

Optimizing the clinical pathway for patients with Lower Limb Amputation (LLA)



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Introduction

Patients with LLA have a high 30 days and 1 year mortality rate. Hvidovre Hospital has successfully implemented a new standard treatment reducing the mortality rate. Standards for fluid administration, transfusions, oxygen supplementation, pain treatment, early mobilization and physiotherapy were enforced. Therefore we did similar changes to optimize the treatment and reduce mortality rate.

Aim

The aim of study was to identify interventions to optimize the pathway for patients with LLA.

Method

A retrospective audit of 142 patients with LLA between March 2015 and December 2016 was undertaken using their medical records. The patient-characteristics, status of treatment and care, dates for admission, ambulation, training, discharge, re-admission and death were collected. Results were described with descriptive statistics.

The patients' perspective were examined in a qualitative focus group-meeting with five patients and health-care workers from the hospital unit and primary health-care.



Table 1: Demographics of the lower limb amputee patients in the study¹

	All ¹ (n=142) ^a	BKA ² (n=26) ^a	AKA ³ (n=102) ^a	REA ⁴ (n=14) ^a
Age at admission, mean (SD) ^b	72 (12) ^a	67 (11) ^a	75 (11) ^a	60 (10) ^a
Gender, M/F ^c	91 (64)/51 (36) ^a	21 (81)/5 (19) ^a	61 (60)/41 (40) ^a	9 (64)/5 (36) ^a
Co-morbidities at admission ^d				
Diabetes mellitus ^e	71 (50) ^a	18 (69) ^a	46 (45) ^a	7 (50) ^a
Renal impairment/chronic kidney disease ^e	31 (22) ^a	5 (19) ^a	25 (25) ^a	1 (7) ^a
Vascular disease ^e	128 (90) ^a	23 (88) ^a	91 (89) ^a	14 (100) ^a
Vascular surgery ^e	73 (51) ^a	22 (85) ^a	49 (48) ^a	2 (14) ^a
Vascular disease + Diabetes mellitus ^e	69 (49) ^a	17 (65) ^a	45 (44) ^a	7 (50) ^a
Number of co-morbidities at admission of the above ^e				
0-1 ^e	40 (28) ^a	2 (8) ^a	34 (33) ^a	4 (29) ^a
2 ^e	50 (35) ^a	9 (35) ^a	31 (30) ^a	10 (71) ^a
3-4 ^e	52 (37) ^a	15 (58) ^a	37 (36) ^a	-
ASA scores ^f				
1-2 ^g	5 (4) ^a	2 (8) ^a	3 (3) ^a	-
3 ^g	100 (70) ^a	21 (81) ^a	68 (66) ^a	11 (79) ^a
4 ^g	37 (26) ^a	3 (11) ^a	31 (31) ^a	3 (21) ^a

^aBKA: below-knee amputation (Transfemoral); AKA: above-knee amputation (Transfemoral); REA: Re-amputation and revision^h
^bE: Female; M, male; ASA: American Society of Anesthesiologists rating (1-5);^h
^cData are presented as mean (SD) or as number (%).

Table 2: Complications, readmission, mortality and length of stay after lower extremity amputation

	All (n=142)	BKA (n=26)	AKA (n=102)	REA (n=14)
Complication				
Infections ¹	64 (45)	9 (35)	53 (52)	2 (14)
Stump problems ²	42 (30)	14 (54)	26 (25)	2 (14)
Re-operation	17 (12)	5 (19)	11 (11)	1 (7)
Medical ³	68 (48)	19 (73)	46 (45)	3 (21)
Pain ⁴	41 (29)	11 (42)	25 (20)	5 (36)
Transferred to Intensive Care Unit	22 (15)	3 (3)	19 (18)	-
Rapid Response Team (RRT) called	12 (8)	3 (3)	9 (9)	-
Readmission				
30-days post-amputation	19 (13)	5 (19)	14 (14)	-
1-year post-amputation	49 (35)	9 (35)	35 (34)	5 (36)
Mortality				
30-days post-amputation	20 (14)	2 (8)	18 (17)	-
1-year post-amputation	43 (30)	4 (15)	38 (37)	1 (7)
Length of stay, days (IQR)	10 (6 to 16)			
Length of stay, days (IQR), adjusted⁵	14 (8 to 23)			

BKA: below-knee amputation (Transfemoral); AKA: above-knee amputation (Transfemoral); REA: Re-amputation and revision
¹Pneumonia, Urinary Tract Infection (UTI), Sepsis; ²Wound infection, wound problems; ³Poorly regulated diabetes, peripheral arterial diseases
⁴Exceeding normal pain threshold levels; ⁵Patients transferred to other department (n=13) or other hospitals (n=33) or died during hospitalization (n=9) and was removed prior to analysis
 Note: Infection-free for last 22 % Pneumonia, 15 % UTI and 29 % Sepsis

Table 3: In hospital fluid, oxygen, mobilization and physiotherapy treatment of lower limb amputee patients

Treatment	All (n=142)	BKA (n=26)	AKA (n=102)	REA (n=14)
Within 24 hours, n (%)				
Fluid	125 (88)	24 (92)	89 (88) ¹	12 (84)
Oxygen	82 (58)	15 (58)	62 (61) ²	5 (31)
Mobilized	66 (46)	12 (46)	44 (43) ³	10 (77)
No. patients who had all of the above		None	None	None
IV fluid within 24h, [mL], mean, (SD)	1878 (784)	1888 (547)	1909 (830)	1654 (861)
During hospitalization, n (%)				
Physiotherapy	108 (76)	23 (88)	75 (74)	10 (70)
Mobilized to chair	118 (83)	23 (88)	83 (82) ⁴	12 (85)
Time, days (median, IQR)				
Time from surgery to physiotherapy ⁵	1 (1-2)	2 (1-3)	1 (1-2)	2 (1-4)
Time from surgery to chair mobilization ⁶	2 (1-2)	2 (1-3)	2 (1-2)	0 (0-1)

¹Missing data n = 13; ²Missing data n = 23; ³Missing data n = 1; ⁴Missing data n = 19; ⁵Based on no of patients who received physiotherapy (23/75/10); ⁶Based on no of patients who were mobilized to chair (23/83/12)

Results

Quantitative results

- The patients had a mean age of 72 years, the majority were men (64%). In total 90% had vascular diseases and 50% suffered from diabetes (table 1)
- The number of 30-day post re-admission was 13% and almost tripled during the first year (35%)
- The mean mortality was 14% and 30 % for 30-days and 1-year respectively (table 2)
- No patients followed all elements of the standard treatment, 88 % received fluid within the first 24 hours, 58% of the patients received additional oxygen and 46% were mobilized within the 24-hour time-frame
- The number of days it took to get physiotherapy or be mobilized was 1-2 days (median) with the range margin being 0-4 days
- The number of patients mobilized to chair was higher than “mobilized to chair within 24hours”, since more patients could be mobilized when time exceeded 24 hours (table 3)

Qualitative results

Patients were focused on the importance of training for more reasons:

- Being able to manage daily activities
- Mobilization and ability to walk was connected with positive influence on social interactions
- Training was associated with hope for the future and a better quality of life

All patients experienced big challenges in the transfer to primary health-care:

- When to start training?
- How to get walking aids, a wheelchair and other aids?

We need to standardize treatment, mobilization and training
The Patients need a better support in the transfer from hospital to primary health-care

Implication for practice

- We systematically follow the standard treatment
- We document standard treatment more systematically using standard preformulated phrased text
- We are focused on early ambulation and training
- We are now optimizing the pathway for the patients in cooperation with primary health-care