innen rimelig tid **0.** Trenger hjelp til mer enn halvparten	
TARMKONTROLL **10.** Kontinent. Klarer selv eventuelt å sette stikkpille/klyx **5.** Nedsatt kontroll og enkelte "uhell". Trenger hjelp til eventuelt å sette stikkpille/klyx **0.** Helt inkontinent eller hyppige "uhell"	
BLÆREKONTROLL **10.** Kontinent. Selvhjulpen og holder seg tørr ved bruk av uridom **5.** Nedsatt kontroll og enkelte "uhell" og holder seg tørr med uridom o.l. men trenger hjelp til å bruke dette **0.** Helt inkontinent eller trenger permanent kateter	
TOALETTBESØK **10.** Selvhjulpen på toalett/dostol eller bekken. Ordner klær, tørker seg, spyler toalettet eller tømmer bekken **5.** Trenger hjelp til klær, papir etc. **0.** Kan ikke bruke toalett/dostol	
STOL/SENG - FORFLYTNING **15.** Selvhjulpen. Klarer også å låse rullestol og bevege forstøtte **10.** Klarer forflytning med litt hjelp eller tilsyn **5.** Kan sitte men må ha mye hjelp ved forflytning **0.** Kan ikke sitte. Sengeliggende eller må løftes	
MOBILITET **15.** Klarer å gå 50 meter. Kan bruke stokk eller krykke, men ikke rullator **10.** Kan gå 50 meter med rullator og støtte/tilsyn av en person **5.** Kan ikke gå, men kan kjøre rullestol uten hjelp/tilsyn i 50 meter **0.** Kan ikke kjøre rullestol uten hjelp	
TRAPPEGANG **10.** Selvhjulpen med eller uten bruk av hjelpemidler **5.** Trenger hjelp/tilsyn av en person **0.** Kan ikke gå i trapp	
SUM: (totalt 100 poeng)	

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

☐ Intervju av pasient ☐ Intervju av pårørende ☐ Telefonintervju

Opplysninger mangler:

NOTTINGHAM I-ADL

SE NØKKEL FØR UTFYLLING

Få fram det personen faktisk gjør, og har gjort de siste to ukene (ikke hva vedkommende tror eller ønsker han/hun kan gjøre).

SKÅRSKALA

Nei	0
Med hjelp	1
Alene med vansker	2
Alene	3

	Nei	Med hjelp	Alene med vansker	Alene
MOBILITET				
1. Går du omkring utendørs?	☐	☐	☐	☐
2. Går du i trapper?	☐	☐	☐	☐
3. Kommer du deg inn og ut av bilen?	☐	☐	☐	☐
4. Går du på ujevnt underlag?	☐	☐	☐	☐
5. Krysser du veier?	☐	☐	☐	☐
6. Reiser du med offentlig transport?	☐	☐	☐	☐
7. Spiser du selv?	☐	☐	☐	☐
8. Lager du varm drikke?	☐	☐	☐	☐
9. Tar du med varme drikker fra ett rom til et annet?	☐	☐	☐	☐
10. Tar du oppvasken?	☐	☐	☐	☐
11. Lager du et enkelt varmt måltid til deg selv?	☐	☐	☐	☐
12. Håndterer du egne penger når du er ute?	☐	☐	☐	☐
13. Tar du småvask/håndvask?	☐	☐	☐	☐
14. Gjør du husarbeidet selv?	☐	☐	☐	☐
15. Gjør du innkjøpene dine selv?	☐	☐	☐	☐
16. Tar du en hel klesvask?	☐	☐	☐	☐
17. Leser du aviser eller bøker?	☐	☐	☐	☐
18. Bruker du telefonen?	☐	☐	☐	☐
19. Skriver du brev?	☐	☐	☐	☐
20. Går du ut for sosialt samvær?	☐	☐	☐	☐
21. Steller du din egen hage?	☐	☐	☐	☐
22. Kjører du bil?	☐	☐	☐	☐

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

- ☐ Klinisk us.
- ☐ Sykejournal

- ☐ Testbar
- ☐ Ikke testbar

Årsak til ikke testbar:

- ☐ Afasi
- ☐ Redusert bevissthet
- ☐ Medisinsk ustabil
- ☐ Forstår ikke norsk
- ☐ Redusert kognitiv funksjon
- ☐ Demens

Annen årsak: _____

NIH STROKE SCALE (NIHSS)

		Dato / Tid	Ankomst	Dag 1	Dag 7/utreise (hvis utreise før dag 7)
1a	**Bevissthetsnivå** 0 = Våken 1 = Døsig, reagerer adekvat ved lett stimulering 2 = Døsig, reagerer først ved kraftigere/gjentatt stimulering 3 = Reagerer ikke, eller bare med ikke-målrettet bevegelse				
1b	**Orientering** (spør om måned + alder) 0 = Svarer riktig på to spørsmål 1 = Svarer riktig på ett spørsmål (eller ved alvorlig dysartri) 2 = Svarer **ikke** riktig på noe spørsmål				
1c	**Respons på kommando** (lukke øyne + knytte hånd) 0 =Utfører begge kommandoer korrekt 1 = Utfører en kommando korrekt 2 = Utfører ingen korrekt				
2	**Blikkbevegelse** (horisontal bevegelse til begge sider) 0 = Normal 1 = Delvis blikkparese (eller ved øyenmuskelparese) 2 = Fiksert blikkretning til siden eller total blikkparese				
3	**Synsfelt** (bevege fingre/fingertelling i laterale synsfelt) 0 = Normalt 1 = Delvis hemianopsi 2 = Total hemianopsi 3 = Bilateral hemianopsi/blindhet/koma				
4	**Ansikt** (vise tenner, knipe igjen øynene, løfte øyenbryn) 0 = Normal 1 = Utvisket nasolabialfure, asymmetri ved smil 2 = Betydelig lammelse i nedre ansiktshalvdel 3 = Total lammelse i halve ansiktet (eller ved koma)				
5	**Kraft i armen** (holde armen utstrakt 45° i 10 sekunder) 0 = Normal (også ved "ikke testbar") 1 = Drifter til lavere posisjon 2 = Noe bevegelse mot tyngdekraften, drifter til sengen 3 = Kun små muskelbevegelser, faller til sengen 4 = Ingen bevegelse/koma	ve hø			
6	**Kraft i benet** (holde benet utstrakt 30° i 5 sekunder) 0 = Normal (også ved ikke testbar) 1 = Drifter til lavere posisjon 2 = Noe bevegelse mot tyngdekraften, drifter til sengen 3 = Ingen bevegelse mot tyngdekraften, faller til sengen 4 = Ingen bevegelse	ve hø			
7	**Koordinasjon/ataksi** (finger-nese-prøve/hæl-kne-prøve) 0 = Normal (også ved ikke testbar eller koma) 1 = Ataksi i arm eller ben 2 = Ataksi i arm og ben				
8	**Hudfølelse** (sensibilitet for stikk) 0 = Normal 1 = Lettere sensibilitetsnedsettelse 2 = Markert sensibilitetsnedsettelse (også ved koma, tetraparese)				
9	**Språk/afasi** (spontan tale, taleforståelse, leseforståelse, benevning) 0 = Normal 1 = Moderat afasi, samtale mulig 2 = Markert afasi, samtale svært vanskelig eller umulig 3 = Ikke språk/koma				
10	**Tale/dysartri** (spontan tale) 0 = Normal 1 = Mild – moderat dysartri 2 = Nær uforståelig tale eller anartri/koma				
11	**Neglekt** (bilateral simultan stimulering av syn og hudsensibilitet) 0 = Normal (også ved hemianopsi med normal sensibilitet) 1 = Neglekt i en sansemodalitet 2 = Neglekt i begge sansemodaliteter/koma				
	Total NIHSS-Score				

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: ☐☐☐☐ 2 0 ☐☐

Tester: ☐☐☐

Pasient-ID: ☐☐☐☐☐☐

Metode for innhenting av data:

☐ Klinisk undersøkelse

☐ Testbar

☐ Ikke testbar → **Årsak til ikke testbar:**

☐ Afasi ☐ Redusert bevissthet ☐ Medisinsk ustabil

☐ Forstår ikke norsk ☐ Redusert kognitiv funksjon ☐ Demens

Annen årsak: _____

MONTREAL COGNITIVE ASSESSMENT (MOCA) norsk versjon 7.1.

	POENG
1., 2. og 3. VISUOKONSTRUKTIV/EKSEKUTIV (utføres på eget ark) ☐ **1A2B** ☐ **Kopier kube** **Tegn en klokke** (ti over elleve) ☐ Kontur ☐ Tall ☐ Visere	/5
4. BENEVNING ☐ Løve ☐ Neshorn ☐ Kamel eller dromedar	/3
5. HUKOMMELSE Les ordene, forsøksperson må gjenta dem. Gjør to forsøk, selv om første forsøk gjennomføres helt riktig. Gjør gjenkalling etter 5 minutter. **ANSIKT** **FLØYEL** **KIRKE** **TUSENFRYD** **RØD** 1. forsøk ☐ ☐ ☐ ☐ ☐ 2. forsøk ☐ ☐ ☐ ☐ ☐	ingen poeng
6. OPPMERKSOMHET Les rekken med tall (1 tall/sekund) Forsøksperson skal gjenta i samme rekkefølge ☐ **2 1 8 5 4** Forsøksperson skal gjenta i baklengs rekkefølge ☐ **7 4 2**	/2
Les listen med bokstaver. På hver bokstav A skal forsøkspersonen banke på bordet med hånden sin. Ingen poeng ved 2 feil ☐ **F B A C M N A A J K L B A F A K D E A A A J A M O F A A B**	/1
Seriell subtraksjon med 7, begynnende med **100** **93** ☐ **86** ☐ **79** ☐ **72** ☐ **65** ☐ 4 eller 5 riktig: 3 png 2 eller 3 riktig: 2 png 1 riktig: 1png 0 riktig: 0 png	/3
7. SETNINGSREPETISJON **Gjenta etter meg:** Jeg vet kun at det er Jon som skal hjelpe i dag ☐ Katten gjemte seg alltid under sofaen når det var hunder i rommet. ☐	/2
8. ORDFLYT Si så mange ord du kan komme på som begynner med **F** innenfor ett minutt **Antall ord:** ☐ ☐ (N ≥ 11 ord)	/1
9. LIKHETER **Likhet mellom for eksempel en banan og en appelsin=frukt** ☐ tog-sykkel ☐ klokke-linjal	/2
10. UTSATT GJENKALLING **ANSIKT** **FLØYEL** **KIRKE** **TUSENFRYD** **RØD** Kun poeng for gjenkalling uten stikkord. ☐ ☐ ☐ ☐ ☐ Frivillig: Kategori-stikkord ☐ ☐ ☐ ☐ ☐ Frivillig: Multiple-choice stikkord ☐ ☐ ☐ ☐ ☐	/5
11. ORIENTERING ☐ **Dato** ☐ **Måned** ☐ **År** ☐ **Ukedag** ☐ **Sted** ☐ **By**	/6
Total skår Normal ≥26/30 Legg til 1 poeng dersom ≤ 12 år utdanning	/30

Kommentar:

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

☐ Klinisk undersøkelse

☐ Testbar

☐ Ikke testbar

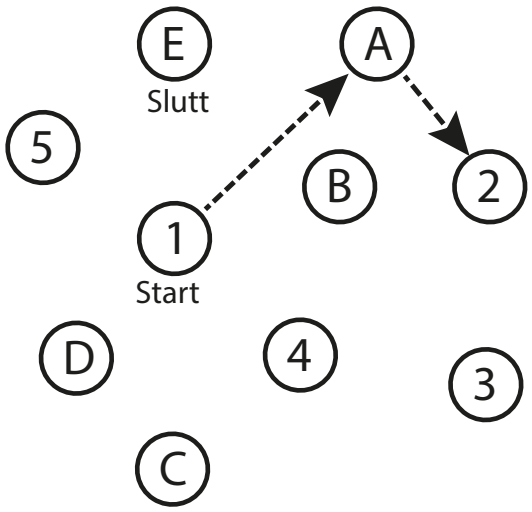
Årsak til ikke testbar:

☐ Afasi ☐ Redusert bevissthet ☐ Medisinsk ustabil

☐ Forstår ikke norsk ☐ Redusert kognitiv funksjon ☐ Demens

Annen årsak: _____

MOCA trailmaking, kube og klokke



Nor-COAST
Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

☐ Intervju av pasient ☐ Intervju av pårørende ☐ Telefonintervju

Opplysninger mangler:

AD8 DEMENS SCREENING INTERVJU

Husk, «Ja, en endring» indikerer at det har vært en endring i det siste året forårsaket av kognitive (tenkning og hukommelse) problemer.		JA, en endring	NEI, ingen endring	Vet ikke
1.	Problemer med å bedømme (for eksempel problemer med å ta beslutninger, dårlige økonomiske beslutninger, problemer med å tenke)			
2.	Mindre interessert i hobbyer/aktiviteter			
3.	Gjentar de samme tingene om og om igjen (spørsmål, historier eller uttalelser)			
4.	Problemer med å lære hvordan man bruker et verktøy, utstyr eller ulike tekniske enheter (eks. videospiller, data, mikrobølgeovn, fjernkontroll)			
5.	Glemmer korrekt måned eller år			
6.	Problemer med å håndtere kompliserte økonomiske/finansielle forhold (for eksempel bruk av nettbank, betale skatt og regninger)			
7.	Problemer med å huske avtaler			
8.	**Daglige** problemer med tenking og/eller hukommelse			
	TOTAL AD8 SKÅR			

Nor-COAST
Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: ☐☐☐☐2020

Tester: ☐☐☐

Pasient-ID: ☐☐☐☐☐☐

Metode for innhenting av data:

☐ Klinisk us.

☐ Testbar

☐ Ikke testbar

Årsak til ikke testbar:

☐ Afasi ☐ Redusert bevissthet ☐ Medisinsk ustabil

☐ Forstår ikke norsk ☐ Redusert kognitiv funksjon ☐ Demens

Annen årsak: _____

NEGLEKT - test (del linje på midten)

Avstand fra linjens start til merket: ☐☐,☐ cm, mm

TRAIL-MAKING-test A

Tid (m:ss): ☐:☐☐

Klarer ikke gjennomføre ☐

Gjennomfører med hjelp ☐

TRAIL-MAKING-test B

Tid (m:ss): ☐:☐☐

Klarer ikke gjennomføre ☐

Antall feil ☐

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

☐ Klinisk us.

☐ Testbar

☐ Ikke testbar

Årsak til ikke testbar:

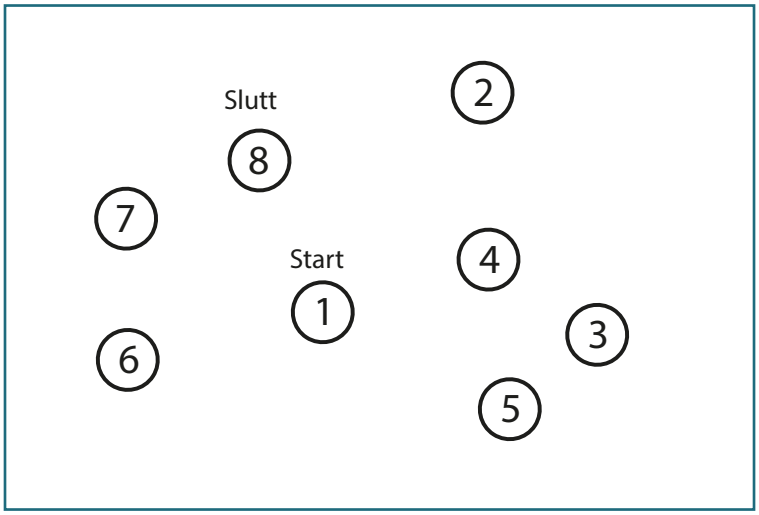
☐ Afasi ☐ Redusert bevissthet ☐ Medisinsk ustabil

☐ Forstår ikke norsk ☐ Redusert kognitiv funksjon ☐ Demens

Annen årsak: _____

Trailmaking A forsøk

EKSEMPEL



Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

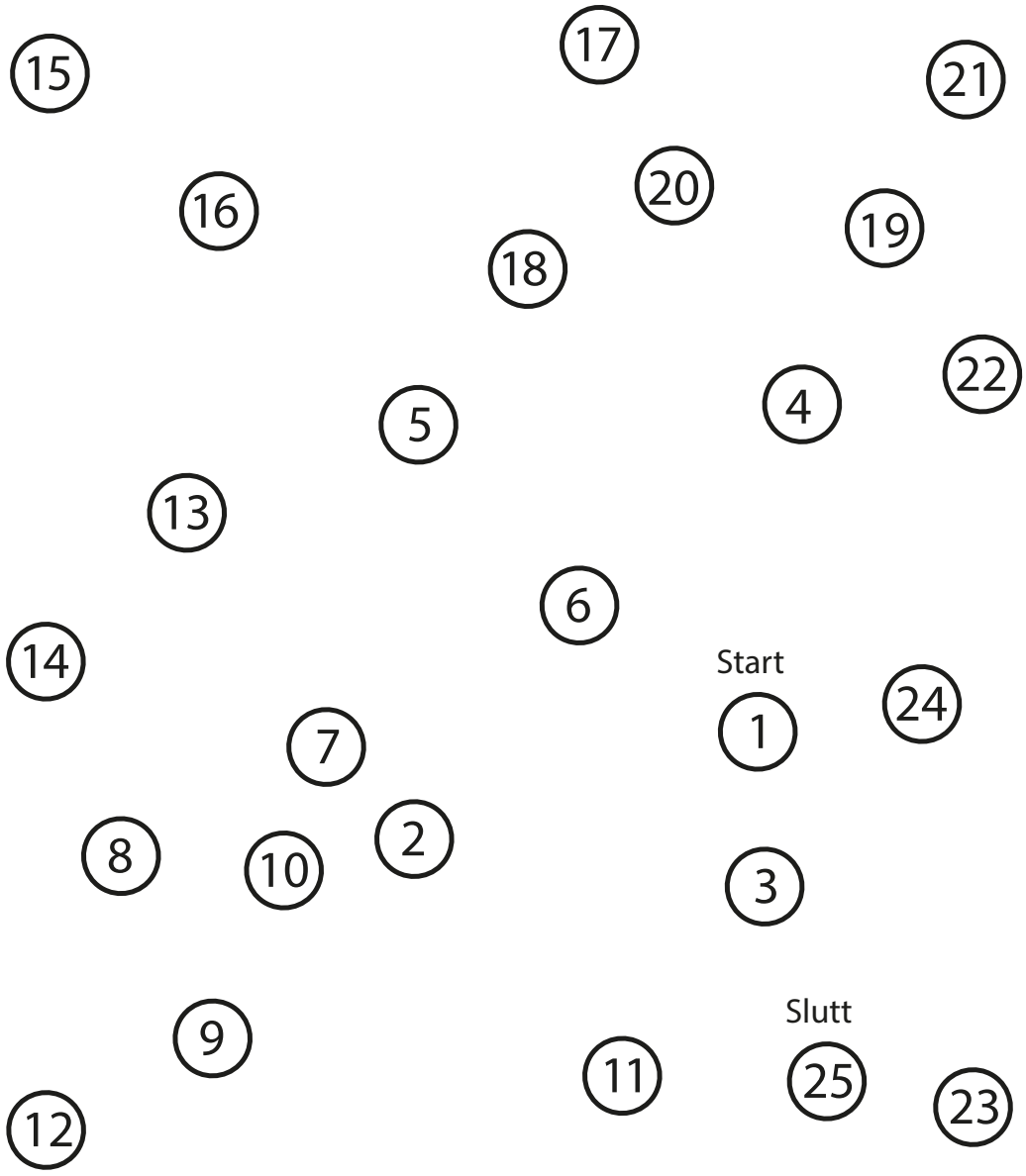
- ☐ Klinisk us.
- ☐ Testbar
- ☐ Ikke testbar

Årsak til ikke testbar:

- ☐ Afasi
- ☐ Redusert bevissthet
- ☐ Medisinsk ustabil
- ☐ Forstår ikke norsk
- ☐ Redusert kognitiv funksjon
- ☐ Demens

Annen årsak: _____

Trailmaking test A



Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

☐ Klinisk us.

☐ Testbar

☐ Ikke testbar

Årsak til ikke testbar:

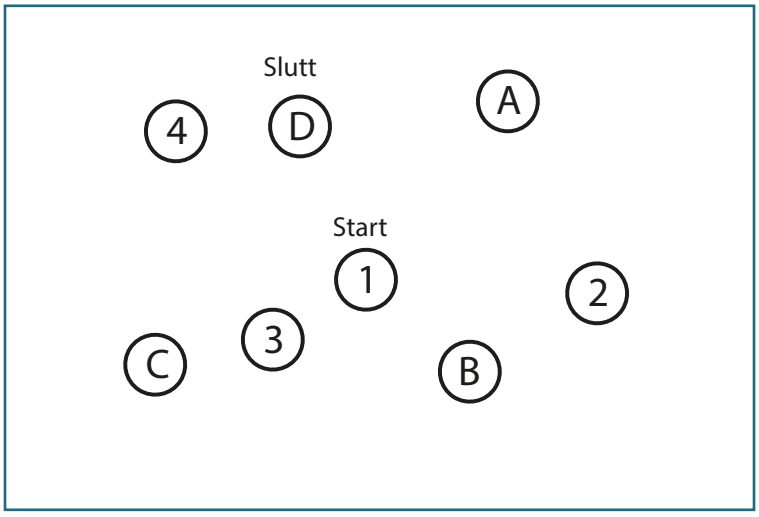
☐ Afasi ☐ Redusert bevissthet ☐ Medisinsk ustabil

☐ Forstår ikke norsk ☐ Redusert kognitiv funksjon ☐ Demens

Annen årsak: _____

Trailmaking B forsøk

EKSEMPEL



Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

- ☐ Klinisk us.

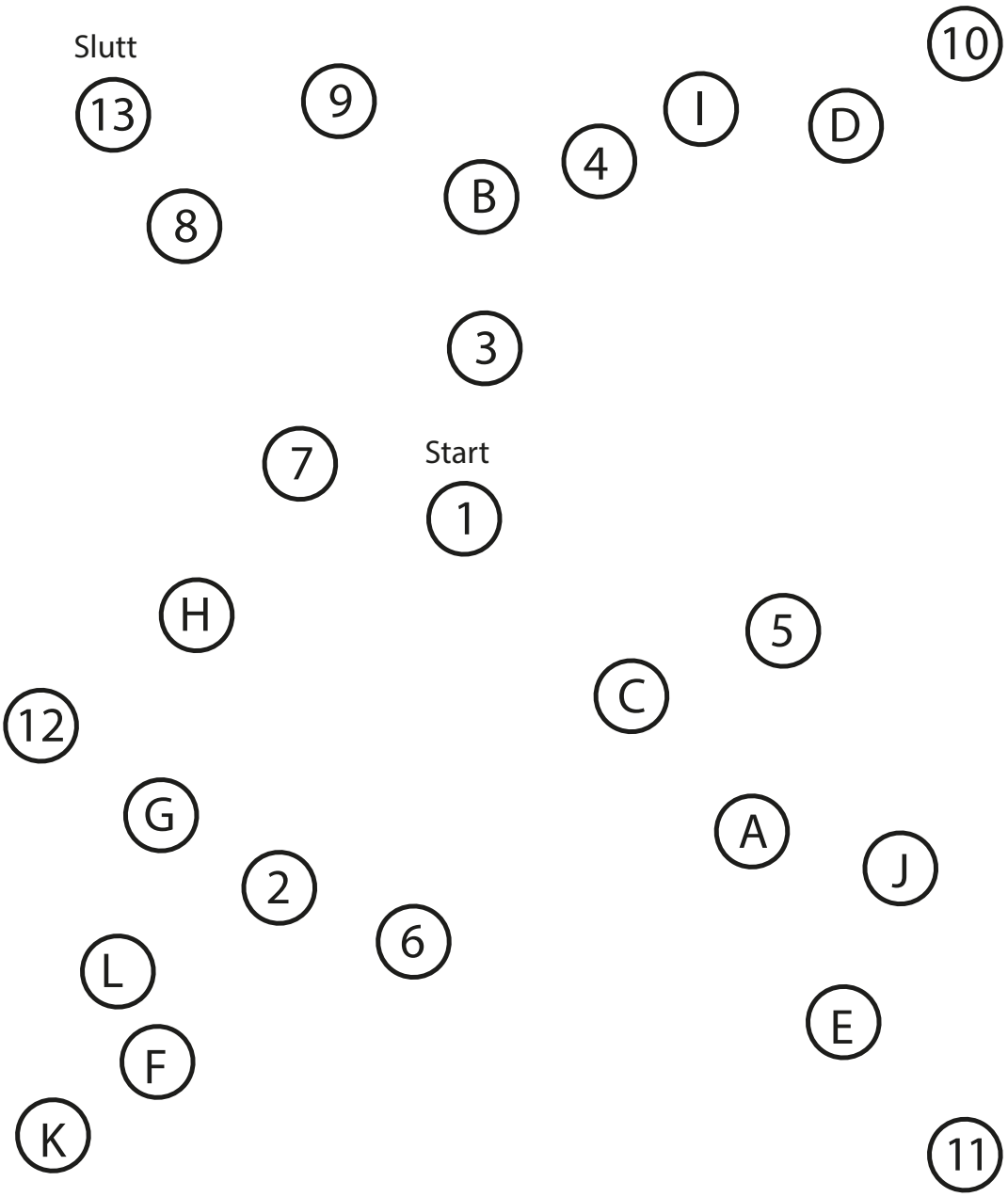
- ☐ Testbar
- ☐ Ikke testbar

Årsak til ikke testbar:

- ☐ Afasi
- ☐ Redusert bevissthet
- ☐ Medisinsk ustabil
- ☐ Forstår ikke norsk
- ☐ Redusert kognitiv funksjon
- ☐ Demens

Annen årsak: _____

Trailmaking test B



Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: | | | | | 2 | 0 | | |

Tester: | | | |

Pasient-ID: | | | | | | |

Metode for innhenting av data:

☐ Intervju av pasient ☐ Intervju av pårørende

Opplysninger mangler:

GLOBAL DETERIORATION SCALE (sett ring rundt eller strek under mest passende skår-nivå før slaget)

Skår- Nivå	Svikt i kognisjon og funksjon	Omsorgsbehov
1. Ingen kognitiv svikt		Uavhengig
2. Svært mild kognitiv svikt	Subjektiv opplevelse av mildt hukommelsestap. Ingen objektive tegn på kognitiv svikt ved intervju, arbeid eller sosial funksjon. Normal ved testing. Ingen funksjonssvikt.	Uavhengig
3. Mild kognitiv svikt (MCI)	Tidligste tydelige svikt, se fotnote. Normalt funksjonsnivå, men kolleger kan ha lagt merke til sviktende funksjon i arbeidssituasjon. Objektiv svikt ved testing. Benekting kan være til stede.	Uavhengig
4. Mild demens	Tydelig svikt ved grundig klinisk intervju, se fotnote. Vanskeligheter med å håndtere komplekse oppgaver, som økonomi, reiseaktivitet. Benektning er vanlig. Trekker seg tilbake fra utfordrende situasjoner.	Kan bo alene – trolig med hjelp fra familie eller omsorgsgiver.
5. Moderat demens	Kan ikke lenger leve uten en viss form for assistanse. Ikke i stand til å huske viktige deler av sin aktuelle livssituasjon, for eksempel adresse, telefonnummer som vedkommende har hatt i flere år, navn på barnebarn osv. En viss grad av desorientering for dato, ukedag, årstid, eller for sted. Trenger ikke assistanse ved toalettbesøk, spising, påkledning, men kan ha behov for hjelp til å velge passende påkledning.	Kan bo hjemme med familie. Kan bo i omsorgsbolig med hjemmehjelp. Det kan være nødvendig med bokollektiv, særlig hvis det er uttalte atferdssymptomer eller fysisk funksjonssvikt.
6. Moderat – alvorlig demens	Kan av og til glemme navnet til ektefellen. Mangler stort sett oversikt over nylige opplevelser og hendelser i deres liv. Trenger hjelp ved personlig ADL. Kan være inkontinent for urin. Atferdsmessige og psykologiske symptomer ved demens (APSD) er vanlig, f.eks. vrangforestillinger, repetitive atferd, agitasjon, angst etc.	Vanligvis sykehjem
7. Alvorlig demens	Personen mister språkfunksjonen. Inkontinens. Trenger mye hjelp i personlig ADL. Mister gangfunksjon, motoriske symptomer.	Sykehjem

3.symptomer på mild kognitiv svikt kan være at pasienten har mistet veien til ukjent sted, får problemer med ord/navn som merkes av pårørende, husker lite av det han leser, navn på nye personer, forlegger eller mister ting. Pasientens nærmeste merker sviktende funksjon

4.symptomer på mild demens: pasienten kan ha nedsatt kunnskap om nåværende og nylige hendelser, problemer med å redegjøre for eget livsløp, problem med hoderegning, håndtere økonomien sin, reise alene

5.symptomer på moderat demens: pasienten husker ikke sin adresse eller telefonnummer gjennom mange år, navn på familiemedlemmer (barnebarn for eksempel), hvilke skoler, arbeidsplasser etc. de har vært på, problemer med tidsorientering

Nor-COAST

Kartlegging av mental funksjon etter hjerneslag

PRIMÆROPPHOLD

Dato: ☐☐☐☐ 2 0 ☐☐

Tester: ☐☐☐

Pasient-ID: ☐☐☐☐☐☐

Metode for innhenting av data:

☐ Klinisk us.

☐ Testbar

☐ Ikke testbar

Årsak til ikke testbar:

☐ Afasi ☐ Redusert bevissthet ☐ Medisinsk ustabil

☐ Forstår ikke norsk ☐ Redusert kognitiv funksjon ☐ Demens

Annen årsak: _____

FYSISKE TESTER

1. Balansetest

☐ Gjennomført: ☐ Ikke i stand ☐ missing

1.Stå uten støtte
10 sekunder
↓
2.Samlede føtter
10 sekunder
↓
3.Semi-Tandem
10 sekunder
↓
4.Tandem
10 sekunder
↓
5.Ett ben stående inntil
20 sekunder

1. ☐☐.☐☐ sek.
2. ☐☐.☐☐ sek.
3. ☐☐.☐☐ sek.
4. ☐☐.☐☐ sek.
5. ☐☐.☐☐ sek. Høyre
5. ☐☐.☐☐ sek. Venstre

2. 360 graders vending

☐ Gjennomført: ☐ Ikke i stand ☐ missing

***INSTRUKSJON:* Snu deg rundt en hel omgang. Stans. Snu deg så rundt en hel omgang den andre veien. Det brukes ikke hjelpemidler under testen**

☐ 4 Kan snu seg sikkert 360 grader på 4 sekunder eller mindre

☐ 3 Kan snu seg sikkert 360 grader på 4 sekunder eller mindre kun en retning

☐ 2 Kan snu seg sikkert 360 grader, men trenger mer enn 4 sekunder

☐ 1 Trenger tilsyn eller muntlige ledetråder

☐ 0 Trenger støtte under vendingen

Tid vending mot høyre
☐☐.☐☐ sek.

Tid vending mot venstre
☐☐.☐☐ sek.

3.a Reise/ sette seg x 1

☐ Gjennomført: ☐ Ikke i stand ☐ Missing

3.b Reise/ sette seg x 5

☐ Gjennomført: ☐ Ikke i stand ☐ Missing

Tid 5 repetisjoner uten armbruk ☐☐.☐☐ sek.

Tid 5 repetisjoner med armbruk (hvis deltager ikke klarer uten armbruk) ☐☐.☐☐ sek.

4. 4m Gangtest

☐ Gjennomført: ☐ Ikke i stand ☐ Missing

Hvis mulig gjennomføres testen uten ganghjelpemidler

Ganghjelpemidler ved test (kryss av):

1. ☐ Uten
2. ☐ Krykke/stokk (er)
3. ☐ Rullator
4. ☐ Annet (spesifiser)_____

Tid test 1: ☐☐.☐☐ sek.

Tid test 2: ☐☐.☐☐ sek.

5. 10-meter gangtest

☐ Gjennomført: ☐ Ikke i stand ☐ Missing

	Runde-tid (sekunder og ti-deler)
Normal. hast. 1	
Normal. hast. 2	
Maks. hast. 1	
Maks. hast. 2	

Bruk av hjelpemidler

☐ Ingen
☐ Krykke/stokk (er)
☐ Rullator
☐ Annet (spesifiser)_____

6. 8-talls balansetest

☐ Gjennomført: ☐ Ikke i stand ☐ Missing

Testen er utført ☐ med sko ☐ uten sko

Total antall feiltråkk: ☐

Tid (mm:ss): ☐☐.☐☐

7. Gripestyrke

Høyre hand: ☐ Gjennomført: ☐ Ikke i stand Missing

Venstre hand: ☐ Gjennomført: ☐ Ikke i stand Missing

Dynamometer:

Transverst volargrep	Høyre hand (kg)	Venstre hand (kg)
Prøve forsøk		
2. forsøk		
3. forsøk		

---

8. Nine Hole Peg Test

Antall sekunder som benyttes for å plassere alle 9 peg-er registreres (testen avbrytes etter 2 minutter).

Høyre hand: ☐ Gjennomført: ☐ Ikke i stand ☐ Missing

Venstre hand: ☐ Gjennomført: ☐ Ikke i stand ☐ Missing

	Høyre hand		Venstre hand	
	Ant. sekunder:	Ant. peg plassert:	Ant. sekunder:	Ant. peg plassert:
Forsøk 1				
Forsøk 2				

ST. OLAVS HOSPITAL
UNIVERSITETSSYKEHUSET I TRONDHEIM

NTNU
Kunnskap for en bedre verden

Forespørsel om deltakelse i forskningsprosjektet

Mental funksjon etter hjerneslag

Bakgrunn og hensikt
Dette er et spørsmål til deg om å delta i en forskningsstudie hvor hensikten er kartlegge forekomsten av følgetilstander etter hjerneslag med spesielt fokus på mentale funksjoner som språkfunksjon, hukommelse, evne til problemløsning.

Vi har etter hvert fått god kunnskap om effektiv akuttbehandling av hjerneslag, og du vil i forbindelse med ditt sykehusopphold få den behandling og opptrening som vi i dag mener er den beste. Allikevel vet vi at en del pasienter får følgetilstander etterpå, og vi ønsker å få mer kunnskap om det.
I denne studien vil vi undersøke mental funksjon etter hjerneslag og om fysisk funksjon og oppfølgende behandling har betydning for denne. Pasienter fra fem ulike sykehus over hele landet vil bli spurt om å være med. Vi tror at denne studien vil gi kunnskap som på sikt vil kunne gi bedre oppfølging og behandling.

Hva innebærer studien?
Pasienter som er innlagt i sykehus med symptomer på akutt hjerneslag vil bli spurt om å delta. Alle pasienter vil gjennomgå utredning og behandling i henhold til nasjonale retningslinjer for hjerneslagbehandling uansett om de deltar i studien eller ikke.
Studien innebærer at resultater av kliniske undersøkelser, blodprøver, ultralydundersøkelser og bildeundersøkelser av hjernen og blodåresystemet under sykehusoppholdet blir registrert. I tillegg vil vi be deg og dine pårørende svare på spørsmål om helsetilstanden forut for hjerneslaget, risikofaktorer for hjerte-karsykdom og legemidler. Mentale, følelsesmessige og fysiske funksjoner vil bli kartlagt gjennom tester og spørreskjemaer. Du vil også få festet en aktivitetsmåler til låret og en på brystet som du skal bruke opp til en uke for å se hvor mye du beveger deg.
Studien har til hensikt å følge opp pasienter med hjerneslag opp til fem år etter slaget. I første omgang vil du bli kalt inn til en ny undersøkelse etter 3 og 18 måneder som ved 3 måneder også vil omfatte en legekonsultasjon i tillegg til forskningsregistreringer. Da vil mental, følelsesmessig og fysisk funksjon igjen bli kartlagt gjennom tester, spørreskjema og samtale med dine pårørende. For noen vil det også være aktuelt med MR undersøkelse av hodet.
Det vil også bli innhentet opplysninger fra andre kilder som sykehusets journaler, kommunale registre på bruk av helsetjenester, Norsk Pasientregister, Norsk hjerneslagregister, Norsk hjerteinfarktregister, Nasjonalt register over hjerte- og karlidelser, Dødsårsaksregistret og Reseptregistret. Ved å si ja til deltagelse gir du også samtykke til innhenting av opplysninger fra disse registrene. Kun opplysninger som er relevant for dette prosjektet vil bli innhentet.

Mulige fordeler og ulemper
Ved å delta i studien vil du få ekstra oppfølging av din fysiske, følelsesmessige og mentale funksjon. Du vil også bidra til økt kunnskap om hvordan hjernen påvirkes av et hjerneslag over tid. Hvis du skulle oppleve at det blir for mange tester eller at enkelte undersøkelser/spørsmål er ubehagelige, kan du selvsagt reservere deg mot disse.

Hva skjer med prøvene og informasjonen om deg?
Informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle prosjektmedarbeidere har taushetsplikt og alle opplysninger vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjennende opplysninger. En kode knytter deg til opplysninger og prøvesvar gjennom en navneliste. Det vil ikke være mulig å identifisere deg i resultatene fra studien når disse publiseres.
Prosjektet avsluttes senest 01.07.2021, av kontrollhensyn blir grunnlagsdata oppbevart forsvarlig frem til 01.07.2026. Deretter vil data bli slettet. Det er prosjektleder Ingvild Saltvedt, Institutt for Nevromedisin, NTNU som er ansvarlig for datamaterialet i denne perioden. Instanser som kan tenkes å kontrollere

grunnlagsmaterialet er for eksempel forskningsansvarlige, Uredelighetsutvalget for forskning og Helsetilsynet.

Frivillig deltakelse.
Det er frivillig å delta i studien. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i studien. Dette vil ikke få konsekvenser for din videre behandling. Dersom du ønsker å delta, undertegner du samtykkeerklæringen på siste side. Om du nå sier ja til å delta, kan du senere trekke tilbake ditt samtykke uten at det påvirker din øvrige behandling. Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du ta kontakte prosjektleder og overlege Ingvild Saltvedt på telefon 72 83 67 27 eller på e-mail ingvild.saltvedt@ntnu.no eller forsker Torunn Askim på e-mail torunn.askim@ntnu.no

Biobank
Vi vil også be om å få ta blodprøver av deg som ledd i denne studien, der det kan være aktuelt å gjøre undersøkelser på arvemateriale, stress- og betennelsesmarkører, vitaminer, antioksidanter og andre faktorer som kan ha relasjon til hjerneslag. Prøvene vil bli anonymisert slik at man ikke kan koble resultater tilbake til enkeltindivid. Prøvene vil videre bli lagret i «Regional forskningsbiobank Midt-Norge», der de også kan bli brukt i framtidig forskning. Hos noen vil det som ledd i medisinsk utredning bli tatt en ryggmargsprøve. Hvis dette blir gjort hos deg, vil vi også be om å få lagre ryggmargsveske i forskningsbiobanken til bruk i dette prosjektet.

Utlevering av materiale og opplysninger til andre
Ettersom studien er en samarbeidsstudie kan det også være aktuelt at prøver og avidentifiserte opplysninger utleveres til samarbeidende forskningsgrupper. Dette gjelder andre sykehus i Norge og våre samarbeidspartnere ved Nuffield Department of Clinical Neuroscience, University of Oxford, Storbritannia, Florey Institutes of Neuroscience and Mental Health, Melbourne, Australia og Mary S. Easton Center for Alzheimer's Disease Research, University of California, Los Angeles, USA.

Rett til innsyn og sletting av opplysninger om deg og sletting av prøver
Hvis du vil delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har også rett til å få korrigert eventuelle feil i de opplysningene som vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet innsamlede prøver og opplysninger med mindre disse allerede har inngått i analyser eller brukt i vitenskapelige publikasjoner

Økonomi
Studien er finansiert gjennom forskningsmidler fra Nasjonalforeningen for folkehelsa. Det vil bli søkt om mer finansiering fra kilder som Norges forskningsråd, helseforetakene, Extrastiftelsen og tilsvarende instanser. Ingen av de som finansierer studien har deltatt i utformingen av prosjektet, og de vil heller ikke være involvert i bearbeidingen av resultatene fra prosjektet. Det vil således ikke være interessekonflikter knyttet til prosjektet.

Forsikring
Pasientskadeordningen gjelder ved deltagelse i studien.

Etisk og faglig vurdering
Studien er godkjent av Regional komité for medisinsk og helsefaglig forskningsetikk (REK)

Informasjon om utfallet av studien
Resultatene fra studien vil bli publisert i internasjonalt anerkjente tidsskrift. Du vil også få informasjon om utfallet av studien dersom du henvender deg direkte til oss i ettertid.

Samtykke til deltagelse i studien

Jeg er villig til å delta i studien. Kryss her hvis du også vil gi prøver til biobank ☐

Signert av prosjektdeltager, dato

Bevitnelse hvis pasienten ikke kan skrive:

Pasienten har samtykket, men er ikke i stand til å skrive navnet sitt.

Pasienten har også samtykket til å gi prøver til biobank ☐

(Signert av nærstående/vitne, dato)

Bevitnelse hvis pasienten ikke kan samtykke:

Pasienten har ikke samtykket på grunn av nedsatt språkevne, bevissthet eller mental svikt. Dersom pasienten har pårørende, er disse informert og har ikke motsatt seg at pasienten skal inkluderes. For pasienter som ikke kan samtykke vil prøver til biobank kun benyttes til problemstillinger relatert til denne studien. Hvis de har motsatt seg prøver til biobank sett kryss her ☐

(Signert av nærstående/vitne, dato)

Jeg bekrefter å ha gitt informasjon om studien

Signert prosjektmedarbeider, dato

REK
REGIONALE KOMITEER FOR MEDISINSK OG HELSEFAGLIG FORSKNINGSETIKK

Region:	Saksbehandler:	Telefon:	Vår dato:	Vår referanse:
REK nord	Veronica Sørensen	77620758	30.04.2015	2015/171/REK nord
			Deres dato:	Deres referanse:
			27.04.2015	

Vår referanse må oppgis ved alle henvendelser

INGVILD SALTVEDT
OLAV KYRRES GT 17

2015/171 Kognitiv funksjon etter hjerneslag

Forskningsansvarlig institusjon: NTNU, Vestre Viken, Oslo universitetssykehus, Haukeland sykehus, St Olavs hospital, St Olavs hospital, Universtietetsykehuset i Nord-Norge
Prosjektleder: INGVILD SALTVEDT

Prosjektleders prosjektomtale
Over 55000 nålevende nordmenn har hatt hjerneslag. Mange har kognitve symptomer som nedsatt hukommelse, språkfunksjon, vanskeligheter med å gjennomføre praktiske gjøremål. Noen blir også demente. Studien vil kartlegge hyppigheten og årsaksmekanismene til kognitive endringer etter hjerneslag og forsøke å utvikle en metode for å kunne identifisere risikopasienter tidlig. Betydning av fysisk aktivitet og etterlevelse av forebyggende medikamentell behandling og livsstilsråd vil bli undersøkt. Opp til 1000 pasienter med akutt hjerneslag fra fem ulike sykehus vil bli inkludert. Ved 3 og 18 mnd vil de bli undersøkt med tanke på mental og fysisk funksjon. Det vil også bli tatt MR av hjernen og blodprøver. Side 5 av 19 Kunnskapen fra studien vil gjøre oss i stand til å gi bedre behandling etter hjerneslag og ha betydning for planlegging av helsetjenester framover. Kunnskap fra studien gir et godt utgangspunkt for videre forskning på forebygging og behandling av kognitive endringer etter hjerneslag.

Vurdering
Vi viser til skjema for tilbakemelding av 27.4.15, vedlagt revidert informasjonsskriv.

REK anser at tilbakemeldingen er i tråd med de merknader komiteen gav i sitt utsettelsesvedtak av 24.3.15.

REK aner at formuleringen på siste side i samtykkeskrivet hvor det står at «For pasienter som ikke kan samtykke vil prøver til biobank kun benyttes til problemstillinger relatert til denne studien. « vil være dekkende for å unngå at ikke blir forsket videre på biologisk materialet fra de deltagerne som har mistet eller nedsatt samtykkekompetanse.

Etter fullmakt er det fatte slikt:

Vedtak
Med hjemmel i helseforskningsloven §§ 2,9 og 10, samt forskningsetikkloven § 4 godkjennes prosjektet.

Sluttmelding og søknad om prosjektendring
Prosjektleder skal sende sluttmelding til REK nord på eget skjema senest 01.11.2025, jf. hfl. § 12. Prosjektleder skal sende søknad om prosjektendring til REK nord dersom det skal gjøres vesentlige

endringer i forhold til de opplysninger som er gitt i søknaden, jf. hfl. § 11.

Klageadgang
Du kan klage på komiteens vedtak, jf. forvaltningsloven § 28 flg. Klagen sendes til REK nord. Klagefristen er tre uker fra du mottar dette brevet. Dersom vedtaket opprettholdes av REK nord, sendes klagen videre til Den nasjonale forskningsetiske komité for medisin og helsefag for endelig vurdering.

Med vennlig hilsen

May Britt Rossvoll
sekretariatsleder

Veronica Sørensen
Seniorrådgiver

Kopi til:lars.stovner@ntnu.no; nielskristian.thybo@vestreviken.no; sivatn@ous-hf.no; hakon.nordli@helse-bergen.no; eiliv.brenna@stolav.no; Geir.Brathen@stolav.no; Bjorn-Yngvar.Nordvag@unn.no

Region:	Saksbehandler:	Telefon:	Vår dato:	Vår referanse:
REK nord	Lill Martinsen		17.01.2020	21880
			Deres referanse:	

Torunn Askim

21880 Fysisk aktivitet og kognitiv svikt etter hjerneslag

Forskningsansvarlig: Norges teknisk-naturvitenskapelige universitet

Søker: Torunn Askim

REKs vurdering

Vi viser til søknad om prosjektendring for ovennevnte forskningsprosjekt mottatt 08.01.20. Søknaden er behandlet av sekretariatet i REK nord på delegert fullmakt fra komiteen, med hjemmel i forskningsetikkforskriften § 7, første ledd, tredje punktum. Søknaden er vurdert med hjemmel i helseforskningsloven § 11.

Endringen gjelder tillegg av prosjektmedarbeidere. Prosjektet har også lagt til et delmål. Beskrivelse av dette framgår med markerte endringer i innsendt protokoll. Delmål beskrives slik: "*To investigate the level of sedentary behaviour during hospital stay and to identify factors associated with high levels of sedentary time.*" Dette skal måles av en aktivitetsmonitor.

Ved godkjenning av prosjektet, jf. vedtaksbrev av 29.8.17. framgår det at prosjektet skal benytte data fra hovedstudien NOR-COAST, og at alle data skal overføres avidentifisert. REK legger til grunn i sin vurdering av prosjektendringssøknaden at det nå søkes om å innhente ytterligere avidentifiserte data fra hovedprosjektet, iht. omsøkte prosjektendring.

REK har ingen innvendinger til dette.

Etter fullmakt er det fattet slikt:

Vedtak

Godkjent

Med hjemmel i helseforskningsloven § 11, godkjennes prosjektendringen.

Med vennlig hilsen

May Britt Rossvoll

Lill Martinsen
seniorrådgiver

Klageadgang
Du kan klage på komiteens vedtak, jf. forvaltningsloven § 28 flg. Klagen sendes til REK nord. Klagefristen er tre uker fra du mottar dette brevet. Dersom vedtaket opprettholdes av REK nord, sendes klagen videre til Den nasjonale forskningsetiske komité for medisin og helsefag (NEM) for endelig vurdering.