QUALITY OF LIFE OUTCOMES AND PSYCHOSOCIAL OUTCOMES IN LOWER LIMB AMPUTEES: A LONGITUDINAL PROSPECTIVE STUDY

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Introduction

Amputation leads to permanent disability and brings about dramatic changes in an individuals life in all aspects of their daily functioning. The loss of a limb, especially in traumatic events such as traffic or industrial accidents, results in significant psychological adjustment. This surgery is life-changing and shorter residual limbs (above knee amputation AKA) are known to place greater physiological and psychological strain on patients than longer residual limbs (below knee amputation BKA) (Penn-Barwell, 2011).

There is little research in Australian non-veteran populations on specific effects on quality of life and psychosocial constructs and how these results may differ for patients with below knee amputations (BKA) and below knee amputations (BKA).

There is growing evidence internationally regarding rehabilitation outcomes in amputees. Research suggests that patients with traumatic limb amputations vary from the general population of amputees due to younger age, higher expectation of return to life roles including work and other confounding factors such as concurrent injuries. It is important to understand rehabilitation outcomes in amputees in Australia in order to ensure holistic reintegration and participation of amputee patients into the community to enable patients to regain or maintain QoL.

Aims

This study aims to look at how patients with distal major lower limb amputation perform compared with those patients who have a more proximal lower limb amputation on quality of life and psychosocial outcomes.

Methodology

Study Design

Prospective Longitudinal study

Settings and study participants

Consecutive patients admitted to Epworth HealthCare Hawthorn (Outpatient or Inpatient) during the period 06/01/2014 to 08/07/2021.

Inclusion and exclusion criteria

Inclusion criteria - any patient admitted to the inpatient and/or outpatient department during the above period at Epworth HealthCare Hawthorn. The total number of patients recruited n = 53 patients.

Exclusion criteria - patients who had missing data on all 9 outcome variables described below and patients who had upper limb loss

- 3 patients —> trans-humeral amputees.
- 12 patients —> had no data.

After excluding the above patients, 38 patients were included in the study analysis - 19 patients with below knee amputation (BKA), 12 patients with AKA (above knee amputation) and 7 patients with other lower limb amputations (3 bilateral BKA, 1 Hip disarticulation, 3 TKA (through knee amputation)).

Procedure

The self-reported questionnaires administered at 4 months, 8 months, 12 months, 2 years, 5 years and 10 years following loss of their limb.

The original Human Research Ethics Committee approval (HREC reference number RES-19-0000434E).

Measures

Data collection was through self reported questionnaires

1. Short form McGill Pain Questionnaire
2. SF-36 (36 item Short Form survey) version 1
4. PCL-C (PTSD Checklist - Civilian Version)
5. HADS (Hospital Anxiety and Depression Scale)
6. PEQ (Prosthetic use and satisfaction)

The total number of sub scales = 9

Demographic measures were collected including type of amputation (traumatic vs non traumatic), age at amputation and gender were assessed within the subcategories of AKA, BKA and other. QoL and psychosocial outcome measures were analysed for AKA and BKA groups. A comparison between level of amputation and two time points (8 months and 5 years) was conducted.

STATISTICAL ANALYSIS

Hierarchical or mixed model analysis was employed for the main analysis. Mixed models analysis includes all those patients with data on at least one of the two timepoints being studied.

Results

Demographics

At all three levels of amputation patients were predominantly male. There was no statistical difference between the groups.

The groups also did not differ in terms of proportion of traumatic amputations, or mean age at amputation.

For the 38 patients, the main etiology of amputation was traumatic (n = 33, 86.8%), followed by non-traumatic (n = 5, 13.2%).
The study was primarily concerned with BKA and AKA; thus the analytic sample consisted of 31 patients.

It is important to note that Epworth Hawthorn Amputee Service is a Private Amputee Service in Melbourne and primarily sees privately funded patients through Workcover and Transport Accident Commission (TAC). There are some privately funded patients (admitted for non-traumatic prosthetic training) although this is rare. The patients were younger at age of amputation (mean - 47.8 years) and predominantly male (mean - 80.7%).

Demographics - Table 1.0

	BKA (n=19)		AKA (n=12)		Other (n=7)	
	n	%	n	%	n	%
Male	15	78.95	10	83.33	6	85.7
	n	%	n	%	n	%
Etiology = traumatic	15	78.95	11	91.67	7	100.0
	mean	sd	mean	sd	mean	sd
Age at amputation (in years)	46.34	15.79	49.97	14.49	49.99	20.96

Comparisons by level of amputation and time-point

Comparison of level of amputation and time-point was undertaken using data from patients collected at 8 months and 5 years due to small sample size and the large amount of missing data for other time-points. One outcome variable, PTSD Checklist - Civilian Version, exhibited a statistically significant interaction (p = 0.025) between amputation level and time-point.

Outcome variables for which interaction between level of amputation and/or time-point reaches statistical significance

PCL - PTSD CHECKLIST CIVILIAN VERSION
As shown in Table 1.1, the BKA overall and AKA overall PTSD means were only slightly different, being very slightly lower for AKA, and the difference between them was not statistically significant (p =0.665).

There was a statistically significant (p = 0.047) increase in the overall PTSD means across time. PTSD decreased across time for BKA, but increased across time for AKA. The interaction between level of amputation and time-point was statistically significant (p = 0.025).

PTSD checklist - Table 1.1

Grouping	mean	95% CI
BKA overall	37.91	29.13 – 46.69
AKA overall	35.01	24.26 – 45.76
F(1, 18.00) = 0.193, p = 0.665		
8 months overall	33.60	26.65 – 40.55
5 years overall	39.32	32.36 – 46.27
F(1, 1.00) = 174.64, p = 0.047		
BKA – 8 months	40.43	31.64 – 49.21
BKA – 5 years	35.39	26.57 – 44.22
AKA – 8 months	26.77	16.01 – 37.54
AKA – 5 years	43.23	32.48 – 53.99
F(1, 1.00) = 617.44, p = 0.025		

SHORT-FORM 36 (SF-36) - EMOTIONAL WELLBEING
As shown in table 1.2, the BKA overall SF-36 Emotional Wellbeing mean was higher than that for AKA, but the difference between them was not statistically significant (p = 0.189). Overall SF-36 emotional wellbeing significantly increased over time, regardless of level of amputation (p = 0.037).

SF-36 Emotional Wellbeing -Table 1.2

Grouping	mean	95% CI
BKA overall	77.19	68.15 – 86.23
AKA overall	68.33	58.06 – 78.61
F(1, 16.16) = 1.88, p = 0.189		
8 months overall	66.72	58.24 – 75.20
5 years overall	78.80	69.62 – 87.98
F(1, 52.94) = 4.57, p = 0.037		

PROSTHESIS EVALUATION QUESTIONNAIRE (PEQ) - SOCIAL BURDEN
As shown in Table 1.3, the overall BKA PEQ social burden mean was lower than that of AKA, although the difference between them was not statistically significant (p = 0.137). Overall mean PEQ social burden score significantly decreased between 8 months and 5 years, this decrease is statistically significant (p = 0.007).

PEQ - Social burden - Table 1.3

Grouping	mean	95% CI
BKA overall	61.44	46.88 – 76.00
AKA overall	78.48	60.65 – 96.31
F(1, 18) = 2.42, p = 0.137		
8 months overall	84.29	72.78 – 95.80
5 years overall	55.63	44.12 – 67.14
F(1, 1.001) = 7545.41, p = 0.007)		

Outcome variables for which interaction between level of amputation and/or time-point is not statistically significant

1. Prosthesis Evaluation Questionnaire (PEQ) Appearance
2. Prosthesis Evaluation Questionnaire (PEQ) - Wellbeing
3. Short Form 36 (SF-36) Social Functioning
4. Hospital Anxiety And Depression Scale - Anxiety
5. Hospital Anxiety And Depression Scale - Depression
6. McGill Short Form

Conclusions

This study shows that emotional wellbeing and overall burden of prosthetic use improved over time, regardless of level of amputation. Compared to AKA those with BKA show significant improvements in PTSD scores. Similar results are also demonstrated in other variables however they did not reach statistical significance.

We recommend future research should look at repeating and extending this study with a larger amputee population and more complete data. It would also be highly interesting to look at how pain and pain medication usage impacts these variables. Further studies could also review the impact of targeted muscle reinnervation on quality of life and psychosocial outcomes.

REFERENCES
Penn-Barwell, J.G. Outcomes in lower limb amputation following trauma: A systemic review and meta-analysis. Injury. 2011. 42(12):1474-1479