Supplementary material to article by B. Fard et al. "Return home after dysvascular major amputation of the lower limb: A multicentre observational study in the Netherlands"

Appendix SI. Supplementary information: return home after major amputation of the lower limb.

S1. Health care system in the Netherlands and study setting

In the Netherlands, medical insurance is mandatory for all citizens, ensuring universal medical access for both primary and specialist care. This study was performed in the northern region of the Netherlands consisting of the provinces of Groningen, Friesland and Drenthe, containing 1.7 of the 16.8 million inhabitants in the Netherlands in 2013[1]. The region is relatively less densely populated (on average 207 persons per km^2) compared to the Netherlands in general (on average 498 persons per km^2). In the study region, 18.3% of the population was aged >65 years, compared to 16.8% in the total Dutch population in 2013. For the total Dutch population aged 75-84 years the annual year risk of death was estimated as 2.5-7.3% in 2013[1]. A comprehensive study of regional mortality rates in the Netherlands, notes that the provinces of Groningen and Friesland seem to show slightly lower mortality rates compared to the other parts of the Netherlands. Whereas, in Groningen and Drenthe there are a few municipalities that are relatively lower in socio-economic development, which is associated with a lower average life expectancy compared to the rest of the Netherlands[2]. A majority of the population in the study region resides in cities with a general hospital (within 5 km radius), the median distance to a general hospital is 9.4 km (compared to 6.5 km nationwide)[1], the maximum distance from the most rural town in the region to a general hospital is 38 km.

In the study region, there are 2 inpatient rehabilitation centres and 34 Skilled Nursing Facilities (SNF) offering 'geriatric rehabilitation'. In the Netherlands, inpatient rehabilitation programs are aimed at regaining ambulation, prosthesis procurement and facilitating return to independent living and comprise:

- multidisciplinary treatment (including physiotherapy, occupational therapy, social work and psychology);
- high intensity therapy (at least 1.5-2 hours per day, excluding nursing);
- certified prosthetist (on site);
- coordination by Physical & Rehabilitation Medicine (PRM) specialist (on site).

Geriatric rehabilitation takes place in dedicated wards in selected nursing homes (i.e., SNFs) aimed at facilitating return to independent or semi-independent living and comprises:

- multidisciplinary treatment (mostly physiotherapy and nursing, to a lesser extent occupational therapy, social work and psychology)[3,4];
- low intensity therapy (on average 4-5 hours per week, including nursing)[4];
- certified prosthetist and PRM specialist (consultation);
- coordination by elderly care physician.

The SNFs are distinct from nursing homes, which provide long stay care for patients (i.e., nursing and assistance with daily activities). Residential care homes provide semi-independent living, typically located in close approximation of nursing homes in order to provide home nursing up to 3-4 times a day. During acute care in hospitals, PRM specialists are consulted and advise whether patients are to be discharged to home (with outpatient rehabilitation), admitted to inpatient rehabilitation, SNF or nursing home. In the Netherlands, all citizens are entitled to receive home care when prescribed by the general physician or medical specialist and approved by the central governing body. Temporary home care may be initiated after hospital admissions, which is often provided by registered home nurses and is more focused on dedicated activities such as wound care or administering medication. On the long term, there may be need for home care for assistance with daily activities (e.g., bathing or clothing) and household shores (e.g., cleaning and groceries), which is often provided by caretaker professionals and organised on a municipality level. The government policy aims to enable the elderly population to remain in their respective homes as long as possible. There are limits however, in what home care services are expected to provide: typically, when more than 3 times a day 15-30 minutes of care is required, it is deemed unfeasible for individuals to remain home. Home adaptations for physically challenged persons are financed through municipality funds. With the aim of rendering residents' homes accessible from the outside (e.g., level entrance) and inside (e.g., stairs lift chair), given that the total costs of adaptations do not exceed a certain percentage of the estimated worth of the individual's home (either private homeowners or tenants).

References:

1. Central Bureau for Statistics (CBS). StatLine. [cited 2017 Sep 25]. Available from: https://www.cbs.nl/en-gb/figures
2. Loke R, De Jong A. Regionale verschillen in sterfte verklaard. 2013. Available from: https://www.cbs.nl/nl-nl/achtergrond/2013/07/regionale-verschillen-in-sterfte-verklaard
3. Eijk MS, van der Linde H, Buijck BI, Zuidema SU, Koopmans RTCM. Geriatric rehabilitation of lower limb amputees: a multicenter study. Disabil Rehabil 2012;34: 145–150.
4. Fortington LV, Rommers GM, Wind-Kral A, Dijkstra PU, Geertzen JHB. Rehabilitation in skilled nursing centres for elderly people with lower limb amputations: a mixed-methods, descriptive study. J Rehabil Med 2013; 45: 1065–1070.

Appendix SI. *conts.*

S2. Details for search strategy, inclusion/exclusion and definition of comorbidity variables.

Inclusion	**ICD-9 code**	**Comorbidity**	**ICD-9 code**
Amputation		Myocardial Infarction	410
Disarticulation of ankle	84.13	Heart failure	428.xx
Disarticulation of ankle through malleoli of tibia and fibula	84.14	Cerebrovascular disease[c]	
Other amputation below knee	84.15	Subarachnoidal hemorrhage	430
Disarticulation of knee	84.16	Intracerebral hemorrhage	431
Amputation above knee	84.17	Other intracranial hemorrhage	432
Disarticulation of hip	84.18	Occlusion and stenosis of precerebral arteries	433
Lower limb amputation, not specified	84.10	Occlusion of cerebral arteries	434
Peripheral arterial disease (PAD)		Renal disease[c]	
Atherosclerosis of the extremities, not specified	440.20	Acute glomerulonephritis	580
Atherosclerosis of the extremities with claudication	440.21	Nephrotic syndrome	581
Atherosclerosis of the extremities with rest pain	440.22	Chronic glomerulonephritis	582
Atherosclerosis of the extremities with ulceration	440.23	Nephritis and nephropathy, not specified	583
Atherosclerosis of the extremities with gangrene	440.24	Acute renal failure	584
Other peripheral vascular disease	443.xx	Chronic renal failure	585
Diabetes Mellitus	250	Renal failure, unspecified	586
Exclusion		Hemodialysis[a,b]	
Malignant neoplasm of bone and articular cartilage	170.xx	Pulmonary disease[c]	
Malignant neoplasm of connective and other soft tissue	171.xx	Chronic obstructive pulmonary disease	491
Malignant melanoma of skin	172.xx	Asthma	493
Traumatic amputation of leg(s)	897.xx	Emphysema	492
Crushing injury of lower limb	928.xx	Alcohol abuse	350.0-3
Reflex sympathetic dystrophy of the lower limb	337.22		
Certain congenital musculoskeletal deformities	754.xx		
Other congenital musculoskeletal anomalies	756.xx		

Note. First, extensive search terms were applied including ICD-9 codes, locally used operation/procedure codes and free text to identify all amputations within the time frame 2012, January – 2013, December. Second, the exclusion criteria were applied. Third, sporadic cases clearly not related to PAD or DM (e.g., fulminant infection in otherwise healthy adults) were additionally excluded.

[a] No ICD codes, using free text in patients' records only.

[b] At the time of index amputation.

[c] Dichotomized as yes/no if any of the underlying diagnoses were present.

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S3. Multivariate analyses of discharge to home following hospital admission for amputation, with age as a continuous variable.

	Multivariate logistic regression			
	β	SE	OR (95% CI)	p
Constant	2.137	0.93		0.022
Age (continuous)	-0.062	0.01	0.94 (0.92 to 0.97)	<0.001
Living with partner	0.995	0.37	2.71 (1.31 to 5.59)	0.007

Note. Logistic regression model with backwards elimination, Nagelkerke R^2 for model fit = 0.18. CI: confidence interval; OR: odds ratio.
Logistic regression equation: $Log(Y) = \beta_0 + \beta_1 X_1 + \cdots \beta_k X_k$
Example: for a 60 year old person: $Log\,(Y) = 2.137 + (-0.062 \times 60) = -1.583\,;\; e^{-1.583} = 0.21$
That is, independently of living with partner, a 60 year old person has OR of 0.21 of discharge to home compared to the youngest person.

S4. Multivariate analyses of return to home within 1 year of amputation, with age as a continuous variable.

	Multivariate logistic regression			
	β	SE	OR (95% CI)	p
Constant	4.834	1.75		0.006
Age (continuous)	-0.070	0.02	0.93 (0.89 to 0.97)	0.002
Discharge destination				0.003
Inpatient rehabilitation	2.641	0.79	14.02 (2.94 to 66.67)	0.001
Skilled nursing facility	1.326	0.57	3.77 (1.24 to 11.49)	0.020
Nursing home	Ref.			

Note. Logistic regression model with backwards elimination, Nagelkerke R^2 for model fit = 0.29. CI: confidence interval; OR: odds ratio.
Logistic regression equation: $Log(Y) = \beta_0 + \beta_1 X_1 + \cdots \beta_k X_k$
Example: for a 75 year old person: $Log\,(Y) = 4.834 + (-0.070 \times 75) = -0.416\,;\; e^{-0.416} = 0.66$
That is, independently of discharge to inpatient rehabilitation, skilled nursing facility or nursing home, a 75 year old person has OR of 0.66 of return to home within 1 year compared to the youngest person.