RESEARCH ARTICLE

The choice between surgical scrubbing and sterile covering before or after induction of anaesthesia: A prospective study [version 1; peer review: 1 approved, 1 approved with reservations]

Irene Sellbrandt¹, Metha Brattwall², Pether Jildenstål³,
Margareta Warrén Stomberg³, Jan G. Jakobsson ⁴

¹Department of Anaesthesia, Capio Lundby Hospital, Gothenburg, 417 17, Sweden

²Department of Anaesthesia and Intensive Care, Sahlgrenska University Hospital, Mölndal, 413 45, Sweden

³Department of Anaesthesiology and Intensive Care Medicine, Institute of Health and Care Sciences, The Sahlgrenska Academy, Gothenburg University, Gothenburg, 413 46, Sweden

⁴Department of Anaesthesia, Institution for Clinical Science, Karolinska Institutet at Danderyds University Hospital, Stockholm, 182 88, Sweden

V1 First published: 28 Jun 2017, 6:1019
<https://doi.org/10.12688/f1000research.11965.1>

Latest published: 09 Aug 2017, 6:1019
<https://doi.org/10.12688/f1000research.11965.2>

Abstract

Background: Day surgery is increasing, and safe and effective logistics are sought. One part of the in-theatre logistics commonly discussed is whether surgical scrub and sterile covering should be done before or after induction of anaesthesia. The aim of the present study was to compare the impact of surgical scrub and sterile covering before vs. after the induction of anaesthesia in male patients scheduled for open hernia repair.

Methods: This is a prospective randomised study. Sixty ASA 1-3 patients scheduled for open hernia repair were randomised to surgical scrub and sterile covering before or after induction of anaesthesia; group “awake” and group “anaesthetised”, respectively. Patients and theatre nurses were asked about their experiences and willingness to have the same logistics on further potential surgeries, through a survey provided before post-surgery. Duration of anaesthesia, surgery, theatre time, recovery room stay and time to discharge was studied.

Results: There was no difference in the patients’ assessment of quality of care, and only one patient in the awake group would prefer to be anaesthetised on a future procedure. All nurses found pre-anaesthesia scrubbing acceptable as routine. The duration of anaesthesia was shorter and doses of propofol and remifentanyl were reduced by 10 and 13%, respectively, in the awake group. Time in recovery area was significantly reduced in the awake group ($p < 0.05$),

Open Peer Review

Approval Status

	1	2
version 2		
(revision)
09 Aug 2017	view	
version 1
28 Jun 2017	view	view

1. **Jakob Walldén** , Umeå University, Sundsvall, Sweden

2. **Adam Magos**, Royal Free Hospital, London, UK

Any reports and responses or comments on the article can be found at the end of the article.

but time to discharge was not different.

Conclusion: Surgical scrub and sterile covering before the induction of anaesthesia can be done safely and without jeopardising patients' quality of care.

Keywords

Day surgery, operating theatre turn around, theatre efficacy, surgical scrubbing, sterile covering

Corresponding author: Jan G. Jakobsson (jan.jakobsson@ki.se)

Author roles: **Sellbrandt I:** Conceptualization, Formal Analysis, Project Administration, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing; **Brattwall M:** Data Curation, Funding Acquisition, Investigation; **Jildenstål P:** Conceptualization; **Warrén Stomberg M:** Conceptualization, Data Curation, Investigation, Methodology; **Jakobsson JG:** Conceptualization, Writing – Original Draft Preparation

Competing interests: No competing interests were disclosed.

Grant information: This study has been supported by Capio Lundby Hospital. No external funding or financial support has been received.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Copyright: © 2017 Sellbrandt I *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Data associated with the article are available under the terms of the [Creative Commons Zero "No rights reserved" data waiver](#) (CC0 1.0 Public domain dedication).

How to cite this article: Sellbrandt I, Brattwall M, Jildenstål P *et al.* **The choice between surgical scrubbing and sterile covering before or after induction of anaesthesia: A prospective study [version 1; peer review: 1 approved, 1 approved with reservations]** F1000Research 2017, 6:1019 <https://doi.org/10.12688/f1000research.11965.1>

First published: 28 Jun 2017, 6:1019 <https://doi.org/10.12688/f1000research.11965.1>

Introduction

Day surgery, where the patient leaves the hospital on the same day as surgery, is increasing. Shortening a hospital stay is associated to several benefits: Early ambulation reduces the risk for thromboembolic complications, as well as postoperative infections; and it will reduce health care costs. Thus, its implementation is of value for both patients and society. However, day surgery calls for good perioperative care, enabling rapid recovery to send patients safely home after a few hours following the end of surgery/anaesthesia. Shortening anaesthesia time, avoiding unnecessary anaesthetic exposure, has several potential benefits, including avoiding unnecessary cardiovascular depression, since there is a miss-match between anaesthetic depression and stimuli, thus requiring vasoactive support, improving early recovery, and reducing the amount of anaesthetic used.

The aim of the present study was to compare surgical scrub and sterile covering before vs. after induction of anaesthesia. Our hypothesis was that avoiding prolonged anaesthesia by inducing anaesthesia prior to surgical scrubbing and sterile covering would reduce the need for vasoactive medication. Additionally, the study aimed to determine if this different theatre logistic further affect drug doses of anaesthetic agents, post-anaesthesia care unit (PACU) time and quality of care?

Methods

Ethical approval

The study protocol has been reviewed and approved by the Gothenburg Ethical Committee (Dnr. 751-16 scientific secretary Sven Wallerstedt).

Study group

The study was conducted at Capio Lundby Hospital in Gothenburg, November 2016 – February 2017. Male patients scheduled for elective open hernia repair with a modified Lichtenstein technique under general anaesthesia were requested to participate. Exclusion criteria was severe cardiovascular, respiratory, hepatic or renal disease, and American Society of Anaesthesiology (ASA) score of >3. Sixty ASA 1-3 patients scheduled for elective open hernia repair, modified Lichtenstein procedure, participated in the study following verbal and written informed consent. These patients were randomised by envelope technique into two groups:

1. Awake group: Surgical scrub and sterile covering before induction of anaesthesia, having the patient awake but sedated.
2. Anaesthetised group: Surgical scrub and sterile covering when the patient is asleep, anaesthesia induction and securing airway and start of maintenance has been initiated.

Patients received all medication and care in accordance to routine procedures of the department, apart from the scrubbing and sterile covering. Premedication was with paracetamol and diclofenac.

Anaesthesia was induced and maintained with propofol and remifentanyl (total intravenous anaesthesia; TIVA). Anaesthesia was adjusted per clinical signs. No EEG-based depth of anaesthesia

monitor was used. Patients had local anaesthesia in the wound area during the surgery. Postoperative nausea and vomiting (PONV) prophylaxis was administered based on risk, assessed by Apfel score.

All patients received care in accordance to routines of the department, apart from the preoperative preparation, surgical scrub and sterile covering awake or after induction of anaesthesia.

Data collection

Patients' assessment of their experience being awake or anaesthetised during surgical scrub and sterile covering was collected using a postoperative survey. The survey used a visual analogue scale (VAS; 0, unacceptable to 10, fully acceptable) to describe the experience, and the question 'would you like to have the same care if you needed further surgery?' (yes/no/I don't know).

Perioperative observations were collected from the patient case record.

Operating room nurses (n=7) were asked whether they found the surgical scrub and covering acceptable from a patient care perspective (VAS scale) only for awake patients.

Data analysis

All data is presented as mean $\pm$ standard deviation (SD), unless otherwise stated. Differences between groups' continuous data, e.g. demographics and perioperative observation were assessed by Student's *t*-test, and categorical data with Chi-square test. A $p < 0.05$ was considered statistically significant. Data was analysed with StatView (v1.04) for MAC.

The number of patients studied is based on a power analysis from findings in a pilot study; awake surgical scrub and sterile covering should reduce the need for vasoactive medication. A difference of 10 to 5 mg composite with SD of 6 with a power of 80% would require two groups of patients with 23 each to show a difference $p < 0.05$.

Results

Assessment of quality of care during surgical scrub and sterile covering was assessed by all 60 patients; three patients were excluded from analysis of anaesthesia and recovery, as the surgery became more extensive than planned or for social reasons, and the patients were kept as inpatients. There were only minor demographic differences between the groups: the mean age of the awake group was 5 years older, but the ASA class was not different (Table 1).

In total, 27 of the awake patients would undergo surgery using the same logistics, two were indifferent and one was "negative", while 21 of the anaesthetised patient would like to have the same logistics, and nine were indifferent. The theatre nurses rated patients being awake during surgical scrub and sterile covering as acceptable; 4/7 rated 10/10, while the remaining three rated as follows: 1, 6/10; 2, 8/10. All 7 nurses involved in the patient care considered it feasible to perform surgical scrub and sterile covering before induction of anaesthesia as routine procedure.

Duration of anaesthesia and time with laryngeal mask airway was shorter in the awake group ($p>0.05$). The amount of propofol and remifentanyl required was lower in the awake group: 10% reduction in propofol and 13% reduction of remifentanyl, but this was not significant. We found no difference in vasoactive need during surgery between groups. There were no differences in early recovery or vital signs, and pain was regained at similar times in both groups. Time in PACU was shorter for the awake patients ($p<0.05$), but time to discharge, pain and PONV showed no difference between groups (Table 2).

Table 1. Patient demographics of patients in the awake and anaesthetised group. Data is displayed as the mean (standard deviation), unless otherwise stated.

	Anaesthetised (n=30)	Awake/sedated (n=30)	P-value
Age (years)	58 (16)	63 (15)	0.2
BMI	26 (3)	26 (3)	0.4
ASA, 1/2/3	5/18/7	9/17/4	.3
Smoking, yes/no	5/25	3/27	0.7

Dataset 1. Demographics, perioperative observations, and response to questionnaire of the patients undergoing surgical scrub and covering pre and post-anaesthesia

<http://dx.doi.org/10.5256/f1000research.11965.d166034>

Discussion

We found surgical scrub and sterile covering prior to induction of anaesthesia feasible and with a maintained quality of care. It reduced drug usage and shortened time in the recovery area. However, no difference in need for vasoactive medication was found.

Many theatre nurses in Sweden prefer the patient being asleep while surgical scrubbing and sterile covering is performed. This prolongs the time of anaesthesia, may cause additional need for vasoactive medications and may prolong recovery. The argument is that it may be distressful for patients if they are awake during preparation, surgical scrubbing and sterile covering. However, in this study, generally patients did not mind being awake, on the contrary some patients gave positive feedback about being awake during preparation. Some nurses also feel that the liquid used for scrubbing may cause a freezing sensation in patients; we did

Table 2. Perioperative observations of the patients in the awake and anaesthetised group.

Data is displayed as the mean (standard deviation), unless otherwise stated. Two patients in the awake group and one in the anaesthetised group were excluded from analysis, since they were kept as inpatients. Surgery time is defined as the time the patient is being operated on; theatre time is defined as the entrance to theatre to leaving for PACU. LMA, laryngeal mask airway; PACU, post-anaesthesia care unit; VAS, visual analog scale.

	Anaesthetised (n=29)	Awake/sedated (n=28)	P-value
Anaesthesia (min.)	64 (10)	60 (14)	0.17
Propofol (mg)	506 (114)	455 (119)	0.10
Remifentanyl (μ g)	837 (205)	731 (256)	0.08
Ephedrine (mg), median (range)	0 (0-15)	0 (0-25)	0.16
Phenylephrine (mg), median (range)	0 (0-0.8)	0 (0-0.4)	0.46
Time with LMA (min.)	58 (10)	52 (14)	0.068
Surgery (min.)	39 (9)	38 (13)	0.78
Theatre (min.)	70 (10)	69 (13)	0.77
PACU (min)	48 (16)	39 (15)	$p0.042$
Max pain during PACU (VAS)	1.8 (2.7)	1.2 (2.1)	0.33
Time to discharge (min.)	224 (58)	235 (65)	0.45
Patient assessed quality of care (VAS), median (range)	10 (6-10)	10 (3-10)	0.09

not hear any comments supporting this notion. There are also discussions regarding that awake patients may be at an increased risk for surgical site infections (SSI). In a majority of SSI cases, the pathogen source is the native flora of the patient's skin and there is no firm evidence that the anaesthetic technique used, i.e. patient being awake or asleep during scrub and sterile covering, should impact the infection risk^{1,2}. Two recent studies in a huge number of patients undergoing orthopaedic procedures did not show any difference between general anaesthesia, spinal anaesthesia and peripheral blocks^{3,4}.

Shortening the duration of anaesthesia and drug doses may be of value, especially for elderly patients. There are studies suggesting that tailoring anaesthesia reduces the risks for cognitive side effects⁵. We did not follow patients beyond discharge. All our patients had total intravenous anaesthesia; whether use of inhaled anaesthesia for maintenance could further improve emergence, the early recovery, and quality of recovery cannot be assessed from the present study. We found in a previous study that inhaled anaesthesia facilitates early recovery⁶. We could however not see any reduced need for vasoactive medication, thus our primary hypothesis was negative. We cannot give any firm explanation as to why this occurred, since in the awake group the need for both propofol and remifentanyl was reduced.

Theatre turnaround time is of increasing importance. Efforts to improve efficacy has been addressed in several studies. Koenig *et al.* studied anaesthesia induction when the surgeon was in theatre or not, and its impact on waiting time and unnecessary anaesthesia duration⁷. They found a significant shortening of anaesthesia time when surgeons were readily available in the theatre. Saha *et al.* found that transfer of patient to and from theatre has a significant impact on theatre turnaround time⁸. We found clear logistical benefits associated with the use of local anaesthesia and sedation as compared to general anaesthesia in a previous study⁹. The benefit of local anaesthesia sedation technique has also been supported by others for vaginal prolapse surgery^{10,11}. Open hernia repair is commonly done under local anaesthesia only¹². Thus, avoiding anaesthesia during surgery preparation also seems to be a feasible alternative when patients are undergoing general anaesthesia.

There are limitations to our study. We studied only one procedure, elderly male patients scheduled for inguinal hernia repair. Whether

these results are transferable to other procedures needs further studies. Proper information around the importance of scrubbing and covering should be given to patients, and providing light sedation should be done in accordance to a patient's wish. Whether fine tuning anaesthetic delivery could further impact the results cannot be stated. We could not find studies assessing the surgical scrub and sterile covering impact on quality of care or theatre time events, thus we are not able to truly put our findings into perspective of previous similar results. We still believe that our findings can be of interest and importance as lean operating theatre planning is of growing importance. There are studies looking at different anaesthetic techniques and the use of a holding area for theatre preparation, which show benefits to introducing peripheral blocks before entry to the theatre¹³.

In conclusion, preparation, surgical scrub and sterile covering, before induction of anaesthesia is feasible, and does not jeopardise quality of care. In addition, it reduce anaesthetic agents need and may thus shorten recovery room stay.

Data availability

Dataset 1: Demographics, perioperative observations, and response to questionnaire of the patients undergoing surgical scrub and covering pre and post-anaesthesia. doi, [10.5256/f1000research.11965.d166034](https://doi.org/10.5256/f1000research.11965.d166034)¹⁴

Competing interests

No competing interests were disclosed.

Grant information

This study has been supported by Capio Lundby Hospital. No external funding or financial support has been received.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Acknowledgements

The authors gratefully acknowledge the staff of the Operating unit, PACU and Postoperative Ward in Capio Lundby Hospital, Gothenburg for help with collecting all data for this study.

References

- Grant MC, Yang D, Wu CL, *et al.*: **Impact of Enhanced Recovery After Surgery and Fast Track Surgery Pathways on Healthcare-associated Infections: Results From a Systematic Review and Meta-analysis.** *Ann Surg.* 2017; **265**(1): 68–79.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Iorio R, Osmani FA: **Strategies to Prevent Periprosthetic Joint Infection After Total Knee Arthroplasty and Lessen the Risk of Readmission for the Patient.** *J Am Acad Orthop Surg.* 2017; **25**(Suppl 1): S13–S16.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Curry CS, Smith KA, Allyn JW: **Evaluation of anesthetic technique on surgical site infections (SSIs) at a single institution.** *J Clin Anesth.* 2014; **26**(8): 601–5.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Kopp SL, Berbari EF, Osmon DR, *et al.*: **The Impact of Anesthetic Management on Surgical Site Infections in Patients Undergoing Total Knee or Total Hip Arthroplasty.** *Anesth Analg.* 2015; **121**(5): 1215–21.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Oliveira CR, Bernardo WM, Nunes VM: **Benefit of general anesthesia monitored by bispectral index compared with monitoring guided only by clinical parameters. Systematic review and meta-analysis.** *Braz J Anesthesiol.* 2017; **67**(1): 72–84.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Dolk A, Cannerfelt R, Anderson RE, *et al.*: **Inhalation anaesthesia is cost-effective for ambulatory surgery: a clinical comparison with propofol during elective knee arthroscopy.** *Eur J Anaesthesiol.* 2002; **19**(2): 88–92.
[PubMed Abstract](#)

7. Koenig T, Neumann C, Ocker T, *et al.*: **Estimating the time needed for induction of anaesthesia and its importance in balancing anaesthetists' and surgeons' waiting times around the start of surgery.** *Anaesthesia*. 2011; **66**(7): 556–62.
[PubMed Abstract](#) | [Publisher Full Text](#)
8. Saha P, Pinjani A, Al-Shabibi N, *et al.*: **Why we are wasting time in the operating theatre?** *Int J Health Plann Manage*. 2009; **24**(3): 225–32.
[PubMed Abstract](#) | [Publisher Full Text](#)
9. Sellbrant I, Pedroletti C, Jakobsson JG: **Pelvic organ prolapse surgery: changes in perioperative management improving hospital pathway.** *Minerva Ginecol*. 2017; **69**(1): 18–22.
[PubMed Abstract](#) | [Publisher Full Text](#)
10. Buchsbaum GM, Albushies DT, Schoenecker E, *et al.*: **Local anesthesia with sedation for vaginal reconstructive surgery.** *Int Urogynecol J Pelvic Floor Dysfunct*. 2006; **17**(3): 211–4.
[PubMed Abstract](#) | [Publisher Full Text](#)
11. Flam F: **Sedation and local anaesthesia for vaginal pelvic floor repair of genital prolapse using mesh.** *Int Urogynecol J Pelvic Floor Dysfunct*. 2007; **18**(12): 1471–5.
[PubMed Abstract](#) | [Publisher Full Text](#)
12. Prakash D, Heskin L, Doherty S, *et al.*: **Local anaesthesia versus spinal anaesthesia in inguinal hernia repair: A systematic review and meta-analysis.** *Surgeon*. 2017; **15**(1): 47–57.
[PubMed Abstract](#) | [Publisher Full Text](#)
13. Lohela TJ, Chase RP, Hiekkänen TA, *et al.*: **Operating unit time use is associated with anaesthesia type in below-knee surgery in adults.** *Acta Anaesthesiol Scand*. 2017; **61**(3): 300–308.
[PubMed Abstract](#) | [Publisher Full Text](#)
14. Sellbrandt I, Brattwall M, Jildenstä IP, *et al.*: **Dataset 1 in: The choice between surgical scrubbing and sterile covering before or after induction of anaesthesia: A prospective study.** *F1000Research*. 2017.
[Data Source](#)

Open Peer Review

Current Peer Review Status:

Version 1

Reviewer Report 04 August 2017

<https://doi.org/10.5256/f1000research.12935.r24416>

© 2017 Magos A. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Adam Magos

Royal Free Hospital, London, UK

This is a simple, small prospective RCT addressing the issue of scrubbing and prepping patients undergoing hernia repair ("anaesthetised" group) before or after ("awake" group) induction of general anaesthesia. The manuscript is clearly written and provide adequate details about methodology, including a power calculation. The results show that the only statistically significant advantage an "awake" approach was less time in recovery by 9 (48 v 39) minutes. None of the other variables were significantly different although there was a trend to less anaesthetic usage in the awake group associated with a 4 (64 v 60) minutes reduction in anaesthetic time.

Whether or not there is a meaningful advantage of pre-anaesthetic scrubbing and prepping is not confirmed by this study, perhaps because it was underpowered, and this is reflected in the authors' conclusions.

Nonetheless, this is an interesting study and one which may stimulate larger studies in different surgical areas. For this reason, publication would be worthwhile.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 17 July 2017

<https://doi.org/10.5256/f1000research.12935.r23882>

© 2017 Walldén J. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Jakob Walldén

Anaesthesia and Intensive Care, Umeå University, Sundsvall, Sweden

General comments:

Interesting pragmatic study evaluating if surgical scrub should be done before or after induction of anesthesia. The perspective is both from the patients and nurses point of view. The authors have found no major differences between the approaches and the major conclusion of the study is adequate.

My major concerns regarding the manuscript is that the authors must be more consistent with the endpoints in the study, there is no clear line in the manuscript of the primary and secondary endpoints. The power analysis is done on the reduction of an undefined vasoactive drug and this is consistent with the hypothesis stated in the end of the introduction, but this outcome is not even mentioned in the abstract.

Please define the endpoint in the study clearly, and be consistent with these endpoint when presenting and discussing the results throughout the manuscript.

Please correct tense throughout the manuscript and use past tense when describing the study. Please also proof-read so that grammar is correct throughout the manuscript, there are still quite a few grammatical errors.

Specific comments:

Abstract/Results: Present the figures of the main results, not only the p-values.

Abstract/Conclusion: Is the statement "safe" supported"? No outcomes regarding safety.

Introduction:

Relevant section. Punctuation instead of question-mark in in last sentence of introduction.

Methods:

- Please use correct name of the review board (Regional Ethical Review Board in Gothenburg). State date for decision.
- Please state main outcome variables, primary and secondary.
- Duplicated sections?

Patients received all medication and care in accordance to routine procedures of the department, apart from the scrubbing and sterile covering. Premedication was with paracetamol and diclofenac.

All patients received care in accordance to routines of the department, apart from the preoperative preparation, surgical scrub and sterile covering awake or after induction of anaesthesia.

- How was the procedure/routine for giving vasoactive drugs during anesthesia? First choice, second choice? Blood pressure cutpoints?
- Power analysis: Reduction in what drug?

Results and Table 1:

Present the results in a structured order according to primary and secondary outcomes.

The primary endpoint (vasoactive drugs) is a parameter that might need to be presented more extensively. Three drugs are presented, and there is a small tendency that the awake group received more vasoactive drugs. Another dimension to explore the data is to present the number of patients that needed vasoactive drugs.

Nurse rating: unclear what you mean with: / ... follows: 1, 6/10; 2, 8/10./ Are there one nurse rating missing?

Discussion:

Main conclusions adequate in first paragraph.

In second paragraph regarding theatre nurses, there are many statements without references. (..prefer patients being asleep... distressful for patients.... freezing sensations...discussion regarding that awake patients may be at an increased risk for surgical site infections...). Please support the statements if possible.

Discuss more extensively the differences between the group and possible impact on the results (i.e. age differences, anesthetic doses).

Discuss if the study was properly powered. Better to use other variable calculate power?

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Partly

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response (F1000Research Advisory Board Member) 27 Jul 2017

Jan Jakobsson, Karolinska Institutet at Danderyds University Hospital, Stockholm, Sweden

Thank you for adequate and constructive comments;

My major concerns regarding the manuscript is that the authors must be more consistent with the endpoints in the study, there is no clear line in the manuscript of the primary and secondary endpoints. The power analysis is done on the reduction of an undefined vasoactive drug and this is consistent with the hypothesis stated in the end of the introduction, but this outcome is not even mentioned in the abstract.

Please define the endpoint in the study clearly, and be consistent with these endpoints when presenting and discussing the results throughout the manuscript.

The study was set-up to study differences between the two logistics, sterile washing and dressing before or after induction of anaesthesia. The power analysis was based on a pilot study looking at the amount of ephedrine needed, with MAP 60 and SAP 90 as cut-off values. Secondary outcomes where patients and scrub nurses assessment, any signs of safety concerns, and last theatre turn time around and PACU stay duration. We have now clarified and amended

the manuscript accordingly.

Please correct tense throughout the manuscript and use past tense when describing the study. Please also proof-read so that grammar is correct throughout the manuscript, there are still quite a few grammatical errors.

We have amended the language to past tense and further checked spelling and grammar

Specific comments:

Abstract/Results: Present the figures of the main results, not only the p-values.

Added accordingly

Abstract/Conclusion: Is the statement "safe" supported"? No outcomes regarding safety.

Amended/clarified

Introduction:

Relevant section. Punctuation instead of question-mark in in last sentence of introduction.

Methods:

- Please use correct name of the review board (Regional Ethical Review Board in Gothenburg). State date for decision. *Amended/added*
- Please state main outcome variables, primary and secondary. Clarified
- Duplicated sections?

Patients received all medication and care in accordance to routine procedures of the department, apart from the scrubbing and sterile covering. Premedication was with paracetamol and diclofenac.

All patients received care in accordance to routines of the department, apart from the preoperative preparation, surgical scrub and sterile covering awake or after induction of anaesthesia.

Corrected

- How was the procedure/routine for giving vasoactive drugs during anesthesia? First choice, second choice? Blood pressure cutpoints?
- Power analysis: Reduction in what drug? Efedrin

Results and Table 1:

Present the results in a structured order according to primary and secondary outcomes.

The primary endpoint (vasoactive drugs) is a parameter that might needs to be presented

more extensively. Three drugs are presented, and there is a small tendency that the awake group received more vasoactive drugs. Another dimension to explore the data is to present the number of patients that needed vasoactive drugs.

Nurse rating: unclear what you mean with: / ... follows: 1, 6/10; 2, 8/10./ Are there one nurse rating missing?

Discussion:

Main conclusions adequate in first paragraph.

In second paragraph regarding theatre nurses, there are many statements without references. (..prefer patients being asleep... distressful for patients.... freezing sensations...discussion regarding that awake patients may be at an increased risk for surgical site infections...). Please support the statements if possible.

Discuss more extensively the differences between the group and possible impact on the results (i.e. age differences, anesthetic doses).

Further commented

Competing Interests: No competing interests

The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com

F1000Research