

## Original Article

Maria-Christina Stefanescu, Jasmina Sterz, Sebastian Herbert Hofer and Miriam Ruessler\*

# Young surgeons' challenges at the start of their clinical residency: a semi-qualitative study

<https://doi.org/10.1515/iss-2018-0015>

Received April 17, 2018; accepted May 24, 2018; previously published online June 4, 2018

## Abstract

**Introduction:** According to German regulations on licensing to practice medicine, the aim of undergraduate medical training is to produce a scientifically and practically trained physician who is able to work independently. More precisely, medical training has to impart the required knowledge and skills in diagnostics, therapy, health promotion, prevention, and rehabilitation. From the young residents' point of view, this aim is not achieved, and they do not feel prepared to be a doctor. However, the literature on this subject relies mostly on data based on surveys, and there is a lack of deep analysis of the specific details of the topic. The aim of this study was to analyze in depth how junior doctors in their first and second years felt about their preparation for clinical practice as a doctor from their undergraduate training, as well as which teaching formats and factors influence their preparedness.

**Methods:** This semi-qualitative study is based on recorded interviews conducted using a structured interview manual. This serves to limit the subject matter of the interview and to target the topics. The study participants were 35 residents of general and visceral surgery, trauma surgery, and urology in their first and second years of medical specialty training. The number of participants was defined by the concept of saturation of the content. Basic data regarding age and the location and

length of study were collected using a questionnaire. The audio recordings were transcribed word by word and analyzed with structured qualitative content analysis techniques.

**Results:** Only 43% (n = 15) of the 35 participating residents stated they were sufficiently prepared to be a doctor from undergraduate medical training, and 22.9% stated that they were not prepared for their work as a resident (8/35). However, 34.3% of the residents stated that undergraduate medical training did prepare them for some of the parts they were expected to master in daily clinical practice, but not other parts. Most of the participants described their first weeks as doctors as particularly stressful and exhausting. As major hurdles during their daily clinical work, participants described knowledge gaps regarding organizational and administrative pathways (71%), deficits in linking knowledge to clinical reasoning (71%), decision making (54%), and therapy planning (51%). Most participants stated that the practical placements during the semester, the clinical clerkships, and the last year internship were most effective as preparation for clinical residency. To be better prepared for clinical practice, participants suggested providing a clearer structure and that the course subjects bear better relations to each other. Nearly all participants proposed increasing patient encounters directly from the beginning of medical training as a longitudinal approach.

**Discussion:** Even though we were able to demonstrate an increase in residents' preparedness, 57% of the study participants still felt unprepared for their job to some extent. One might argue that starting a new profession will always result in a feeling of being unprepared to some extent. However, this unpreparedness can increase the risk for patients' well being due to medical errors, which actually represents the third leading cause of death in the US after malignant tumors and cardiovascular diseases. Structured on-the-job adjustment, structured qualification training, and guided professional training are becoming increasingly important for future doctors as selection criteria for career choice and choice of employer. Thus, the surgical disciplines that are struggling with new young residents have to improve their concepts.

\*Corresponding author: Prof. Dr. med. Miriam Ruessler,

Department of Trauma, Hand and Reconstructive Surgery, University Hospital Frankfurt, Goethe University, Theodor Stern Kai 7, 60590 Frankfurt, Germany, Phone: 069-6301-6123, E-mail: miriam.ruessler@kgu.de

**Maria-Christina Stefanescu:** Department of Pediatric Surgery and Pediatric Urology, University Hospital Frankfurt, Goethe University, Frankfurt, Germany

**Jasmina Sterz:** Department of Trauma, Hand and Reconstructive Surgery, University Hospital Frankfurt, Goethe University, Frankfurt, Germany

**Sebastian Herbert Hofer:** Department of Surgery, University Hospital Frankfurt, Goethe University Frankfurt, Frankfurt, Germany

**Keywords:** junior doctors; preparedness; residency; surgery; undergraduate medical training.

## Introduction

According to the German regulations on licensing to practice medicine [1], the aim of medical training is to produce a scientifically and practically trained physician who can work independently. More precisely, medical training has to impart the required knowledge and skills in diagnostics, therapy, health promotion, prevention, and rehabilitation. From a young doctors' point of view, however, this aim does not seem to be completely achieved [2–6]. Young graduates report deficits in their knowledge on daily clinical practice in the ward, being on call, the management of emergencies, and the prescription of medications [5]. Studies involving graduates from the UK, Denmark, the Netherlands, and the US demonstrate that even basic practical skills are often never performed by the students, themselves, during undergraduate medical training [7–9].

In 2003, Ochsmann et al. [2] and Jungbauer et al. [10] discovered that only about one-third of the alumni of German medical schools felt prepared for their work as residents and named deficits in various medical skills and knowledge, such as ECG interpretation, therapy planning, and medication prescription. One might argue that starting a new job profession will always result in feeling unprepared to some extent. On the other hand, Philips and Barker identified a 10% increase in fatal medication errors in the month that all new graduates begin their medical residencies in the US [11]. This indicates a need for change in undergraduate training. Therefore, an analysis of new graduates and their preparedness, challenges, and deficits in their residency is of great importance.

Especially in surgery, proper preparedness for clinical practice is highly relevant to preventing patient harm (e.g. wound infection). This is intensified by the fact that young surgeons have to make their own decisions in stressful situations and under time pressure, even at the beginning of their careers. The relevant literature relies mostly on data from surveys. However, there is a lack of deep analysis of the specific details of identified deficits. Therefore, the aim of this study is to analyze in-depth whether clinical practice junior doctors in their first and second years of surgical training feel prepared from undergraduate medical training, and in which fields.

## Materials and methods

### Study design

This is a semi-qualitative interview-based study. The epidemiological data were collected using a written questionnaire and include the location and time of medical training as well as previous knowledge in other parts of health care (e.g. emergency, nursing). The study was conducted according to the ethical principles of the Helsinki Declaration (Ethical Principles for Medical Research Involving Human Subjects). According to the Ethics Board at Goethe University Medical School, no ethical approval was required to conduct this study.

### Study participants

The participants were first and second year residents from trauma, general, and visceral surgery and urological departments all over Germany. The recruitment of participants was done through open calls via email (distributed by “Junge Forum O&U” from the German society for orthopedic and trauma surgery and the working group “undergraduate training” of the German society of surgery), three closed Facebook groups (“Stipendiaten der Konrad-Adenauer-Stiftung,” “stipnetz-Medizin,” and “GeSRU-German Residents in Urology”), and direct contact from the authors to young doctors and chief physicians from the included specializations. Participation in the study was voluntary and took place after written informed consent was provided. Residents were excluded if they had already spent more than 2 years in residency in total.

### Study protocol

An in-depth structured interview manual with pre-formulated open questions was constructed to explore the main research issues: how participants felt during their first weeks as residents, which fields they felt sufficiently prepared for, in which field they felt unprepared and why, which parts of undergraduate training prepared them the most for clinical practice, and how participants were acquainted within their hospital. Additional questions asking for clarification about the previous answers were drafted to clarify the meaning, obtain additional details, and ascertain what the underlying assumptions. The interview manual served as a framework for the subject matter of the interview and to target the topics. Thus, the reproducibility of the different interviews could be guaranteed.

After informed written consent was obtained and after completion of the written questionnaire, the interviews were conducted in person or by phone and recorded with the iPhone applications “Dictaphone” (Alon Software Ltd., Sochi, Russian Federation) or “TapeA-Call Pro” (TelTech Systems, South Amboy, NJ, USA). All interviews were conducted by the same investigator. Care was taken to alert respondents to the fact that their personal accounts were of interest so that they recounted their own experiences and views rather than what they may have perceived that the interviewer wanted to hear.

Consent for study participation and recording of the interview were obtained again before starting the interview. Every interview was introduced with the question, “How were the first weeks of

clinical practice?” followed by a quest to clarify the reasons for their feelings. The interview lasted until all questions from the manual were answered. Every interview was ended with a question about whether the interviewee felt prepared for their job by undergraduate medical training. The number of study participants was defined by the concept of saturation of the content.

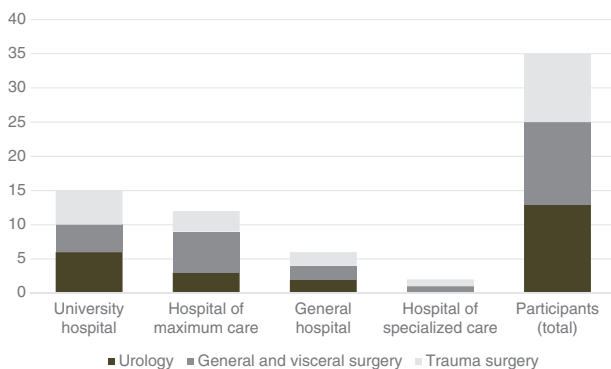
## Data analysis

The audio recordings were transcribed verbatim using “F5 Transcription Pro” for Macintosh (Drs. Dreising & Pehl GmbH, Marburg, Germany) and assigned a pseudonym. Analysis was performed with the structured qualitative content analysis techniques [12] using MAX-QDA12® (VERBI GmbH, Berlin, Germany). Therefore, before progressing to more detailed analysis, each transcript was read to obtain a global impression of residents’ experiences.

Codes were developed, refined, and revised in an iterative process for the main categories (e.g. “field of preparedness,” “field of unpreparedness,” “that should be taught more”), plus additional subcategories (e.g. positive or negative answers, knowledge, practical skills). Based on these categories, the transcripts and the answers to the questionnaire were coded by two authors and analyzed by reference to the questions of the study. For the quantitative analysis, the number of indications within the interview or the questionnaire was counted.

## Results

The study participants were 35 first and second year residents (15 males = 42.86%, 20 females = 57.14%) of general, visceral, orthopedic, and trauma surgery and urology with a mean age of 28.4 years (25–35 years) from different hospitals in Germany (Figure 1, Table 1). Study participants received their undergraduate training at 20 medical schools in Germany (mean students per medical school:  $2.0 \pm 3.3$ ), with five students having studied at two



**Figure 1:** Study participant assignment to surgical specialization and hospital's type of care.

different medical schools and one having studied at three different medical schools. Furthermore, 22.2% of the participants already completed vocational training in health care (Table 2), and 57.14% worked in health care (e.g. as a paid student in the O.R. or on night shift in a ward parallel to medical school).

Among all residents, 43% (15/35) stated they were sufficiently prepared to be a doctor from undergraduate medical training, 22.9% stated that they were not prepared for their work as a resident (8/35), and 34.3% stated that undergraduate medical training did prepare them for some of the parts they were expected to master in daily clinical practice, but not others.

*“In my mind, as good as possible... for some aspects, you cannot be prepared.” (01W26)*

*“... Regarding medical knowledge, yes... for daily clinical routine, I was not well prepared...” (36M35)*

*“Being a doctor, that I was not prepared for... coping with the responsibility was definitively missing.” (33W29)*

*“... There were high efforts to prepare us to become doctors... it is difficult to cover medicine in undergraduate training completely, as there are so many different specialties.” (5M30)*

Most of the participants described their first weeks as doctors as being especially stressful and exhausting. As major reasons, they indicated the change in their role from learner to doctor with a 100% increase in responsibility for all of their actions and decisions, which was unfamiliar and an especially abrupt change. Furthermore, they felt uncertain about what is expected from them to master independently and where questions and advice could or should be sought.

*“Stressful, unfamiliar, beautiful... because I was unaccustomed, I did not know the team, the processes, I partially felt out of place and was not yet able to perform as I would have liked to.” (11W32)*

*“... All at once, everyone wants to know something, expects you to know, and you have to make decision. From zero to sixty!” (02W26)*

*“... Accountability... my signature under each document... in the practical year, everything was checked, and my name did not appear.” (24W27)*

*“... Being in a completely new role...” (01W26)*

Participants stated that they were overextended during their first weeks (43%; 15/35), and 46% stated that they felt challenged but were not swamped (16/35). Four did not answer with definitive wording and, thus, could not

**Table 1:** Study participants in order of specialization.

	1st year n (age in years)	2nd year n (age in years)	Total n (age in years)
General surgery	10 (27.7 ± 1.8)	2 (29 ± 0)	12 (27.9 ± 1.7)
Orthopedic and trauma surgery	6 (28.5 ± 3.6)	4 (31.3 ± 2.5)	10 (29.6 ± 3.4)
Urology	6 (27.3 ± 2.5)	7 (28.3 ± 1.6)	13 (27.9 ± 2.0)
Total	22 (27.8 ± 2.5)	13 (29.3 ± 2.2)	35

Mean age in years presented as mean ± SD.

**Table 2:** Participants who completed vocational training in health care.

Vocational training	Number (total)
Emergency medical technician (EMT)	3
Nursing	2
Paramedics	1
Elderly care	1
Scrub nursing	1
Total number	8

be included in this quantitative analysis. Of the participants, 54% received on-the-job adjustment training within the first weeks. The participants who received this training stated more often that they were not swamped during the first weeks in comparison to those without any structured familiarization time (no overextension during the first week: 63% participants with on-the-job adjustment training (12/19) versus 25% without structured familiarization (4/16)).

*“I was absolutely overextended. I had absolutely no plan... there was no concrete contact person... in my mind, a week for familiarization would have been good.” (01W26)*

*“It was extremely exhausting and I was considerably overextended... you are thrown in the deep end and all at once, you have to be able to make it all. Taking charge, you have never done it before and suddenly you make decisions, which can be highly relevant for patients of which you do not have any clou.” (18W28)*

*“Overextended, no, but challenged, definitely. Not physically exhausting but intellectually. Many decisions have to be made where you do not yet have the precise background.” (23M24)*

*“Exhausting... many new things... but I was never completely left alone...” (04M30)*

As major hurdles during their daily clinical work, participants described knowledge gaps regarding organizational and administrative pathways (71%), deficits in linking knowledge to clinical reasoning (71%), decision making (54%), and therapy planning (51%). Most study participants (25/35) stated that they were overwhelmed with the

mass of bureaucracy in daily clinical routine and that that they were not prepared for it. They particularly described gaps regarding organizational and administrative patient management, such as discharge management, making prescriptions, insurance, and the organization of rehabilitation. In this context, many stated that the major deficits were not only the pure procedure but deficits in time management, prioritization, and scheduling a work plan.

*“... All these organizational things. Thus, I had no plan before... preparing discharge, social services, and all these things...” (06W27)*

*“... Especially the amount of bureaucracy, something you are mostly not confronted with during undergraduate training and the time management, what to do when... at first, I had to provide myself a basis for how to structure my work.” (10W27)*

*“... Scheduling all my tasks... to decide what has priority and trying not to be pressed for time.” (27W28)*

Most participants (25/35) described deficits in knowledge transfer. They stated that they had a good level of knowledge but were unable to link this knowledge to their work, individual patients, and practical application.

*“... Many things I knew theoretically but was unable to bring them together, unable to recognize the connection.” (01W26)*

*“... I identify symptoms... I am unable to relate them correctly... I cannot find the right clue...” (10W27)*

*“... During undergraduate training you learn the theory... in the ward, well, you then know the theory, but how to do it in reality, I don't know.” (3M27)*

Participants (54%) declared that decision making had been a missing competency at the beginning of their postgraduate career. Lacking competencies for making decisions were strategies to come to a decision, how to estimate the risk of a patient, and the identification and rating of the importance of possible steps.

*“In my mind, it was extremely hard... decision making.” (01W26ACH)*

“... A major difficulty was to estimate how dangerous a situation actually was and what to do concretely...” (04M30)

“... The whole practical aspect, how to differentiate who is critically ill, and how can I evaluate things ... I had to learn this in daily routine.” (20W27)

Knowledge gaps in therapy planning were deficits for 51% of the participants. They particularly described that in postoperative care, how to further proceed with a patient after diagnosis and indication for operative or conservative therapy was extremely difficult for them, especially determining what had to be done, when, for how long, and who should be involved.

“We learned as far as how to operate on a fracture, but what to do for post-operative treatment, immobilization, etc., that is missing.” (17W27)

“... Putting it all together in a complete concept... developing a concept for the individual patient in his/her actual situation.” (18W28)

“... Making a therapy plan... came far too short during undergraduate training.” (36M35)

“... During undergraduate training, you learn there is a disease and what the primary therapy is. But you absolutely do not learn how long to leave the drainage or when can the patient be sent to rehabilitation. Does he really need one? Which one? When is the patient allowed to start eating again?... All these daily simple things.” (03M27)

Most participants felt well prepared regarding medical knowledge and how to fill knowledge gaps. Most also felt well prepared regarding basic practical skills and communicative competencies such as taking a patient's history, performing a physical examination, and obtaining informed consent.

“Yes, medical knowledge by all means, otherwise you could not work.” (09M26)

“In the area of practical skills...in my mind, that worked well.” (01W26)

“Patient communication, patient handling – there we were well prepared.” (11W32)

“Patient handling, taking a patient's history, physical examination... I found no trouble with that. (33W29)

Most participants stated that the most effective preparation for clinical residency came from practical placements during the semester, clinical clerkships, and the last year internship. They provided the participants with the

opportunity to link their knowledge with clinical practice, connect knowledge and skills that were learned separately, perform patient management firsthand, and take the first steps in assuming responsibility.

“From a practical view, the last year's internship... that is where you internalize it... before, you had small islands of knowledge, but the connection between many things became clear there.” (07M28)

“The clerkships and internship, those prepared me pretty well for daily clinical work.” (29W25)

“... Learning ward management, taking responsibility, taking care of your own patients...” (09M26)

Furthermore, the participants described the practical assessment [Objective Structured Clinical Examination (OSCE)] as useful for their clinical work as they were forced to train practical skills in combination with communicative competencies and patient management.

“... The OSCEs, well not the OSCE directly, but the preparation for it.” (29W25)

Most participants denied that something could be omitted in undergraduate training in retrospect. They rated all subjects as important for comprehensive understanding and for their clinical practice. However, many rated the amount of different subjects and their weighting during their training as inadequate, as well as their contents.

“In retrospect, I have to say that it made sense, that you learn all the basics. Somehow, you need them all.” (07M28)

“I think really eliminating something is not possible, as all of them have a right to exist. Personally, I find the ratios sometimes unjustified. I had half a year of internal medicine and surgery but one and a half years of biochemistry. Well, there, the ratio in my mind is quite honestly wrong.” (34M28)

“Ethics in medicine is a highly important topic, but do you have to hear many many lectures over several semesters regarding medicine in the Third Reich? To discuss the actual medical ethics questions that would be important for clinical work... we do not study history.” (01W26)

To be better prepared for clinical practice, participants requested that study subjects receive a clearer structure and that the subjects bear better relations to each other. This necessitates arrangements between the subjects regarding the included learning objectives. Participants wished particularly for a disease-related connection between the different subjects. As a further benefit, this

could facilitate the connection between knowledge and its application in different clinical contexts.

*“The whole training was arranged very fragmentarily. Each specialty did its own thing, and you savored only a relatively small amount of interdisciplinary training. Thus, the combination of knowledge impressions is difficult.” (34M28)*

*“During undergraduate training, you do not get an overall understanding. Each specialty stays in its own specialty... You do not need more details during undergraduate training, but seeing a patient from the perspectives of all different specialties – what relevance does a particular pre-existing condition or medication have to a particular specialty – that is missing.” (13W28)*

Most of the participating residents recommend increasing the practical orientation of undergraduate medical training and increasing the transfer of theoretical knowledge into practical relevance.

*“Over the years, we had plenty of courses on radiology, but no one prepared us in any way to appraise an X-ray or how to document it correctly.” (17W27)*

*“Therefore, you could have assumed the role of a doctor instead of only shadowing, that would have helped.” (16M31)*

*“Pharmacology takes a big amount of clinical training, but in my case at least, it generated relatively little output. Pharmacology facilitated having good theoretical knowledge about the complete pharmaceuticals and the composition of pharmaceuticals but insufficiently informed us about what to do with them. What do you do if a patient suffers pain? What do you give as an initial therapy in pneumonia? Or for soft-part infections?” (8M31)*

Nearly all participants proposed increasing patient encounters directly from the beginning of medical training as a longitudinal approach. They anticipated that looking after patients during their whole undergraduate training would have helped them to understand clinical pathways and clinical thinking better by becoming acquainted with the whole process of patient management more often. Furthermore, the longitudinal approach should increase their responsibility, from which they expect to earn more of the competencies needed when starting clinical practice.

*“... That you look after a patient from beginning until the discharge... so you look at how it goes on... You see the patients during undergraduate training for just a short amount of time... That would make the organizational things easier to handle.” (06W27)*

*“Taking responsibility from the beginning of patient arrival until the last consequences, which means I care for the patient and do not say at 12:00, ‘well, I am leaving for an hour lunch break and then I have to go into the seminar and then I am gone,’ and thus, I*

*do not get anything about what is going on in the afternoon, what went wrong from what I did in the morning.” (8M31UCH)*

When asked about what they completely missed during undergraduate training, participants indicated the legal aspects of working as a doctor, such as what is important to document when obtaining informed consent and why, professional discretion, how the medical system works, how is it financed, political aspects of health care, the DRG-system, and coding medical performances.

*“... Thus how the medical system runs in general.” (5M30)*

*“... Legal aspects are missing a lot... how important it is to document what I talk about when obtaining informed consent, that I am obliged to hand out a copy... guidelines for work-related accidents...” (29W25)*

*“Accounting, that is something doctors are faced with more and more and what we needed to do relatively quickly and I did not have any idea of.” (16M31)*

## Discussion

In the present study, 43% of the participants stated in retrospect that undergraduate training prepared them adequately to be a doctor. Thus, in comparison to previous German studies, we were able to demonstrate an increase in students who perceived preparedness for the job (Schmid et al. 17% [13]; Ochsmann et al. 34% [2]). In the time between these studies, multifaceted changes took place in the levels of German regulations on licensing to practice medicine and, thus, the curricula of universities to increase students' clinical competence. Which of these factors contributed most cannot and should not be the focus of the present work. However, this study demonstrates that the changes made in the German undergraduate medical training did improve students' emotive preparedness for their job.

Even though we were able to demonstrate an increase in residents' preparedness, 57% of the study participants still felt unprepared for their job to some extent. The transition period from medical student to resident is described in many studies and is also defined as “CLIP,” or a “critically intense learning period” [14]. Important factors contributing to this transition period are the change from a scheduled classroom to the ward with an unfamiliar role in a different culture with partly unknown and unfamiliar responsibilities and expectations, and unfamiliar interactions with healthcare staff, which are combined with gaps in knowledge and skills to some extent [15–22]. These factors were also confirmed by our study results.

One might argue that starting a new profession will always result in a feeling of being unprepared to some extent. However, a high level of unpreparedness can increase the risk for patients' well being due to medical errors, which actually represents the third leading cause of death in the US after malignant tumors and cardiovascular diseases [23]. Philips and Barker identified a 10% increase in fatal medication errors in the month when all new graduates begin their medical residencies in the US [11]. Thus, it is of major importance to clearly identify the areas of unpreparedness of residents and in consequence, develop concepts to decrease the unpreparedness. The present study design allows an in-depth analysis of residents' deficits.

Residents described the largest deficits in organizational and administrative pathways, linking knowledge to clinical reasoning, decision making, and therapy planning. The present results confirm the results of previous German studies [2, 13] and match with international studies to some extent, which describe reasons for unpreparedness in residents as being deficiencies in knowledge and skills, deficits in the use of biomedical knowledge in clinical reasoning, and difficulties using acquired skills in real time with real patients [17–20, 24, 25].

In our study, deficits in knowledge and practical skills were rated as minor deficits from only some of the study participants, and most were satisfied with their overall training in these aspects. A reason for the differences between the German studies and international studies, particularly from Anglo-American regions, might be the different training systems. In Germany, undergraduate training includes many practical placements, especially the last year internship, which allows students to participate in clinical activities with varying degrees of responsibility and autonomy prior to residency. Based on our results, these practical placements are rated as most effective for preparing students for clinical work and should thus be used to decrease the length and degree of the transition period. In the international literature, practical placements are rated as highly important, demonstrating that clinical competence can best be developed through experiential learning and experiences from work-related activities of the day-to-day-job. Thus, learning to become a medical specialist means working and acting as specialists do [15, 16, 24, 26].

The present study identified major deficits in management aspects. Knowing organizational and administrative pathways is of major importance in daily clinical work. These factors take up approximately 3 h/day of residents' clinical work [27]. The German national competency-based catalog of learning objectives (NKLM) defines

manager and management task as important learning objectives for undergraduate training in Germany [28]. From the residents' point of view based on our study results, undergraduate training needs more focus on the training of management aspects such as organizational and administrative pathways, time management, prioritization, and scheduling work plans, particularly during practical placements. Here, further studies are needed in order to analyze how and where these learning objectives could be taught effectively.

The participants described further major deficits in linking their existing medical knowledge to clinical reasoning, decision making, and therapy planning. To be better prepared, participants identified their clinical rotations as point of action, particularly the last year of internship. As major improvements, participants suggested increasing their participation in the care of patients from admission to discharge in order to improve the competencies in patient management by actively participating in all required steps of patient care. In particular, active planning of further procedures on one's own should be increased.

Students' supervision in the wards during clinical placements is mostly carried out by residents. They have to be more aware of their function as role models [29]. In this function, they should demonstrate the "how and why" of their daily work and decisions. Thus, they should give reasons for their decisions and how their decision-making process takes place. Students' last year internship may, therefore, be a good opportunity to strengthen and optimize students' competencies in patient management. Mentoring programs are implemented at some hospitals in order to improve students' supervision during clinical placements; here, further studies are needed regarding the influence and impact of these programs.

The revision of medical students' last state exam develops in a similar direction, as described by J. Jünger, the head of the central German institute for medical and pharmaceutical examinations [30]. The new state examination might include an assessment of patient management, decision making, clinical reasoning, and therapy planning competencies, which are all aspects described as deficits by our study participants. Assessment drives learning and the curriculum [31–33], and thus, this development might further increase students' competencies and decrease the transition period.

Another aspect of the study results that has to be discussed is the on-the-job adjustment. It could help to decrease the extent of the transition period by accustomizing the residents to the new surroundings, including their expected roles and responsibilities, as well as introducing

them to common procedures and standards. This would not only help students navigate and function in the clinical setting but also contribute sooner to patient care [15, 24, 26]. However, future studies must investigate whether these measures can decrease the risk to patient safety. In the present study, only 54% of the participants received on-the-job adjustment training during the first weeks. We were able to demonstrate that any structured on-the-job adjustments positively correlate with reduced overextension in the first weeks.

As the sample of study participants was spread among 20 different medical schools with different curricula, some study participants completed a so called “Reform-Studiengäng”. These implement clinical learning objectives, patient contact, and training of clinical competencies early in the curriculum without a separation of preclinical and clinical study phases. In our study, those study participants from “Reform-Studiengängen” were in the group of those who felt well prepared for clinical practice, did describe the transition period as a challenge but not as stressful or overextending, and described less deficits in clinical daily routine. However, here, further studies are needed regarding the influence of these curricula on clinical practice, as our subgroup in the present study is too small to make a clear statement.

Structured on-the-job adjustment, structured qualification training, and guided professional training are becoming increasingly important for future doctors as selection criteria for career choice and choice of employer [34]. Thus, the surgical disciplines that are struggling with new young residents have to improve their concepts. The participants in the present study had already chosen a residency in the surgical disciplines, in contrast to the large number of the newly graduated who choose a different discipline.

The sample of 35 study participants seems to be very small. However, the study was conducted based on the principles of qualitative research. We were able to draw conclusions about the possible main population despite the small number of study participants by using the principle of saturation of the content (i.e. the addition of more study participants leads to no additional insights). The results are comparable with those of previous studies in Germany. The distribution of study participants among 20 different medical schools allows more generalization.

The present study analyzed only residents from general surgery, trauma, and orthopedic surgery and urology. Thus, the results cannot be freely transferred to other surgical disciplines or other disciplines in general. Further research should focus on this issue.

**Acknowledgments:** The authors thank Bernd Bender for his support in analyzing and interpreting the data.

### Author Statement

**Research funding:** This work was supported by the German Federal Ministry of Education and Research (grant 01PL12038A) as part of the joint research project, “Practical clinical competence – a joint program to improve training in surgery.” **Conflict of interest:** All authors declare that they have no conflict of interest. **Informed consent:** Informed consent has been obtained from all individuals included in this study. **Ethical approval:** The study was conducted according to ethical principles of the Helsinki Declaration (Ethical Principles for Medical Research Involving Human Subjects). According to the Ethics Board at Goethe University Medical School, no ethics approval was required for conducting this study.

### Author Contributions

Maria-Christina Stefanescu: conceptualization; data curation; formal analysis; investigation; methodology; visualization; writing – original draft; writing – review and editing. Jasmina Sterz: conceptualization; investigation; methodology; validation; writing – review and editing. Sebastian Herbert Hoefler: conceptualization; formal analysis; methodology; writing – review and editing. Miriam Ruessler: conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; supervision; validation; visualization; writing – original draft; writing – review and editing.

## References

- [1] Approbationsordnung für Ärzte vom 27. Juni 2002 (BGBl. I S. 2405), die zuletzt durch Artikel 2 der Verordnung vom 2. August 2013 (BGBl. I S 3005).
- [2] Ochsmann EB, Zier U, Drexler H, Schmid K. Well prepared for work? Junior doctors' self-assessment after medical education. *BMC Med Educ* 2011;11:99.
- [3] Goldacre MJ, Lambert TW, Svirko E. Foundation doctors' views on whether their medical school prepared them well for work: UK graduates of 2008 and 2009. *Postgrad Med J* 2014;90:63–8.
- [4] Goldacre MJ, Lambert T, Evans J, Turner G. Preregistration house officers' views on whether their experience at medical school prepared them well for their jobs: national questionnaire survey. *Br Med J* 2003;326:1011–2.
- [5] Illing JC, Morrow GM, Rothwell nee Kergon CR, Burford BC, Baldauf BK, Davies CL, et al. Perceptions of UK medical graduates' preparedness for practice: a multi-centre qualitative study reflecting the importance of learning on the job. *BMC Med Educ* 2013;13:34.



- [6] Kolbert-Ramm C, Ramm M. Zur Studiensituation im Fach Humanmedizin – Ergebnisse des 11. Studierendensurveys. Medizinischer Fakultätentag (MFT); 2011.
- [7] Moercke AM, Eika B. What are the clinical skills levels of newly graduated physicians? Self-assessment study of an intended curriculum identified by a Delphi process. *Med Educ* 2002;36:472–8.
- [8] Ladak A, Hanson J, de Gara CJ. What procedures are students doing during undergraduate surgical clerkship? *Can J Surg* 2006;49:329–34.
- [9] Goodfellow PB, Claydon P. Students sitting medical finals – ready to be house officers? *J R Soc Med* 2001;94:516–20.
- [10] Jungbauer J, Kamenik C, Alfermann D, Brahler E. [How do young physicians assess their medical studies in retrospect? Results of a medical graduates' survey in Germany]. *Gesundheitswesen* 2004;66:51–6.
- [11] Phillips DP, Barker GE. A July spike in fatal medication errors: a possible effect of new medical residents. *J Gen Intern Med* 2010;25:774–9.
- [12] Kuckartz U. *Qualitative Inhaltsanalyse: Methoden, Praxis, Computerunterstützung*. Weinheim, Basel: Beltz Juventa; 2014.
- [13] Schmid K, Gailhofer A, Krieger C, Hiddemann-Koca K, Drexler H. Ausbildungszufriedenheit und Zukunftsperspektiven von Erlanger Medizinstudenten vor und nach dem Praktischen Jahr. In: Fuchs C, Koch T, Scriba PC, editors. *Perspektiven junger Ärztinnen und Ärzte in der Patientenversorgung: Eine Herausforderung für die gesamte Ärzteschaft (Report Versorgungsforschung)*. Köln: Deutscher Ärzteverlag, 2013.
- [14] Kilminster S, Zukas M, Quinton N, Roberts T. Learning practice? Exploring the links between transitions and medical performance. *J Health Organ Manag* 2010;24:556–70.
- [15] O'Brien BC, Poncelet AN. Transition to clerkship courses: preparing students to enter the workplace. *Acad Med* 2010;85:1862–9.
- [16] Teunissen PW, Scheele F, Scherpbier AJ, van der Vleuten CP, Boor K, van Luijk SJ, et al. How residents learn: qualitative evidence for the pivotal role of clinical activities. *Med Educ* 2007;41:763–70.
- [17] Duvivier RJ, van Geel K, van Dalen J, Scherpbier AJ, van der Vleuten CP. Learning physical examination skills outside time-tabled training sessions: what happens and why? *Adv Health Sci Educ Theory Pract* 2012;17:339–55.
- [18] Godefröoij MB, Diemers AD, Scherpbier AJ. Students' perceptions about the transition to the clinical phase of a medical curriculum with preclinical patient contacts; a focus group study. *BMC Med Educ* 2010;10:28.
- [19] Dornan T, Littlewood S, Margolis SA, Scherpbier A, Spencer J, Ypinazar V. How can experience in clinical and community settings contribute to early medical education? A BEME systematic review. *Med Teach* 2006;28:3–18.
- [20] Diemers AD, Dolmans DH, Verwijnen MG, Heineman E, Scherpbier AJ. Students' opinions about the effects of preclinical patient contacts on their learning. *Adv Health Sci Educ Theory Pract* 2008;13:633–47.
- [21] O'Brien B, Cooke M, Irby DM. Perceptions and attributions of third-year student struggles in clerkships: do students and clerkship directors agree? *Acad Med* 2007;82:970–8.
- [22] Prince KJ, Boshuizen HP, van der Vleuten CP, Scherpbier AJ. Students' opinions about their preparation for clinical practice. *Med Educ* 2005;39:704–12.
- [23] Makary MA, Daniel M. Medical error—the third leading cause of death in the US. *BMJ* 2016;353:i2139.
- [24] Shacklady J, Holmes E, Mason G, Davies I, Dornan T. Maturity and medical students' ease of transition into the clinical environment. *Med Teach* 2009;31:621–6.
- [25] van Hell EA, Kuks JB, Schonrock-Adema J, van Lohuizen MT, Cohen-Schotanus J. Transition to clinical training: influence of pre-clinical knowledge and skills, and consequences for clinical performance. *Med Educ* 2008;42:830–7.
- [26] Dornan T, Boshuizen H, King N, Scherpbier A. Experience-based learning: a model linking the processes and outcomes of medical students' workplace learning. *Med Educ* 2007;41:84–91.
- [27] MB-Monitor 2017 Gesamtauswertung. Evaluation IfQu, editor 2017.
- [28] Hahn EG, Fischer MR. Nationaler Kompetenzbasierter Lernzielkatalog Medizin (NKLM) für Deutschland: Zusammenarbeit der Gesellschaft für Medizinische Ausbildung (GMA) und des medizinischen Fakultätentages (MFT). *GMS Z Med Ausbild* 2009;26:Doc35.
- [29] Russeler M, Schill A, Kalozoumi-Paisi P, Ganzert C, Arheilger L, Sterz J, et al. [Teaching in perspective – how medical students assess their practical clinical training in surgery]. *Zentralbl Chir* 2017;142:46–52.
- [30] Juenger J. *Kompetenzorientiert prüfen im Staatsexamen Medizin*. Bundesgesundheitsblatt, Gesundheitsforschung, Gesundheitsschutz; 2017.
- [31] van der Vleuten CP, Schuwirth LW, Scheele F, Driessen EW, Hodges B. The assessment of professional competence: building blocks for theory development. *Best Pract Res Clin Obstet Gynaecol* 2010;24:703–19.
- [32] van der Vleuten CP, Schuwirth LW. Assessing professional competence: from methods to programmes. *Med Educ* 2005;39:309–17.
- [33] Wood T. Assessment not only drives learning, it may also help learning. *Med Educ* 2009;43:5–6.
- [34] Kasch R, Engelhardt M, Forch M, Merk H, Walcher F, Frohlich S. [Physician shortage: how to prevent generation Y from staying away – results of a nationwide survey]. *Zentralbl Chir* 2016;141:190–6.

---

**Supplementary Material:** The article (<https://doi.org/10.1515/iss-2018-0015>) offers reviewer assessments as supplementary material.



## Reviewer Assessment

Maria-Christina Stefanescu, Jasmina Sterz, Sebastian Herbert Hofer and Miriam Ruessler\*

# Young surgeons' challenges at the start of their clinical residency: a semi-qualitative study

<https://doi.org/10.1515/iss-2018-0015>

Received April 17, 2018; accepted May 24, 2018

\*Corresponding author: Prof. Dr. med. Miriam Ruessler, Department of Trauma, Hand and Reconstructive Surgery, University Hospital Frankfurt, Goethe University, Theodor Stern Kai 7, 60590 Frankfurt, Germany, Phone: 069-6301-6123, E-mail: miriam.ruessler@kgu.de

## Reviewers' Comments to Original Submission

### Reviewer 1: anonymous

May 09, 2018

**Reviewer Recommendation Term:** Accept with Minor Revision  
**Overall Reviewer Manuscript Rating:** 75

Custom Review Questions	Response
Is the subject area appropriate for you?	4
Does the title clearly reflect the paper's content?	4
Does the abstract clearly reflect the paper's content?	4
Do the keywords clearly reflect the paper's content?	4
Does the introduction present the problem clearly?	4
Are the results/conclusions justified?	4
How comprehensive and up-to-date is the subject matter presented?	4
How adequate is the data presentation?	4
Are units and terminology used correctly?	4
Is the number of cases adequate?	4
Are the experimental methods/clinical studies adequate?	4
Is the length appropriate in relation to the content?	4
Does the reader get new insights from the article?	4
Please rate the practical significance.	4
Please rate the accuracy of methods.	N/A
Please rate the statistical evaluation and quality control.	N/A
Please rate the appropriateness of the figures and tables.	4
Please rate the appropriateness of the references.	4
Please evaluate the writing style and use of language.	4
Please judge the overall scientific quality of the manuscript.	4
Are you willing to review the revision of this manuscript?	Yes

**Comments to Authors:**

In the current paper the authors analysed how junior doctors in their first and second years felt about their preparation for clinical practice as a doctor from their undergraduate training, as well as which teaching formats and factors influence their preparedness. A semi-qualitative interview-based study was performed using a structured interview manual. The study participants were 35 residents of general and visceral surgery, trauma surgery, and urology in their first and second years of medical specialty training. The audio recordings were transcribed word by word and analysed with structured qualitative content analysis techniques.

Only 43% of the participating residents stated they were sufficiently prepared to be a doctor from undergraduate medical training while 22.9% stated that they were not prepared. Nevertheless, 34.3% of the residents stated that undergraduate medical training did prepare them for some extent.

Administrative pathways (71%), deficits in linking knowledge to clinical reasoning (71%), decision making (54%), and therapy planning (51%) were the major hurdles the study participants described. Finally, to be better prepared for clinical practice, participants suggested providing a clearer structure of medical training as a an increasing patient encounters directly from the beginning of medical school.

In my opinion this is a very interesting topic the authors assess in their paper: the impression of junior doctors in their first and second years about their preparation for clinical practice as a doctor from their undergraduate training.

In fact the paper is well structured, written and gives a good overview of the current topic. Therefore, I have just some minor comments:

1. After completing the current study, the authors should clearly state what further research should focus in this topic.
2. A statistician should evaluate the study with respect to the statistical methods used in this study.

**Reviewer 2: Carsten Krones**

May 05, 2018

**Reviewer Recommendation Term:**

Accept with Minor Revision

**Overall Reviewer Manuscript Rating:**

99

**Custom Review Questions****Response**

Is the subject area appropriate for you?	5 - High/Yes
Does the title clearly reflect the paper's content?	5 - High/Yes
Does the abstract clearly reflect the paper's content?	5 - High/Yes
Do the keywords clearly reflect the paper's content?	5 - High/Yes
Does the introduction present the problem clearly?	5 - High/Yes
Are the results/conclusions justified?	4
How comprehensive and up-to-date is the subject matter presented?	5 - High/Yes
How adequate is the data presentation?	4
Are units and terminology used correctly?	5 - High/Yes
Is the number of cases adequate?	5 - High/Yes
Are the experimental methods/clinical studies adequate?	4
Is the length appropriate in relation to the content?	5 - High/Yes
Does the reader get new insights from the article?	4
Please rate the practical significance.	5 - High/Yes
Please rate the accuracy of methods.	4
Please rate the statistical evaluation and quality control.	4
Please rate the appropriateness of the figures and tables.	4
Please rate the appropriateness of the references.	3
Please evaluate the writing style and use of language.	5 - High/Yes
Please judge the overall scientific quality of the manuscript.	4
Are you willing to review the revision of this manuscript?	Yes

**Comments to Authors:**

Congratulations: hot Topic and a very good study; for sure, it must be printed;

Some additional comments:

\* to work independently - as a newcomer in medicine - is a totally unreal aim, despite all improvements; please, stress shortly on this fact in your discussion; do we have to weaken this assumption?

\* include your interview manual as an attachment

\* If possible: add sub analyses according to age, sex, type of hospital and vocational training; are there any striking differences?

\* Page 11: „what do you if a patient suffers pain?“ is this correct? Or better: what do you do...?

\* you identify discontinuity as a major problem in patient care; this problem derives at least to some extent from the trend to speciality, which is forced by the health policy as well as all medical societies; stress shortly on this contradiction, which needs to be solved

\* Your discussion identifies management aspects, participation in care from admission to discharge, the role model of residents and structured on-the-job adjustments as the main topics to be solved; but who stands in the duty to improve the situation? Make some proposals;

\* Your proposals for improvement are expensive; who is going to pay for it?

\* The discussion about the unknown role model as a physician is very important, especially in times of rising bureaucracy, specialisation and economic pressure; there are several literal attempts to counter this development, e.g. Survival Guide Chirurgie, Survival Guide Neurology, Mein erster Dienst - Anästhesie, Mein erster Dienst - psychiatrische Notfälle; mention them as good examples

\* Literature: try to include:

\* [“Practical clinical competence” - a joint programme to improve training in surgery].

\* [Article in German]

\* Ruesseler M1, Schill A1, Stibane T2, Damanakis A3, Schleicher I4, Menzler S5, Braunbeck A1, Walcher F1

\* Chirurg. 2010 Jan;81(1):7-13. doi: 10.1007/s00104-009-1760-6.

\* [Realistic surgical training. The Aachen model].

\* [Article in German]

\* Krones C1, Binnebösel M, Stumpf M, Schumpelick V.

\* Zentralbl Chir. 2012 Apr;137(2):144-8. doi: 10.1055/s-0031-1283985. Epub 2012 Apr 11.[Surgical education has its price].

\* [Article in German]

\* Schröder W1, Krones C].

## Authors' Response to Reviewer Comments

May 16, 2018

Dear Prof. Jähne, dear reviewers,

thank you for the appreciation of our manuscript and for giving us valuable feedback to further improve its quality. Below, you will find our point-by-point reply to your comments. All changes made within the manuscript are highlighted using coloured text.

We hope that after these changes our manuscript is suitable for acceptance in the journal.

Kind regards

### Reviewer #1:

In the current paper the authors analyzed how junior doctors in their first and second years felt about their preparation for clinical practice as a doctor from their undergraduate training, as well as which teaching formats and factors influence their preparedness. A semi-qualitative interview-based study was performed using a structured interview manual. The study participants were 35 residents of general and visceral surgery, trauma surgery, and urology in their first and second years of medical specialty training. The audio recordings were transcribed word by word and analyzed with structured qualitative content analysis techniques.

Only 43% of the participating residents stated they were sufficiently prepared to be a doctor from undergraduate medical training while 22.9% stated that they were not prepared. Nevertheless, 34.3% of the residents stated that undergraduate medical training did prepare them for some extent.

Administrative pathways (71%), deficits in linking knowledge to clinical reasoning (71%), decision making (54%), and therapy planning (51%) were the major hurdles the study participants described. Finally, to be better prepared for clinical practice, participants suggested providing a clearer structure of medical training as a an increasing patient encounters directly from the beginning of medical school.

In my opinion this is a very interesting topic the authors assess in their paper: the impression of junior doctors in their first and second

years about their preparation for clinical practice as a doctor from their undergraduate training.

In fact the paper is well structured, written and gives a good overview of the current topic. Therefore, I have just some minor comments:

- Thank you for highly appreciating our work.

1. After completing the current study, the authors should clearly state what further research should focus in this topic.

- Thank you for this remark, the further research needed is more clearly formulated in the discussion.

2. A statistician should evaluate the study with respect to the statistical methods used in this study.

- The whole study was supervised and analysed and evaluated by a statistician specialised in qualitative and semi-qualitative studies.

#### Reviewer #2:

Congratulations: hot Topic and a very good study; for sure, it must be printed;

-Thank you

Some additional comments:

\* to work independently - as a newcomer in medicine - is a totally unreal aim, despite all improvements; please, stress shortly on this fact in your discussion; do we have to weaken this assumption?

- Thank you for this remark, this aspect was more stressed in the discussion.

\* include your interview manual as an attachment

- Thank you for this remark, if the editor agrees, the interview manual can be provided as supplemental material.

\* If possible: add sub analyses according to age, sex, type of hospital and vocational training; are there any striking differences?

- Thank you for this remark. For subgroup analysis of sex, age, type of hospital and vocational training, the study sample is too small in order to make clear statements.

\* Page 11: „what do you if a patient suffers pain?“ is this correct? Or better: what do you do...?

- Thank you for this remark, this was corrected in the manuscript.

\* Your discussion identifies management aspects, participation in care from admission to discharge, the role model of residents and structured on-the-job adjustments as the main topics to be solved; but who stands in the duty to improve the situation? Make some proposals;

- Thank you for this remark, this aspect was further emphasized in the discussion.

\* The discussion about the unknown role model as a physician is very important, especially in times of rising bureaucracy, specialisation and economic pressure; there are several literal attempts to counter this development, e.g. Survival Guide Chirurgie, Survival Guide Neurology, Mein erster Dienst - Anästhesie, Mein erster Dienst - psychiatrische Notfälle; mention them as good examples

- Thank you for this remark. The authors do not see the existing books such as survival guides as a good example for attempts to counter this development as to our opinion this should be taught by the medical faculties and the corresponding hospitals.

\* Literature: try to include:

\* [“Practical clinical competence” - a joint programme to improve training in surgery].

\* [Article in German]

\* Ruesseler M1, Schill A1, Stibane T2, Damanakis A3, Schleicher I4, Menzler S5, Braunbeck A1, Walcher F1

\* Chirur. 2010 Jan;81(1):7-13. doi: 10.1007/s00104-009-1760-6.

\* [Realistic surgical training. The Aachen model].

\* [Article in German]

\* Krones CJ1, Binnebösel M, Stumpf M, Schumpelick V.

\* Zentralbl Chir. 2012 Apr;137(2):144-8. doi: 10.1055/s-0031-1283985. Epub 2012 Apr 11.[Surgical education has its price].

\* [Article in German]

\* Schröder W1, Krones CJ.

- Thank you for this remark.

The authors do not see a possibility to fit the first literature proposal within the text. As this literature represents the description of the funded research project where the present study belongs to, it might be the possibility to include the literature in the author statement under research funding, if the editor agrees.

The authors rate the other two proposed references as important in the context of surgical education and training. However, to our mind, the proposed references do not fit completely in the context of our manuscript compared to the already included references which already complete the general guideline for the maximum number of references.

## Comments to Revision

### Reviewer 1: anonymous

May 24, 2018

---

<b>Reviewer Recommendation Term:</b>	Accept
<b>Overall Reviewer Manuscript Rating:</b>	90
<b>Custom Review Questions</b>	<b>Response</b>
Is the subject area appropriate for you?	5 - High/Yes
Does the title clearly reflect the paper's content?	5 - High/Yes
Does the abstract clearly reflect the paper's content?	5 - High/Yes
Do the keywords clearly reflect the paper's content?	5 - High/Yes
Does the introduction present the problem clearly?	4
Are the results/conclusions justified?	4
How comprehensive and up-to-date is the subject matter presented?	5 - High/Yes
How adequate is the data presentation?	4
Are units and terminology used correctly?	5 - High/Yes
Is the number of cases adequate?	4
Are the experimental methods/clinical studies adequate?	N/A
Is the length appropriate in relation to the content?	4
Does the reader get new insights from the article?	5 - High/Yes
Please rate the practical significance.	5 - High/Yes
Please rate the accuracy of methods.	4
Please rate the statistical evaluation and quality control.	4
Please rate the appropriateness of the figures and tables.	4
Please rate the appropriateness of the references.	4
Please evaluate the writing style and use of language.	4
Please judge the overall scientific quality of the manuscript.	5 - High/Yes
Are you willing to review the revision of this manuscript?	Yes

#### Comments to Authors:

Accept in the current form.

---

### Reviewer 2: Carsten Krones

May 17, 2018

---

<b>Reviewer Recommendation Term:</b>	Accept
<b>Overall Reviewer Manuscript Rating:</b>	90
<b>Custom Review Questions</b>	<b>Response</b>
Is the subject area appropriate for you?	4
Does the title clearly reflect the paper's content?	4
Does the abstract clearly reflect the paper's content?	4
Do the keywords clearly reflect the paper's content?	4
Does the introduction present the problem clearly?	4
Are the results/conclusions justified?	4
How comprehensive and up-to-date is the subject matter presented?	4
How adequate is the data presentation?	4
Are units and terminology used correctly?	4
Is the number of cases adequate?	4
Are the experimental methods/clinical studies adequate?	4

Is the length appropriate in relation to the content?	4
Does the reader get new insights from the article?	4
Please rate the practical significance.	4
Please rate the accuracy of methods.	4
Please rate the statistical evaluation and quality control.	4
Please rate the appropriateness of the figures and tables.	4
Please rate the appropriateness of the references.	4
Please evaluate the writing style and use of language.	4
Please judge the overall scientific quality of the manuscript.	4
Are you willing to review the revision of this manuscript?	Yes

**Comments to Authors:**

-

---