

Trainee satisfaction in surgery residency programs: Modern management tools ensure trainee motivation and success

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Objective. To assess trainee satisfaction in their surgery residency with a validated instrument and identify the contributing factors.

Background. Currently, surgery is deemed unattractive by medical students and ignored by many candidates planning to enter an academic career. New insights on the rationale for such lack of interest are needed. Job satisfaction is a central concept in organizational and behavioral research that is well understood by large companies such as Google, IBM, and Toyota. Similar assessment can likewise be used to improve trainee satisfaction in surgery residency.

Methods. A survey among 2039 surgery residents was conducted in three European countries analyzing satisfaction at work using the Global Job Satisfaction Instrument (validated in Emergency Room physicians). Crucial factors covering different aspects of surgery residency were identified using the GJS instrument combined with multiple logistic regression analysis.

Results. With an overall response rate of 23%, we identified trainee dissatisfaction in one third of residents. Factors affecting satisfaction related almost exclusively to training issues, such as assignment of surgery procedures according to skills (OR 4.2), training courses (OR 2.7), availability of a structured training curriculum (OR 2.4), bedside teaching, and availability of morbidity-mortality conferences (OR 2.3). A good working climate among residents (OR 3.7) and the option for part time work (OR 2.1) were also significant factors for trainee satisfaction. Increased working hours had a modest (OR 0.98)—though cumulative—negative effect. The sex of the trainee was not related to trainee satisfaction.

Conclusion. Validated measurement of job satisfaction as used in the industry appears to be an efficient tool to assess trainee satisfaction in surgery residency and thereby identify the key contributing factors. Improvement of conceptual training structures and working conditions might facilitate recruitment, decrease drop-out, and attract motivated candidates with possibly better quality of care. (Surgery 2012;152:794-801.)

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IN THE UNITED STATES and most countries in Europe, the number of applicants to surgery residency

programs is on the decline¹ and drop-out rates are high.² With an increasing number of female medical students, who still choose the surgery profession much less frequently than males, the interest in surgery training is likely to decline further.³ In addition, many surgeons are considering early retirement or switching to other jobs.⁴ In Germany, half of the private practice surgeons and one third of all surgeons will go into retirement by 2020.⁵ To replace these vacant jobs, it has been estimated that 10–12% of medical students

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should begin a surgery residency each year, but only 5% actually apply to surgery.⁵ Those figures indicate clearly that changes must be implemented to stop these disturbing trends in surgery education. The perception of the profession by medical students and the actual satisfaction by young surgeons in training (residents) represent key factors affecting choices for a career in surgery.

Job satisfaction is a concept that describes how people feel about their situation at work.⁶ This concept has been the central and the most discussed variable in organizational and behavioral research in this field.⁶ Job satisfaction is known to depend on intrinsic and extrinsic factors. Intrinsic factors are fixed and related directly to the job (i.e., surgery training) itself. In their "Growth Need Strength Theory," Hackman and Oldham⁷ have described 5 intrinsic factors: skill variety, task identity, task significance, job feedback, and autonomy. Extrinsic factors refer to training culture, salary, work hours, etc., and thus differ from one workplace (i.e., surgery training program) to another. These factors can be identified and corrected. The field of job satisfaction has been studied intensively, because prominent companies, such as IBM, Toyota, or Google, wanted to understand why people like or dislike their jobs in order to improve employment and work conditions. This scientific interest was not solely motivated by altruism; companies sought ways to decrease cost associated with sick days and with high turnover of personnel with the need to train new employees. The goals were also to attract the most talented individuals available on the market to improve the quality of their products. Understanding the factors affecting job satisfaction with appropriate interventions have been shown consistently to impact on the overall success of enterprises.⁸

Surprisingly, despite the frustrating erosions in the surgery profession including a failure to attract young medical students, resident and training satisfaction have been ignored largely. The aims of this study were to assess satisfaction in surgery residency with a validated instrument and to identify the contributing extrinsic factors.

MATERIALS AND METHODS

Inclusion criteria. An attempt was made to contact all residents in Germany, the United Kingdom, and Switzerland. Residents in all university hospitals in Germany ($n = 34$) and Switzerland ($n = 5$) were contacted via personal emails over a 3-month period. Residents at affiliated teaching hospitals, identified through the clinical

manager or responsible secretary of the respective program directors, were also contacted. All residents organized in the Association of Surgeons in Training (ASiT; www.asit.org) in the UK were contacted by e-mail. Altogether, 2039 surgery residents were identified, 1012 from Germany, 686 from the UK, and 341 from Switzerland.

Questionnaire. We followed a 3-step approach to identify the factors that influence satisfaction during surgery residency. First, we evaluated trainee satisfaction, next we determined extrinsic factors influencing trainee satisfaction, and third, we developed a statistical model to decrease the extrinsic factors to the most important ones, thereby creating a simple and easily applicable model. For the first step, we used a validated questionnaire called the Global Job Satisfaction Instrument (GJS),⁹ developed for the medical community. This tool has been shown to measure the concept of "job satisfaction" at the current workplace of Emergency Room physicians in Canada, and contains 12 items with known internal consistence and test-retest characteristics.¹⁰ The GJS declares a resident as satisfied if his/her score on this validated questionnaire is above the threshold of 0, as shown elsewhere.¹⁰ This constituted a binary response variable (GJS Satisfaction: yes/no). For the second step, the binary response was related to 22 questions covering different aspects of surgery training (Table I). These questions were compiled after extensive literature review in order to cover most fields that would influence trainee satisfaction. Care was taken to limit these questions to a number in accordance with previous power calculations. Multiple logistic regression analysis was performed to relate all posed questions to the residents' state (satisfied versus not-satisfied) in a full model. Then, to infer the factors most relevant to job satisfaction, we performed subsequent variable selection on the full model according to the Bayesian Information Criterion (BIC; reduced model).¹¹ Wherever odds ratios are indicated with *P* values and confidence intervals, these calculations originate from the full model; for the approach with variable selection via BIC (reduced model), no method is known to deliver valid *P* values or confidence intervals that take into account model selection uncertainty; hence these are omitted. To test the validity of our GJS measurement, we also assessed the amount of agreement between two methods to determine job satisfaction (job satisfaction computed by GJS Score and the explicit answer of the responders to the same question, Question 23)

Table I. Questionnaire and full multiple logistic regression model influencing job satisfaction, covering extrinsic factors related to training satisfaction in surgery residency

<i>Factor</i>	<i>OR</i>	<i>95% CI</i>	<i>P value</i>
Structure of training			
1. Does your department have a documented training program? Program yes vs no	2.49*	1.26–5.03	.0095
2. Does your department have a program director? Director: yes vs no	1.19	0.64–2.21	.59
3. What is your gender? Sex: female vs male	1.25	0.70–2.26	.45
4. Do you have the possibility to train on simulators? Simulator: yes vs no	0.88	0.50–1.54	.65
5. How are the procedures in the OR assigned? Assign: according to logbook vs random	0.93	0.37–2.45	.87
Assign: according to skills vs random	3.85*	1.79–8.92	<.001
Assign: according to training yrs vs random	2.78*	1.39–5.80	.0048
6. How many procedures are taught to you per week? Number of procedures	1.00	0.98–1.05	.65
7. Do you have teaching rounds and a mortality/morbidity conference on a regular basis? Teaching rounds plus M&M: both vs no	2.48*	1.08–5.96	.04
8. Are you able to participate in training courses? Courses: yes vs no	2.97*	1.63–5.48	<.001
Work hours			
9. Do you have a weekly work hour restriction at your department? Work hour restriction yes vs no	0.85	0.48–1.48	.57
10. How many hours do you usually work per week?*Hrs/week	0.98	0.95–1.00	.06
11. Do you get compensation time for overtime hours? Compensation time yes vs no	1.52	0.88–2.64	.13
Psychological working conditions			
12. Do you have a culture of teamwork and a good working climate among the residents? Good working climate yes vs no	4.06*	2.23–7.55	<.001
13. My department has a high reputation? Reputation yes vs no	1.59	0.79–3.20	.19
14. Is there a mentorship program in your department? Mentor yes vs no	1.19	0.64–2.22	.59
15. Are your career plans discussed on regular intervals? Career planning yes vs no	0.70	0.40–1.24	.23
16. Do you think your institution has problems recruiting residents? Recruiting problems yes vs no	1.12	0.68–1.87	.65
General working conditions			
17. Do you have the option for part time work? Part-time work yes vs no	1.95*	1.15–3.34	.01
18. I feel like I am doing way too much non-medical work? Paperwork yes vs no	0.66	0.29–1.44	.31
19. Do you get protected time for research or studying? Protected time yes vs no	1.14	0.58–2.31	.71
20. We have a high turnover among the residents? Turnover yes vs no	0.81	0.48–1.37	.44
Salary			
21. What is your basic salary per month? Relative salary	0.66	0.24–1.74	.40
22. Are you satisfied with your salary?			

(continued)

Table I. (continued)

Factor	OR	95% CI	P value
Salary satisfied yes vs no	2.55*	1.53–4.28	<.001
Satisfaction			
23. Are you satisfied with your job?	Control question for GJS Score		

*Significant odds ratio.

Interpretation example: Question 1: Does your department have a documented training program? Binary answer “yes” versus “no” resulted in a significant odds ratio to be satisfied of OR 2.49. Residents that answered “yes” have increased odds by a factor of 2.49 to be satisfied compared to those that answered “no”. The given *P* value of .0095 and the confidence interval (1.26, 5.03) indicate a significant effect.

by using the Cohen κ , as described by Cohen.¹² A confidence interval for κ was calculated using bootstrap techniques. To put salaries from different countries on an equal footing, we expressed salaries as a ratio to the country-specific median salary in 2009. The questionnaire and a cover letter were sent via email. Each resident received 3 reminders within 12 weeks.

Statistics. Data were collected using an electronic questionnaire and Excel database (Microsoft Corp, Redmond, WA). All computations were done with R (Vienna, Austria).¹³ The Cohen κ was computed using the R add-on package *psy*¹⁴ and bootstrap confidence intervals were generated using the R add-on package *boot*.¹⁵ Confidence intervals for proportions were computed using Wilson’s method. For the full model, Wald *P* values and 95% profile likelihood confidence intervals were used.

Odds ratio (OR) is used in logistic regression analyses and throughout the manuscript as a measure of effect size. The OR is the ratio of the odds of an event occurring in one group (for example to be “satisfied” in the group of residents who have mortality and morbidity conferences) to the odds of the event occurring in another group (for example to be satisfied in the group of residents who do not have mortality and morbidity conferences). An odds ratio of 1 indicates that the condition or event under study is equally likely to occur in both groups. An odds ratio greater than 1 indicates that the condition or event is more likely to occur in the first group. On the contrary, an odds ratio less than 1 indicates that the condition or event is less likely to occur in the first group.¹⁶

RESULTS

The total response rate was 23% (477/2039) with different response rates among the 3 countries; Germany 25%, UK 14%, and Switzerland 37%.

Demographics of surgery residents. The median age of the surgery residents who responded was 32 years (range: 25 to 46 years); 74% were male, 62% of residents were single, and 29% had children.

The majority worked at university hospitals (76%). The career goals of “academic career” versus “non-academic/general surgeon” were approximately equally distributed (54% vs 46%).

Salary and work hours. The median resident monthly salary was €5622 in Switzerland, €3500 in Germany, and €3480 in the UK (currency exchange rate as of January 3, 2011). To make the respective salaries more comparable, we calculated the ratios of surgery resident salaries to the median country-specific 2009 salary. This calculated ratio (resident salary/country median salary) was 0.79 overall. Switzerland was the only country where resident salary was slightly above the national median income with a ratio of 1.2, for the UK it was 0.79, and Germany had the least relative income with a ratio of 0.68. The median reported working time was 60 hours per week ranging from 38 to 100 hours. Half of the residents (50%) claimed that they were not compensated for their overtime hours with time off-duty or monetary compensation.

About half (44%) of the responders indicated that their departments had problems with the recruitment of new trainees. The turnover in the departments was considered to be “high” by 55% of the residents.

Are surgery residents satisfied with their current situation at work? More than two thirds (69%) of the responders were satisfied with their current working situation, while a third (31%) were not satisfied (95% Wilson CI: [27%, 35%]). There was no impact of sex of the resident on job satisfaction (OR 1.25, CI 0.70–2.26, *P* > .05). The mean GJS score was 0.68. The agreement between GJS and single question assessment of job satisfaction was substantial with a Cohen κ of 0.72, CI: 0.65– 0.79. Table I lists all studied extrinsic factors. After variable selection via BIC, we identified 11 factors that were associated strongly with job satisfaction (Table II).

Which factors influenced trainee satisfaction? Several training related factors strongly influenced trainee satisfaction: the availability of a documented and structured training curriculum (OR

Table II. Reduced multiple logistic regression model (after variable selection via BIC¹¹) of the most important variables related to job satisfaction (number in brackets relates to questions listed in Table I)

Factor	OR
Hrs/week (10)	0.97
Program yes vs no (1)	2.39
Assign: according to logbook (5) vs random	0.95
Assign: according to skills vs random (5)	4.18
Assign: according to training yrs vs random (5)	2.78
Teaching rounds plus M&M both vs no (7)	2.31
Teaching rounds or M&M vs no (7)	0.72
Good working climate yes vs no (12)	3.72
Courses yes vs no (8)	2.74
Part-time work yes vs no (17)	2.06
Salary satisfied yes vs no (22)	2.58

2.39), the implementation of routine teaching activities such as bedside teaching rounds and morbidity/mortality conferences (OR 2.31), participation in training courses (OR 2.74), assignment of surgical procedures according to skills of the trainee (OR 4.18), or years in training (OR 2.78). Other factors positively influencing job satisfaction but not related to training issues included a good working climate among residents (OR 3.72) and the option for part time work (OR 2.06).

Which factors negatively impacted on trainee satisfaction?. A negative association with job satisfaction was identified with increasing work hours (odds to be satisfied decreased by factor of 0.97 per additional work hour). The presence of only one teaching modality (bedside teaching round or morbidity and mortality [M&M] conferences) was equally associated with lesser odds to be satisfied (OR 0.74). While procedure assignment according to skills and training years yielded high odds ratios for satisfaction, such allocation “according to logbook” was associated with slightly less satisfaction (OR 0.94): “logbook” assignment was reported only by 6% of the residents which prevents any conclusion about this assignment modality.

Does salary influence satisfaction among surgery residents?. Only 57% of the residents indicated that they were satisfied with their salary. The gross amount of salary itself, however, was not found to be associated with trainee satisfaction (OR 0.66, $P = .4$) after accounting for the median national income in relation to the resident’s salary.

How many hours is a resident willing to work and still be satisfied with their overall working situation?. We found a negative association

between working hours and trainee satisfaction (OR 0.97) in the reduced model after variable selection via BIC. This effect was, however, small, but multiplicative. This means that when comparing two residents, one of whom was working 10 hours more per week than the other, the odds for satisfaction of the first resident would be decreased by a factor of 0.75 compared to the one working 10 hours less, and would be decreased by a factor of 0.43 for an additional 20 hours. Thus, the negative effect represents a continuum and with actual 60 hours worked (as was the median duration of hours worked per week in our sample), two thirds of residents are still satisfied.

Where are the deficits?. After having identified the most important factors influencing trainee satisfaction, we evaluated how those factors were implemented in the workplaces of our study population (Table III): Failure in adopting a well structured training program was reported in 61% of all institutions with the rare availability of part-time-work (60%) and the lack of transparency of surgical procedure assignment in two third of the institutions (57%).

DISCUSSION

Under a good general there are no bad soldiers— Chinese proverb

This survey conducted in 3 European countries disclosed that only two thirds of surgery residents are satisfied with their current working situation, when assessed with this validated instrument. Factors affecting satisfaction were related mostly to training issues, such as the availability of a structured training curriculum, training courses, bedside teaching, and the availability of M&M conferences. A good working climate among residents and the option for part time work were also found to be important. Working hours had a modest, though cumulative, negative effect, whereas the gross amount of salary was not related directly to job satisfaction.

Job satisfaction has been the single most studied concept in the industry.⁶ Large companies like IBM, Toyota, and Google have built a great part of their success on the intimate knowledge of the needs, distress, and motivation factors among their employees.⁸ Such knowledge leads to an increase in productivity, lesser dropout rates, decreased costs, and the ability to recruit better candidates. Low job satisfaction has a strong impact on many aspects, including burn-out,¹⁷ poor quality of work,¹⁸ increased overall costs, and high turnover of personnel.¹⁹ There is no doubt that with the

Table III. Factors for training satisfaction and their presence in current training programs

<i>Factor</i>	<i>Present (%)</i>
Documented training program	39
Course participation	82
Transparent OR assignment	43
Teaching rounds & conferences	70
Option for part time work	40
Satisfaction with salary	57
Good working climate	82

current situation in surgery education in many countries, surgery residency becomes less attractive, particularly in face of potentially better job satisfaction in the “for profit” industry. The potential positive impact of applying widely accepted management tools (like measuring employee “satisfaction”) in surgery education is obvious: i.e., attracting more medical students to surgery and preventing the brain drain of talented and productive residents to other nonsurgical fields or the pharmaceutical industry. The authors hypothesize that assessing trainee satisfaction might represent an effective way to enhance attractiveness and quality of surgery education among residents and putative trainees. Similar to the positive effects observed in the industry, the benefits of such monitoring may include less drop-out, less turnover, easier recruitment, less training cost, and better quality of care.

We measured satisfaction in surgery residency using a systematic approach and a questionnaire, previously developed and validated for the medical community. The use of specific statistical analysis, such as multiple regression and BIC,¹¹ is an elegant and convincing way to identify the most relevant factors influencing trainee satisfaction, while creating a simple model. We avoided “Chief of Surgery” bias by contacting the residents directly without involving any department heads or other controlling mechanisms.

One third of residents (31%) were dissatisfied with their training in the present study. A study from Germany reported a dissatisfaction rate of 49% (out of 729 surgery residents),²⁰ but satisfaction was assessed only with one single question. Of note, in the yearly evaluation of surgery training organized by the German Surgical Association (Bund Deutscher Chirurgen, BDC), which also included a third of already board-certified surgeons, no attempt was made to identify any parameters related to training satisfaction.²¹

In the original publication by Lloyd et al¹⁰ using this questionnaire, emergency room doctors had a

GJS score of 0.90 and drop out rates for emergency medical doctors were associated with lesser GJS scores. In the present study, the GJS score for surgery residents was even less (0.68) which would predict a high drop out rate besides all the other negative effects of poor training satisfaction. Health care systems in Europe will find it hard to cope with the lack of available surgeons in the future. There is no doubt that urgent changes are required to render surgery residency more attractive.

We identified several “crucial areas,” which, if corrected, may lead to a dramatic improvement of job satisfaction in surgery residency. Residents chose surgery to learn the profession and gather skills to become well trained surgeons; thus, logically, factors related to teaching appeared paramount. Five out of 8 factors positively influencing job satisfaction were related directly to training issues. A recent study from Switzerland among board-certified surgeons looking at arguments for and against a career in surgery²² revealed that almost 20% of responders would not chose surgery again, the top ranked category against a career in surgery being bad training conditions. Our data is in line with this finding, demonstrating that training conditions are the Achilles’ heel in surgery education.

The dramatic decrease of working time, in both the United States and Europe, has triggered a large and controversial debate.²³⁻²⁷ Although we identified a negative association of working hours and trainee satisfaction, the effect was almost negligible per hour; becoming relevant after excessive work hour accumulation. From our data, an absolute cut-off in weekly work hours is hard to identify, because factors related to training and a good curriculum likewise would outweigh a certain number of worked hours. There is agreement among all stakeholders that there should be a limit and a control in weekly working time. Where this limit is best situated depends strongly on national regulations and local surgical traditions. For example, 80% of consultants polled by the Royal College of Surgeons said quality of care had already been damaged by the directive from the European Union limiting residents to a 48-hour week, with risks to patients who are repeatedly “handed” from one shift to the next.²⁸ In contrast, sleep deprivation, overwork, and stress cause errors that can prove fatal in the medical field. A compromise must be found, but the true problem resides in another aspect of the working time directives. In Germany, working time is supposedly “fixed” at 42 hours per week (though opt-out agreements are the rule), and in Switzerland, the law allows for 50

Table IV. The best and worst hospital for surgery training

<i>Best hospital for surgery training</i>	<i>Worst hospital for surgery training</i>
Documented training curriculum with the aim of reaching board certification after a defined number of years.	No documentation about the surgery training curriculum, no structure for different years/levels of skills.
Procedures assigned according to trainee skills and year of training.	Procedures assigned according to preference of the senior surgeons or without established criteria.
Good working climate among residents.	Conflicts within the team.
Participation in training courses.	No training courses available.
Availability of weekly mortality & morbidity conferences and bedside teaching rounds.	No routine mortality & morbidity conference and no time allocated specifically for bedside teaching.
Weekly working time does not accumulate unnecessarily and a substantial amount of this time is dedicated to education rather than service.	Part time work and flexible working times are not available.

hours per week. The factual median weekly working time in our sample was 60 hours, which is thus illegal in both countries. This discrepancy has created a wide range of problems both on the side of the residents and at the hospitals. "Black hours," omitted in official records, put residents in jeopardy. Departments engaging in these practices decrease their attractiveness for new trainees and risk legal implications. Black hours are common practice, with only half of the questioned residents being able to compensate their overtime. We believe that working time regulations should be adapted to surgical reality, providing the implementation of monitored teaching tools. In the United States, the strictly regulated 80-hour work week, initially highly challenged, seems currently to be accepted by most.²⁷ In Europe, working traditions vary among countries, and solutions ensuring a high standard in surgery education and in trainee satisfaction are avoided carefully by most governing bodies. We believe that a realistic working time might range between 60 and 80 hours per week provided that these hours are spent in surgery training and education and accounted for in contracts and regulations.

Residents are not driven primarily by monetary incentive, because the amount of salary itself did not significantly influence trainee satisfaction. This observation is in accordance with other studies not related to surgery.⁶ Similar to other professions,^{29,30} we found that trainee satisfaction was not significantly related to the sex of the trainee. Although they choose surgery training less often than their male peers, we did not find that women have different odds to be satisfied in surgery.

As with every methodology involving a survey, there are limitations to this study. The moderate response rate of 23%, still qualifies as satisfactory in this setting, considering the high mobility of

residents and their notorious overloading by paperwork. Also, much lesser response rates are reported in relevant behavioral science literature, in fact a recent German study showed similar response behavior²¹ and response rates of about 20% are in the range for email questionnaires.³¹ A market survey tool for commercial use would be considered excellent if achieving similar reply rates. Nevertheless, we cannot exclude that the population of non-responders might be the most dissatisfied. We are suspicious that the actual problems outlined here might in fact be underestimated. The key strength of our study, however, is the use of a previously validated tool (the GJS) that measures efficiently job related satisfaction and can even predict drop out. GJS was developed originally by Lloyd et al⁹ to evaluate a population of emergency room physicians in Canada. Those physicians were subjected to similar working conditions as our population of surgery residents, including medical work in a hospital setting, nightshifts, and a stressful work environment without immediate gratification. Later, Lloyd et al¹⁰ concluded that the GJS instrument was a valid tool to assess job related satisfaction in the medical population. In our study, this tool was used specifically to assess the working situation of surgeons in training. As a consequence, we propose to modify the concept of "job satisfaction," as known from the industry, to "training satisfaction," which better characterizes the population of surgery residents. Given our results from about 500 surgery residents, we suggest that this tool could be used widely and on a regular basis to benchmark the quality and attractiveness of training programs in surgery. Another important observation was, that with very few exceptions, only academic centers were able to provide a list of trainees. This leads us to speculate that the concept of surgery training must be

organized and evaluated primarily by university hospitals and affiliated teaching hospitals with central monitoring of trainee progress.

In summary, at least one third of surgery residents are dissatisfied with their working situation when assessed with a validated instrument. Only surgery departments running attractive, structured, and efficient residency programs within an academic network may achieve high training satisfaction. To underline the findings of this study, we propose a simple template describing the best versus the worst places for training (Table IV). Regular measurement of employee satisfaction, similar to trends in industry, and appropriate intervention may secure the future and success of surgery training.

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