

Permissive weight bearing in trauma patients with peri- and intra-articular fractures of the lower extremities

Citation for published version (APA):

Kalmet, P. (2022). *Permissive weight bearing in trauma patients with peri- and intra-articular fractures of the lower extremities*. [Doctoral Thesis, Maastricht University]. Maastricht University. <https://doi.org/10.26481/dis.20221006pk>

Document status and date:

Published: 01/01/2022

DOI:

[10.26481/dis.20221006pk](https://doi.org/10.26481/dis.20221006pk)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
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Summary

This dissertation focuses on: 1) the current state of practice among surgeons in the Netherlands regarding post-treatment weight bearing protocols 2) the current economic burden regarding non- or restricted weight bearing 3) a comprehensive protocol for permissive weight bearing and 4) the (cost) effectiveness of permissive weight bearing versus non- or restricted weight bearing (current guidelines).

As mentioned in the introduction (**chapter 1**), the permissive weight bearing protocol has been conceptualized as a new aftercare mobilization regimen to optimize rapid clinical recovery and the restoration of function and functionality in surgically treated trauma patients with peri- and intra-articular fractures of the lower extremities. Since 60 years, the current paradigm of aftercare treatment in surgically treated trauma patients with peri- and intra-articular fractures of the lower extremities has not changed, namely non- or restricted weight bearing during 6-12 weeks. However, studies substantiating the non- or restricted weight bearing protocol are lacking. In addition, studies comparing permissive weight bearing versus non- or restricted weight bearing are scarce. Therefore, more evidence is needed regarding the permissive weight bearing protocol.

In **chapter 3**, a web-based survey among members of the Dutch Trauma Society and Dutch Orthopaedic Society is presented, identifying the most commonly applied protocols in terms of the post-operative initiation and level of weight bearing in patients with tibial plateau fractures and the surgeons reasoning behind this choice. One hundred and eleven surgeons responded to the survey; 72.1% of the respondents recommended starting weight bearing earlier than the 12 weeks recommended by the AO guideline (current guideline); 11.7% recommended starting weight bearing immediately, 4.5% after 2 weeks and 55.9% after 6 weeks. Moreover, 88.7% of the respondents reported deviating from their own local protocol. There is little consensus about the definition of 100% weight bearing and how to build up weight bearing over time. This study demonstrates that consensus about the weight bearing aftercare for tibial plateau fractures is limited. A large majority of surgeons do not follow the AO guideline or their own local protocol.

In **chapter 4**, in a prospective cohort study, the cost of illness in surgically treated trauma patients with peri- and/or intra-articular fractures of the lower extremities was estimated through a bottom-up method. The Dutch EQ-5D-5L questionnaire was used to calculate utilities while Lower Extremity Functional Scale (LEFS) scores were used as a measure of Activities of Daily Living (ADL). Subgroup analyses were performed to determine the influence of work status. Furthermore sensitivity analyses were performed to test the robustness of the results. Total average societal costs were

€9,836.96 over six months. Unexpectedly, total societal and healthcare costs were lower for patients with a paid job relative to patients without a paid job. The ADL was, respectively 10.4 at baseline and 49.5 at 26 weeks post-surgery treatment. The Quality of life (QoL) at baseline was 0.3 and at 26 weeks post-surgery treatment it was 0.7. These findings are indicative of a significantly improved ADL and QoL ($p < 0.05$) over time.

In **chapter 5**, the newly designed permissive weight bearing protocol presented in chapter 1 was implemented in a patient population from Adelante Rehabilitation Center in Hoensbroek, the Netherlands. The protocol, designed as a new aftercare mobilization regimen within the upper boundary of the therapeutic bandwidth, yet safe enough to avoid overloading, has been further elaborated in this chapter. The first experience in 150 surgically treated trauma patients with peri- and/or intra-articular fractures of the pelvis and lower extremities has been investigated. The study showed that the median time to full weight bearing was 12.0 weeks [IQR 6.8, 19.2]. The complication rate during rehabilitation was 10%, which is comparable to the complications rates in the literature.

In **chapter 6**, quality of life and pain, and number of complications in patients with surgically treated tibial plateau fractures who followed a permissive weight bearing (PWB) regime, relative to those that followed a restricted weight bearing (RWB) regime were compared. This cohort study included 91 patients with a tibial plateau fracture (31 and 60 patients in the PWB and RWB groups respectively). No between-group differences in either age or gender were found. However, a significant difference in fracture type was found between groups, ($p = 0.04$). No differences were found in either patient-reported SF-12 (quality of life) or VAS scores (pain) between the PWB group and RWB group. Time to full weight bearing was significantly shorter in the PWB than in the RWB group, i.e., 14.7 versus 20.7 weeks, ($p = 0.02$). No differences were found regarding postoperative complications between the PWB and the RWB groups, i.e., 6.5% versus 10.0%, respectively.

In the study reported in **chapter 7**, the aim was to investigate the effectiveness of a PWB in surgically treated trauma patients with peri- and intra-articular fractures of the lower extremities. This study reports on patients' self-perceived outcome levels regarding activities of daily living (ADL), quality of life (QoL), pain and weight bearing compliance, in comparison to restricted weight bearing (RWB), over a 26-week post-surgery follow-up period. This study included 106 trauma patients ($N = 53$ in both the PWB and RWB groups). Significantly better ADL and QoL were found in the PWB group compared to the RWB group. There were no differences in postoperative complication rates between the PWB and RWB groups.

In the study reported in **chapter 8**, the cost-effectiveness and the cost-utility of the PWB protocol was compared to the standard RWB protocol from both a societal and a hospital perspective. This prospective comparative cohort study included surgically treated trauma patients with peri- and/or intra-articular fractures of the lower extremities followed by PWB or RWB. Costs, Activities of Daily Living (ADL) and quality of life were measured during 26 weeks (at baseline, 2, 6, 12 and 26 weeks post-surgery). Cost per quality adjusted life year (QALY) gained (cost-utility) and cost per ADL or Life Years (cost-effectiveness) were estimated. This study included 106 trauma patients (N=53 in both the PWB and the RWB-group). There were no group differences in baseline characteristics. Costs were lowest for the PWB group (€9,379.45 vs. €9,836.96) during 26 weeks post-surgery.