Rotterdam Stroke Service

The influence of multimorbidity on rehabilitation outcomes in stroke and amputation

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Nijmegen GRAMPS study

Geriatric Rehabilitation in

AMPutation and Stroke

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GRAMPS research design

Longitudinal

Observational

Multidisciplinary

Multicenter

GRAMPS research design

Patients

- All newly admitted patients in the skilled nursing facility
- Rehabilitation after stroke or amputation
- Skilled nursing facilities from the university knowledge network elderly care Nijmegen
- Informed consent

- Stroke n=186
- Amputation n=48

Amputation

Lower limb amputation yearly in the Netherlands:

n = 3200

Caused by:

Vascular disease (68 %)

Diabetes (27 %)

Trauma (4 %)

Tumor (1 %)

Stroke

Stroke yearly in the Netherlands:

n = 41.000

80% ischemic stroke

Frail patients on admission

	Amputation		Stroke
Age	75 years		78.6 years
Multimorbididty		53%	34%
Comorbidity	Myocardial infarction	30%	18,5%
	Heart failure	27%	15%
	Peripheral vasc dis.	77%	13%
	Diabetes	33%	18%
	Stroke	30%	100%
	Maligne	9%	6%
Incontinence (Item BIpm)	Feces	3%	3%
	Urine	17%	5%

Comorbidity or multimorbidity

- Charlson Index
- 19 items
- Score for presence and severity
- Myocardial Infarction in the past, and no role of significance at this moment: no score
- Heart failure after Myocardial infarction = score
- Corrected for vascular disease and diabetes

Some limitations for this instrument

Model : univariate and multivariate

All factors in relation with the outcome

Factors with significant relation on the outcome

Factors independently associated with the outcome

Associated

- Question: which factors have a predictive value for outcome at discharge
- Calculated the influence of potential factors
- Only the most relevant factors in the model
- Which factors have independently a predictive value for the rehabilitation outcomes

Stroke multimorbidity

Patients with multimorbidity differed from the patients without multimorbidity with respect to:

- Age
- Proprioception
- Vibration sense

But not for:

- Any of the cognitive tests
- Muscle strength
- Sitting balance

Patients with multimorbidity had, on average, lower scores on outcome measures.

Stroke model 1

Balance:

Multimorbidity

Muscle strength

Interaction between muscle strength & static sitting balance

66%

Stroke model 2

Walking abilities:

Multimorbidity

Muscle strength

Interaction between muscle strength & static sitting balance

67%

Amputation model 1

Independent living situation

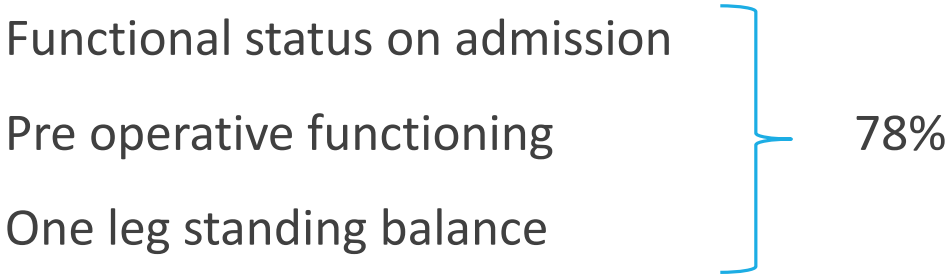
Diabetes Mellitus

Pre operative functioning

47%

Amputation model 2

Functional status after rehabilitation



Amputation model 3

Use of prosthesis

Independent walking

Phantom pain

Amputation level

56%

Amputation model 4

Timed Up & Go test

Cognitive abilities

Low amputation level

Pre-operative functional abilities

82%

Table 2. Associations for prosthetic use and univariate linear analyses for timed up-and-go test (TUG-test) after rehabilitation for lower limb amputation in skilled nursing facilities (SNFs).

	Prosthetic use			TUG-test		
	n = 19	*n* = 19		*n* = 15		
	Yes	No	*p* value	R^2	Beta	*p* value
Age (years)†	73.6	77.4	0.153	0.08	0.79	0.296
Gender (M/F)ᵡ	6/13	5/14	0.721	0.30	0.45	***0.034***
Length of hospital stay (days)	35	32	0.879	0.05	0.25	0.424
Amputation level (*n*)ᵡ			***0.009***	0.25	−23.83	0.056
- High amputation	5	13				
- Low amputation	14	6				
Impaired wound healingᵡ (%)	16	37	0.141	0.27	29.02	***0.047***
Stump painᵡ (%)	37	42	0.740	0.14	−16.48	0.177
Phantom painᵡ (%)	47	74	0.097	0.13	16.59	0.182
Multimorbidity*ᵡ (%)	53	37	0.328	0.01	1.01	0.936
CI score (%)	2	1	0.819	0.00	−0.48	0.927
Diabetes mellitusᵡ (%)	58	37	0.194	0.00	−0.24	0.985
MMSE (0–30)	27	25	0.302	0.60	−5.90	***0.001***
Clock drawing test (0–14)	13	10	0.293	0.09	−6.19	0.325
Barthel Index po (0–30)	20	15	***0.004***	0.35	−5.58	***0.021***
Barthel Index adm (0–30)	12	9	0.306	0.06	−1.69	0.409
FAI (0–35)	25	16	0.386	0.11	−0.68	0.233
FAC (0–5)	2	0	***0.002***	0.08	−4.18	0.313
One-leg balanceᵡ (%)			***0.011***	0.06	−7.88	0.389
- Not possible	11	26				
- With support	16	53				
- Without support < 10s	37	5				
- Without support > 10s	37	16				

adm, admission; CI score, Charlson Index score; FAI, Frenchay Activities Index; FAC, Functional Ambulation Categories; MMSE, Mini Mental State Examination; po, preoperative. *Multimorbidity was defined as CI score (with peripheral arterial disease and diabetes mellitus excluded) > 1; ᵡChi square test; †Students t-test; all others Mann Whitney U test.

Multimorbidity

- In this study multimorbidity has no influence on outcomes for amputation
- Other studies found influence on outcomes but used different and unstandardized instruments
- In this study Charlson Index >1
- Two or more diagnoses next to peripheral vascular diseases
- Distribution of multimorbidity equal for patients with prosthesis or without prosthesis
- Its hard to show a relation with prosthesis use

Conclusion

- Amputation small group in the Netherlands
- Possible overfitting of the models: small sample size
- It is important that nurses have insight in rehabilitation outcome, because the presence of multiple chronic diseases influences the performance of stroke and LLA patients during rehabilitation in het SNF.

References

Spruit-van Eijk M, Zuidema SU, **Buijck** BI, Koopmans RT, Geurts AC. Determinants of rehabilitation outcome in geriatric patients admitted to skilled nursing facilities after stroke: a Dutch multi-centre cohort study.

Age Ageing. 2012 Nov;41(6):746-52.

Eijk MS, van der Linde H, **Buijck** BI, Zuidema SU, Koopmans RT. Geriatric rehabilitation of lower limb amputees: a multicenter study.

Disabil Rehabil. 2012;34(2):145-50.

van Eijk MS, van der Linde H, **Buijck** B, Geurts A, Zuidema S, Koopmans R. Predicting prosthetic use in elderly patients after major lower limb amputation.

Prosthet Orthot Int. 2012 Mar;36(1):45-52.

Spruit-van Eijk M, Zuidema SU, **Buijck** BI, Koopmans RT, Geurts AC. To what extent can multimorbidity be viewed as a determinant of postural control in stroke patients?

Arch Phys Med Rehabil. 2012 Jun;93(6):1021-6.