Title: The impact of surgical experience and frequency of practice on perioperative outcomes in pancreatic surgery

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The impact of surgical experience and frequency of practice on perioperative outcomes in pancreatic surgery.

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Dear Dr. Kanhere, dear Reviewers,

Sincerest thanks for kindly offering us the chance to revise our paper for publication in BMC Surgery, and for the very constructive, thoughtful, and insightful comments and suggestions. We have carefully revised our work accordingly, which has hopefully improved significantly in quality. We most sincerely wish that it could now be accepted for publication.

Please find in the following pages our point-by-point responses to all comments. Notes to specific locations of amendments in the Revised Manuscript are highlighted in bold. In the
Revised Manuscript, modified places are highlighted in yellow. Line numbers refer to those in the Word manuscript file but not those generated by the submission system.

Thank you very much again for your time and kind work on our paper.

Best regards and best wishes,

Sincerely yours,

Christian Krautz on behalf of all authors

To Reviewer #1:
Well written article with logical structure. The authors scientifically analyse a question which in our mind has an obvious answer: More practice and good supervision improves outcomes. This has been done in a diligent way analysing in excess of 1000 pancreatic resection over a 20 year period.

Re: thank you very much for your positive appraisal of our work.

A few points I would suggest would benefit of clarification/mentioning:
- In hospital mortality is not an ideal primary outcome parameter, 60 day mortality would be much preferable

Re: thank you for your constructive comment. We fully agree with you that 60- or even 90day mortality is the more preferable outcome measure as compared to in-hospital mortality. However, as the database was started, only in-hospital mortality was recorded for several years. In order to get a more representative patient cohort, we decided to use in-hospital mortality rather than using 90-day mortality, which would have resulted in a significantly smaller patient cohort. The same applies for the secondary outcome measures (POPF, PPH, DGE). We now clarified this in the method section (page 5, line 14-16).

In addition, one must be aware of the fact that the average length of stay following pancreatic resections in Germany is 20-25 days, as shown in our previous analysis of all pancreatic
resections in Germany using nationwide hospital discharge data (Krautz et al., Annals of Surgery 2018). This is much longer than in most other countries, which is probably why rates of in-hospital mortality and 90-day mortality do not differ as distinctly in Germany (10.1% vs. 12.1%, according to Alsfasser et al. BJS 2016) as in other countries.

- I do not agree with the conclusion that these data supports centralisation of cases. It only looks at the individual surgeons outcomes not the performance of the entire hospital system, especially given in hospital mortality was chosen as primary outcome.

Re: we appreciate your thoughtful comment and do fully agree. We have now carefully modified the conclusions. (abstract: page 2, line 19 and conclusion: page 10, line 15).

- Article would benefit from discussion some limitations for the article: retrospective data, changes/recency of practice over 20y period, selection bias of cases (novice vs expert) etc

Re: as thoughtfully suggested, we have now extended our discussion on limitations (discussion section: page 9, line 22-23 and page 10, line 5-6).

To Reviewer #2:

The group has identified technical training of complex surgical procedures as a complicated and evolving matter, especially in the context of the current outcome-driven environment. A review of the literature has been conducted showing there are well established learning curves in pancreatic surgery and that experience level has been correlated with better operative outcomes. The group retrospectively looked at twenty years of pancreas surgery to investigate the relationship between experience level and operative outcomes as well as frequency of practice in operative outcomes. They have proposed three hypotheses 1) Stringent case selection and intensive supervision will result in comparable postoperative morbidity of novices and experienced surgeons. 2) Reduction of supervision and less stringent case selection will impair outcomes (Figure 1). 3) Frequent practice of pancreatic resections will improve perioperative outcomes.

Overall the paper has identified a pertinent topic in surgical education, that is the transfer of technical skill in complex surgical tasks. Regarding methods, the group retrospectively analysed patients undergoing pancreatic resections between 1993-2013, and using appropriate statistical
tools, investigated the relationship between experience and frequency with operative outcomes. The paper seems more strongly focused on the relationship between surgeon experience and outcomes, which has already been very well established in the literature. In addition, based on the results of beginner and experienced surgeons having similarly good outcomes compared the intermediate surgeon, this is almost certainly secondary to the amount of supervision/independence of the trainee, which was not quantified.

Re: thank you very much for your positive appraisal of our work.

Figure 1 is essentially a pictogram showing the anecdotal relationship of decreased supervision with more experience but does not actually quantify any concrete data. Would get rid of this.

Re: as thoughtfully suggested, Figure 1 has now been removed.

However, this does raise the important point that increasing trainee autonomy, an inevitable part of training, may be associated with higher complication rates, which should still be included as a discussion point.

Re: We fully agree with you that increasing trainee autonomy may be associated with higher complication rates. We added this point to the discussion section (discussion section: page 8, line 19 and 26 and page 9, line 1-4).

What is more impressive about this paper is the relationship it shows between frequency of operations on the shorter term (number of resections in 6 weeks) and improved outcomes. Most of the literature talks about case volume per year, whereas this study shows a very real difference in outcomes of surgeons practicing more frequently in the short term. The manuscript would have more impact if this was the primary focus as it is a more novel concept.

Re: thank you very much for your positive appraisal of our work. We also believe that this way of looking into the practice of surgeons in the short term is one of the important features of this manuscript. We now tried to accentuate this fact in our manuscript (discussion section: page 9, line 8 and 10 and page 9, line 14-17).

Would include rates of R0, R1 and R2 resections as an outcome, as quality of resection is as important if not more so than the rate of post-operative complications.
Re: thank you very much for this constructive comment. Due to the database structure and the limited ability to reconstruct the post-discharge course of our early patients, we decided to undertake an analysis of short-term outcomes in the first place. In our opinion, the inclusion of the R status would be particularly useful in combination with survival data. In such an analysis of long-term results our patient cohort would be significantly smaller, which is why we would like to stick with short-term outcomes.

From an ease of reading perspective, would write out abbreviations in full the first time they are used, even with the appendix at the end.

Re: as suggested, abbreviations have now been written out in full the first time they are used.