

## ORIGINAL ARTICLE

**Loss of liver transplant surgeons into alternate career paths**

Michael Thomas,<sup>1</sup> Martin Angele,<sup>1</sup> Manfred Stangl,<sup>1,2</sup> Markus Rentsch,<sup>1</sup> Sebastian Pratschke,<sup>1</sup>  
Joachim Andrassy,<sup>1,2</sup> Karl-Walter Jauch<sup>1</sup> and Markus Guba<sup>1,2</sup>

1 Department of Surgery, University of Munich, Großhadern, Germany

2 Transplant Center, University of Munich, Großhadern, Germany

**Keywords**

academic surgeons, career satisfaction, careers in transplantation, surgical training in transplantation.

**Correspondence**

Prof. Dr. med. Markus Guba,  
Klinik für Allgemeine-, Viszeral-,  
Transplantations-, Gefäß- und  
Thoraxchirurgie, Marchioninistrasse 15,  
81377 Munich, Germany.  
Tel.: +49 89 44007 3964;  
fax: +49 89 44007 8775;  
e-mail: Markus.Guba@med.uni-muenchen.de

**Conflicts of Interest**

The authors have declared no conflicts of interest.

Received: 6 February 2014

Revision requested: 26 March 2014

Accepted: 24 June 2014

Published online: 22 August 2014

doi:10.1111/tri.12390

**Background**

In Germany, around 1200 liver transplant procedures are performed annually [1]. At present, transplant surgery has not reached specialty status and remains a subdomain of general surgery in academic hospitals. There are minimal specialized training opportunities in transplantation, and training in transplant surgery is mainly provided as part of generalized surgical training. Dedicated academic positions for transplant surgeons are also very rare, leading to a high percentage of surgeons leaving transplantation surgery shortly after their training, before reaching a high level of proficiency.

Besides the futile investment of time and effort, this structure carries several additional problems: (i) For most surgeons, transplantation medicine is considered a minor

**Summary**

In Germany, long-term commitment of surgeons to transplantation is rare. Most surgeons leave transplant surgery after a short stint and follow careers in other surgical fields. This rapid turnover of liver transplant surgeons may result in poor resource utilization and potentially compromise patient safety. In this report, we have analyzed the caseload and the careers of 25 surgeons in liver transplantation over a period of 22 years. The median time in liver transplantation was short. Of all surgeons who engaged in liver transplantation, the median time was 3.5 years. Surgeons who completed their training remained in the field for 7 years. Surgeons who prematurely stopped their training remained for 2 years. Individual total caseloads of transplant surgeons were relatively low. The median number of procedures was 40 for all surgeons, 153 for currently active surgeons, 51 for surgeons who completed training, 27 for surgeons currently in training, and a median of four liver transplantations for surgeons who prematurely stopped liver transplantation. The vast majority (75%) of surgeons prematurely quit liver transplantation to follow alternate surgical careers. Structural changes in academic transplant surgery have to be made to facilitate long-term commitments of interested surgeons and to avoid “futile” transplant careers.

matter compared to other surgical fields. (ii) The clinical focus of transplant surgeons lies not on transplantation, but on more broadly applicable surgical fields. (iii) Problems in transplantation medicine, which require a long-term commitment and have a long-term perspective, are not encountered (iv) Due to the lack of clinical engagement, the role of a transplant surgeon as a comprehensive caregiver may change to a provider of a technical service. (v) Individual experience of transplant surgeons may be too small to provide optimal outcomes. (vi) The lack of reasonable career options may result in a shortage of young surgeons who aspire to a transplant position.

The aim of this review of 25 surgical careers at our institution is to describe and discuss the problem of a high turnover of transplant surgeon within the current German academic medical system.

**Methods**

The careers of 25 general surgeons who performed liver transplantation at our institution between 1991 and 2013 were analyzed. A total of 729 liver transplantation procedures were performed during this interval of time. All, but one surgeon, were trained in liver transplantation at our institution.

Procedures and operating teams were derived from the primary operative reports and supplemented by external operative documentation in cases when a surgeon had performed liver transplant procedures elsewhere during his career. Procedures by the primary surgeon or by the responsible surgeon (while assisting the case) were counted. Current positions of individual surgeons are known by personal communication.

Data are presented as the median (minimum–maximum).

Basic statistical analysis was performed with GraphPad Software Inc., La Jolla, CA, USA. Significance was determined by one-way ANOVA using the Kruskal–Wallis test.

**Results**

At present, the transplant team consists of four staff surgeons who are primarily responsible for all aspects of liver transplantation. In addition, there are four general surgeons, including one transplant fellow, that are in training for liver transplantation.

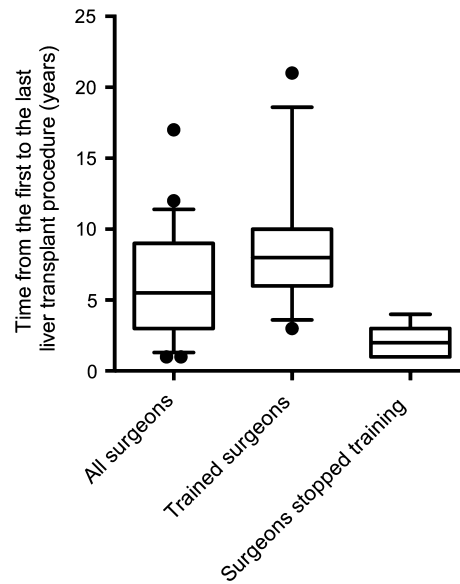
In the past, eight surgeons were trained in liver transplantation, but stopped liver transplantation before they independently performed the procedure. Nine surgeons performed liver transplantation independently, but dropped out of liver transplantation prematurely.

**Duration of transplant careers**

The duration of transplant careers was examined with respect to the level of training. Overall, the duration of transplant careers is relatively short and varies significantly between surgeons who finished their training and those who stopped their training early in order to follow alternate surgical careers. The median time from the first to the last liver transplantation was 3.5 years for all surgeons, 7 years for surgeons who completed training, and 2 years for surgeons who prematurely stopped training (Fig. 1).

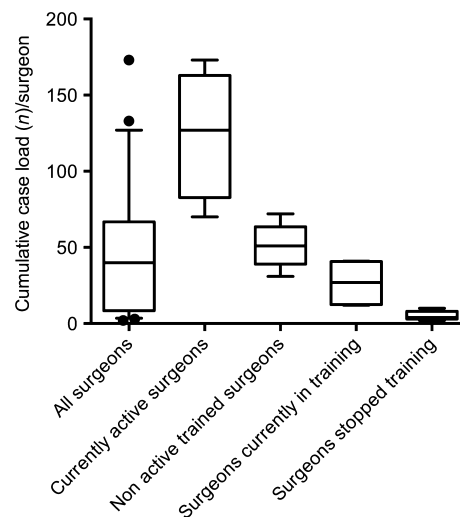
**Caseloads of liver transplant surgeons**

Individual total caseloads of transplant surgeons were relative low. The median number of procedures was 40 for all surgeons, 153 for currently active surgeons, 51 for surgeons who completed training, 27 for surgeons currently

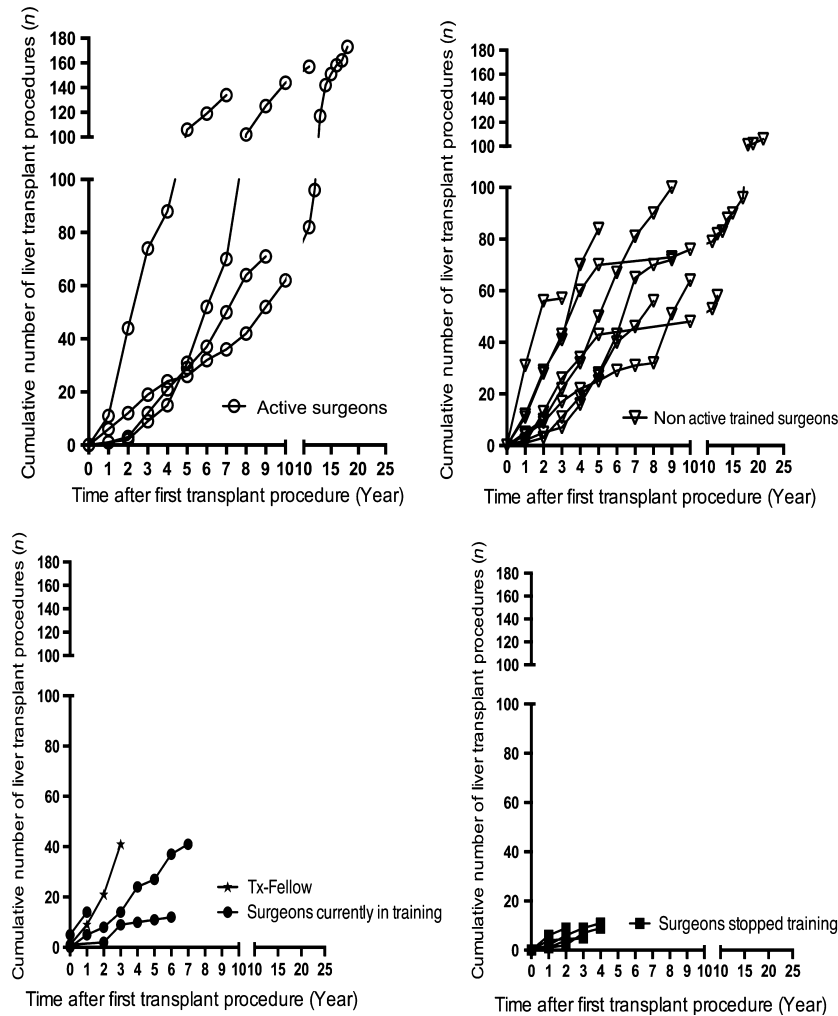


**Figure 1** Time from the first to the last liver transplant procedure in years.

in training, and a median of four liver transplantations for surgeons who prematurely stopped liver transplantation (Fig. 2). In total, only five of the 13 fully trained, independent surgeons have individually performed more than 100 liver transplant procedures. Three of the five are currently active surgeons (Fig. 3a). The average caseload per surgeon per year significantly differed between trained surgeons and surgeons who stopped liver transplantation prematurely. For all surgeons, the median frequency was seven procedures per year, 13 procedures for currently active liver transplant surgeons, seven procedures for nonactive trained surgeons, three procedures per year for surgeons who



**Figure 2** Cumulative case load of liver transplantation (n)/surgeon.



**Figure 3** Cumulative number of liver transplants per individual surgeon over time. Open circles represent still active surgeons, open triangles represent nonactive full-trained surgeons, full circles triangles are surgeons in transplant training (star represents the Tx-fellow), and full squares indicate surgeons who stopped liver transplantation training before they gained proficiency level.

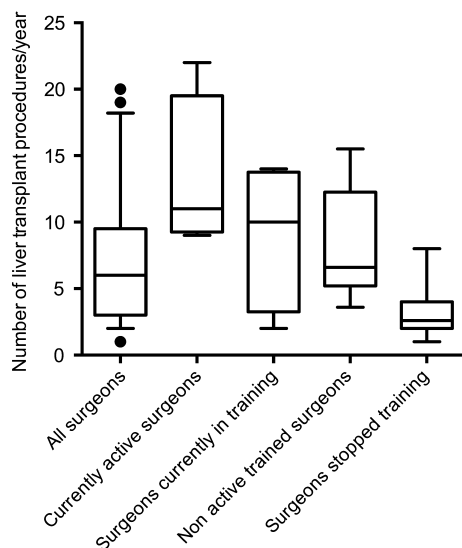
stopped training, and 10 procedures for surgeons currently in training (See Fig. 4). For the currently active transplant fellow, the median frequency was 12 liver transplants per year. The results reveal that the median caseload of surgeons who are trained in dedicated fellowship programs was markedly higher as compared to surgeons who received training simply as part of general surgical training (Fig. 3a and c). Low annual caseloads from the beginning of training generally correlated to a premature stop in liver transplant training (Figs 3d and 4).

**Alternative careers of surgeons after liver transplantation**

Of the surgeons who never completed their liver transplant training, two are chairmen at an academic surgical

department without an active liver transplant program, four are surgical staff surgeons without any involvement in liver transplantation, and one surgeon works in private practice.

Of the nine fully trained transplant surgeons who independently performed liver transplantation, one became head surgeon of a university hospital with a liver transplant program, seven became head surgeons of a nontransplant community hospital, and one became chairman at our institution. He has stopped his clinical career 4 years prior to his regular retirement (emeritus Professor) and is now the medical CEO of our academic institution. Of note, each, but one, of the nine trained transplant surgeons held the position of surgical director of liver transplantation at some point in their career.



**Figure 4** Number of liver transplant procedures/year.

## Discussion

Liver transplantation has evolved from an experimental procedure to the standard of care for end-stage liver disease. Given the evolution of this field and the technical demands of transplantation surgery, surgeons all over the world have specialized in transplant surgery in order to achieve better results. This development has not yet been adopted by the German Surgical Society. On the contrary, specialization in transplant surgery among surgeons is rare, and academic general surgeons perform most transplant surgeries, often with a clinical focus outside transplantation. Moreover, dedicated academic positions for transplant surgeons are scarce. Therefore, transplantation will often lead a surgeon to a dead-end academic career and only very rarely to one of the sought-after academic chairman position. Due to the limited career options, only a minority of surgeons who perform transplants actually commit to a dedicated career in transplantation, while far more surgeons leave transplantation and follow alternate career options in nonacademic, nontransplant hospitals.

This single-center analysis of the careers and the case-loads of individual surgeons sheds some light to this continuous “brain drain” of surgeons out of liver transplantation in Germany. Whereas transplantation is a life-long profession for most surgeons outside Germany, the time dedicated in transplantation for German surgeons is relatively short. The median time in liver transplantation of 25 surgeons in our institution was only 6 years. Fully trained liver transplant surgeons spend a median of only 8 years in liver transplantation. As a consequence, corresponding caseloads were low with a median total caseload of 41 procedures for all surgeons and 73 procedures for

fully trained surgeons, respectively. Only four surgeons, three of them are currently active, have reached a total caseload above 100 liver transplant procedures. Importantly, there is a compelling body of evidence that specialization can improve outcomes significantly [2–4]. Oliphant *et al.* demonstrated that increased surgical specialization accounted for 18.9 percent of the observed survival improvement in colorectal cancer. Given a high-risk transplant population with high MELDs and donor risk indices, volume and the experience of an individual transplant surgeon can make a significant difference [5]. As outcomes after liver transplantation depend more on the caseload of an individual surgeon and not as much on the overall volume of the center, it is reasonable to assume that the low caseloads for individual surgeons may negatively interfere with overall outcomes [6, 7]. In fact, current overall outcomes in Germany compare poorly to international standards. However, this may not be necessarily due to the lack of surgical skills and experience, but be more related to the fact that transplantation is not the focus of most surgeons, who do perform it. In addition, administrative tasks related to the management of patients on the waiting lists are tedious and time consuming. A German survey among transplant surgeons revealed that German transplant surgeons only spend 10–25% of their time in transplantation, the rest in other fields of surgery [8]. For a surgeon with interests in multiple surgical fields, the lack of revenues of intensive patient care in transplantation can be discouraging.

The high dropout rate of surgeons from liver transplant training highlights the need for well-established, dedicated training programs. Transplant fellowships provide this prioritized training [9]. ASTS accredited training as well as our newly established transplant fellowship in Munich allows much faster training in liver transplantation as compared to *en passant* training [9.] Moreover a structured training program may give young surgeons the perspective they need to get involved with transplantation surgery.

Despite better training programs, another concern is the high rate of trained surgeons who leave transplantation permanently. The lack of adequate transplant positions certainly remains as the main factor, but there are also other reasons that render transplant surgery in Germany unattractive. For instance, there are significant lifestyle issues associated with a career in transplantation. In fact, transplant surgeons suffer more than any other surgical specialty from inconvenient working hours (often called in when not on-call and most organ procurements and implants take place out of hours), which places large burdens on family and social commitments [10]. Consequently, burn-out is a significant problem among transplant surgeons [11].

The lack of autonomy of transplant surgeons within the German academic systems is another source of disinterest

in pursuing a career in transplantation. The importance of autonomy at work has been stressed in many studies regarding job satisfaction and efficiency of physicians [11–14]. Autonomy in clinical care and administrative tasks may be one of the main differences between surgeons in Germany and North America/UK, accounting for the higher degree of job satisfaction in these countries [15]. Lower hierarchies and the establishment of a collegial system following the example of the North American system may add to the job satisfaction of German transplant surgeons.

Finally, salaries in liver transplantation in Germany are not competitive compared to other surgical specialties. Most liver transplant surgeons work in a staff surgeon position (Ä3 TVÄ 2012) with an annual salary of 100.000–120.000 €, including all on-call obligations. This salary compares to an average salary of 288.000 € [16] for head surgeons in non-transplant hospitals, which seems to be the preferred career path of our surgeons. The median salary of liver transplant surgeons in an academic teaching hospital in North America was calculated to be 340.000 € [17]. Dissatisfaction with reimbursement was shown to be an independent risk factor for not recommending a surgical career [18].

The obvious limitation of our analysis is that it is based on the experience of a single transplant center in Germany. To further illuminate the current situation in transplantation, we have recently embarked in a nationwide survey among transplant surgeons [8]. The results of this survey show that differences between centers are only minor and that the principle problem of a large-scale loss of liver transplant surgeons into alternate career paths is prevalent across the entire surgical system in Germany. We hope that our data stimulate a general discussion on transplant surgery in Germany with a primary focus on training, specialization, and job opportunities.

## Authorship

MT: collected and analyzed data, wrote manuscript. MA, JA and KWJ: analyzed data and corrected manuscript. MS and MR: collected data. SP: corrected manuscript. MG: designed the study, analyzed data, and wrote manuscript.

## References

1. Deutsche Stiftung Organtransplantation. Organspende und Transplantation in Deutschland. Jahresbericht. 2011.
2. Oliphant R, Nicholson GA, Horgan PG, Molloy RG, McMillan DC, Morrison DS. Contribution of surgical specialization to improved colorectal cancer survival. *Br J Surg* 2013; **100**: 1388.
3. Archampong D, Borowski D, Wille-Jorgensen P, Iversen LH. Workload and surgeon's specialty for outcome after colorectal cancer surgery. *Cochrane Database Syst Rev* 2012; **3**: CD005391.
4. Rhee D, Papandria D, Yang J, et al. Comparison of pediatric surgical outcomes by the surgeon's degree of specialization in children. *J Pediatr Surg* 2013; **48**: 1657.
5. Ozhathil DK, Li Y, Smith JK, et al. Effect of centre volume and high donor risk index on liver allograft survival. *HPB (Oxford)* 2011; **13**: 447.
6. Chowdhury MM, Dagash H, Pierro A. A systematic review of the impact of volume of surgery and specialization on patient outcome. *Br J Surg* 2007; **94**: 145.
7. Scarborough JE, Pietrobon R, Tuttle-Newhall JE, et al. Relationship between provider volume and outcomes for orthotopic liver transplantation. *J Gastrointest Surg* 2008; **12**: 1527.
8. Thomas M, Nadalin S, Schemmer P, et al. Transplant Surgery in Germany: Results of a nation-wide survey. Full oral, Annual meeting of the German Surgical Society, 2014.
9. Guba M, Andrassy J, Stangl M, Jauch KW. [Transplantation and Hepatic, Pancreatic, and Biliary (HPB) Surgery Fellowship - A Pilot Project for a Structured Training in Germany.]. *Zentralbl Chir* 2013; **139**(3): 271–5.
10. Balch CM, Shanafelt TD, Dyrbye L, et al. Surgeon distress as calibrated by hours worked and nights on call. *J Am Coll Surg* 2010; **211**: 609.
11. Bertges Yost W, Eshelman A, Raoufi M, Abouljoud MS. A national study of burnout among American transplant surgeons. *Transplant Proc* 2005; **37**: 1399.
12. Campbell DA Jr, Sonnad SS, Eckhauser FE, Campbell KK, Greenfield LJ. Burnout among American surgeons. *Surgery* 2001; **130**: 696.
13. Green A, Duthie HL, Young HL, Peters TJ. Stress in surgeons. *Br J Surg* 1990; **77**: 1154.
14. Shanafelt TD, Balch CM, Bechamps GJ, et al. Burnout and career satisfaction among American surgeons. *Ann Surg* 2009; **250**: 463.
15. Raptis DA, Schlegel A, Tschuor C, Clavien PA. Job satisfaction among young board-certified surgeons at academic centers in Europe and North America. *Ann Surg* 2012; **256**: 796.
16. Kienbaum Consulting. Führungskräfte in Krankenhäusern 2006 - Vergütungssituation von Geschäftsführern/Vorständen F, Chefarzten und Oberärzten, 9. Auflage.
17. [http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Downloads/AMGA\\_08\\_template\\_to\\_09.pdf](http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Downloads/AMGA_08_template_to_09.pdf).
18. Troppmann KM, Palis BE, Goodnight JE, Ho HS, Troppmann C. Career and lifestyle satisfaction among surgeons: what really matters? The National Lifestyles in Surgery Today Survey. *J Am Coll Surg* 2009; **209**: 160.